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Implications of Late Pleistocene Climatic Change on the Morphological Variations of the Neanderthal

Dawn Marie Bradley

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by

DAWN M. BRADLEY

Under the direction of Beth A. Christensen

ABSTRACT

In this research, the relationship of climatic changes between 130ka to 28ka BP to concurrent morphological variations in Neanderthals was tested. Traditional anthropological studies attribute robust Neanderthal morphological traits as an adaptation to a cold environment. A database of previously completed terrestrial paleoclimatic reconstructions in Europe and the Mediterranean was compiled to create a series of GIS-generated time-slice maps. Regional paleoclimatic conditions were then related to changes in Neanderthal appearances, morphology and disappearances as evident in the archaeological record. Existing studies were compiled from two regions: Europe and the Mediterranean. The European data are based on pollen assemblages from terrestrial lacustrine cores. The Mediterranean data are based on established $\delta^{18}O$ and $\delta^{13}C$ events recorded in speleothems. The GIS perspective allows climatic changes to be viewed at significant time-slices with known Neanderthal morphological variation and to extend the investigation both temporally, including Stage 4 and Stage 5e, and geographically, into the Mediterranean from similarly completed studies.

INDEX WORDS: Neanderthal morphology, Pleistocene, European paleoclimate, Mediterranean Paleoclimate, Paleopalyogeny, Speleothems, GIS

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LIST OF ABBREVIATIONS

Ab-	*Abies*
Aln-	*Alnus*
Ar-	*Artemisia*
Bet-	*Betula*
Bra-	Brassaceae
Bu-	*Buxus*
Car-	*Carpinus*
Cary-	Caryophyllaceae
Chen-	Chenopodiaceae
CMF1-	cool mixed forest
CMF2-	cold mixed forest
Com-	Compositae
Cor-	*Corylu*s
Cy-	Cyperaceae
DSS-	desert: shrubland and steppe
DTMF-	deciduous taiga/montane forest
ETMF-	evergreen taiga/montane forest
Fa-	*Fagus*
Fra-	*Fraxinus*
HD-	hot desert
Hed-	*Hedera*
Heli-	*Helianthemum*
Hip-	*Hippophae*
Jun-	*Juniperus*
Lar-	*Larix*
MIS-	Marine Isotope Stage
Ost-	*Ostrya*
PFT-	Plant Functional Type
Pic-	*Picea*
Pin-	*Pinus*
Pi-	*Pistachia*
Po-	Poaceae
Qu-	*Quercus* (deciduous)
Qu-i	*Quercus-ilex*
Ro-	Roaseae
Tax-	*Taxus*
TCF-	temperate coniferous forest
TDF-	temperate deciduous and temperate woodland
TG-	temperate grassland
Tha-	*Thalictrum*
Til-	*Tilia*
STDT-	shrub tundra/dwarf-shrub tundra/protrate shrub tundra
STWS-	steppe tundra/warm steppe
Ulm-	*Ulmus*
WMF-	warm mixed forest

CHAPTER1: INTRODUCTION

1.1 Objective

The objective of this study is to document regional climatic variations between 128k to 25Ka BP with respect to concurrent Neanderthal morphological variations. The results show how climatic fluctuations as gauged through winter temperature averages have influenced changes in Neanderthal type-morphology. To complete the comparison, a series of GIS-generated time-slice maps were constructed using existing paleoclimatic studies from Europe and the Mediterranean.

1.2 Neanderthal (*Homo sapiens neanderthalensis* or *Homo neanderthalensis*)

1.2.1 Definition

Neanderthals have been defined as an extinct human species (*Homo neanderthalensis*) or subspecies (*Homo sapiens neanderthalensis*), which existed in the late Pleistocene, disappearing from the fossil record prior to the Last Glacial Maximum. Neanderthals are associated strongly with the Mousterian culture, a complex derivative of tools and tool making techniques (Poirier and McKee, 1999). Neanderthals are also thought to be the earliest species associated with deliberate burial practices (Poirier and McKee, 1999).

Table 1.1
Morphological Properties of Classic and Progressive type Neanderthal

	Classic Neanderthal	Progressive Neanderthal
Cranial Morphology	Cranial Capacity of 1524-1640cc for males; 1270-1425cc for females	Cranial Capacity of 1524-1640cc for male 1270-1425cc for females; 1 male specimen with ~1700cc capacity.
	Low skull with flat crown	High crown in some MidEast forms
	Occipital Bun (chignon)	Lack of occipital bun in most
	Mid-facial (maxillary) prognathism	Large jaws with less moderate prognathism
	Large nasal aperture	Large nasal aperture
	Anterior dentition larger than modern *H. sapiens*	Anterior dentition larger than modern *H. sapiens*
	Taurodontism	Taurodontism
	No canine diastema	No canine diastema
	Lack of chin	Receding or lack of chin
	Well developed, discontinuous brow ridges	Less distinct brow ridges; some lacking ridges
	Complex middle ear bony labyrinth	Complex middle ear bony labyrinth
Post-cranial Morphology	Over 5 feet tall	Over 5 feet tall, with tallest specimen being ~6' 3"
	Short extremities/appendages relative to trunk size	Short extremities/appendages relative to trunk size
	Thick ribbed with barrel shaped chests	Thick ribbed with barrel shaped chests
	Robust, slightly curved long bones	Less stout, less curvature of long bones
	Feet similar to modern *H. sapiens*	Feet similar to modern *H. sapiens*
	Large, thick kneecaps	Less robust kneecaps
	Broad scapula	Broad scapula
	Broad, long pelvic bone	Broad, long pelvic bone
	Long, projecting spinous process of cervical vertebrae	Long, projecting spinous process of cervical vertebrae
References	*Poirier & McKee, 1999; Jordan, 1999; Trinkaus & Shipman, 1992; Arsuaga, 2001*	

1.2.2 Classic versus Progressive

Neanderthal are subdivided into two "types": the *Classic*, or more robust featured specimen, and the *Progressive*, or more gracile featured specimens. Differences are subtle and usually refer to a difference in size of the features and a lack of the more extreme features, such as the occipital bun, in the Progressive-type (Table 1.1; Figure 1.1).

Traditionally, researchers have linked Classic-type to a harsh cold climate and the Progressive-type Neanderthal to a warmer climate

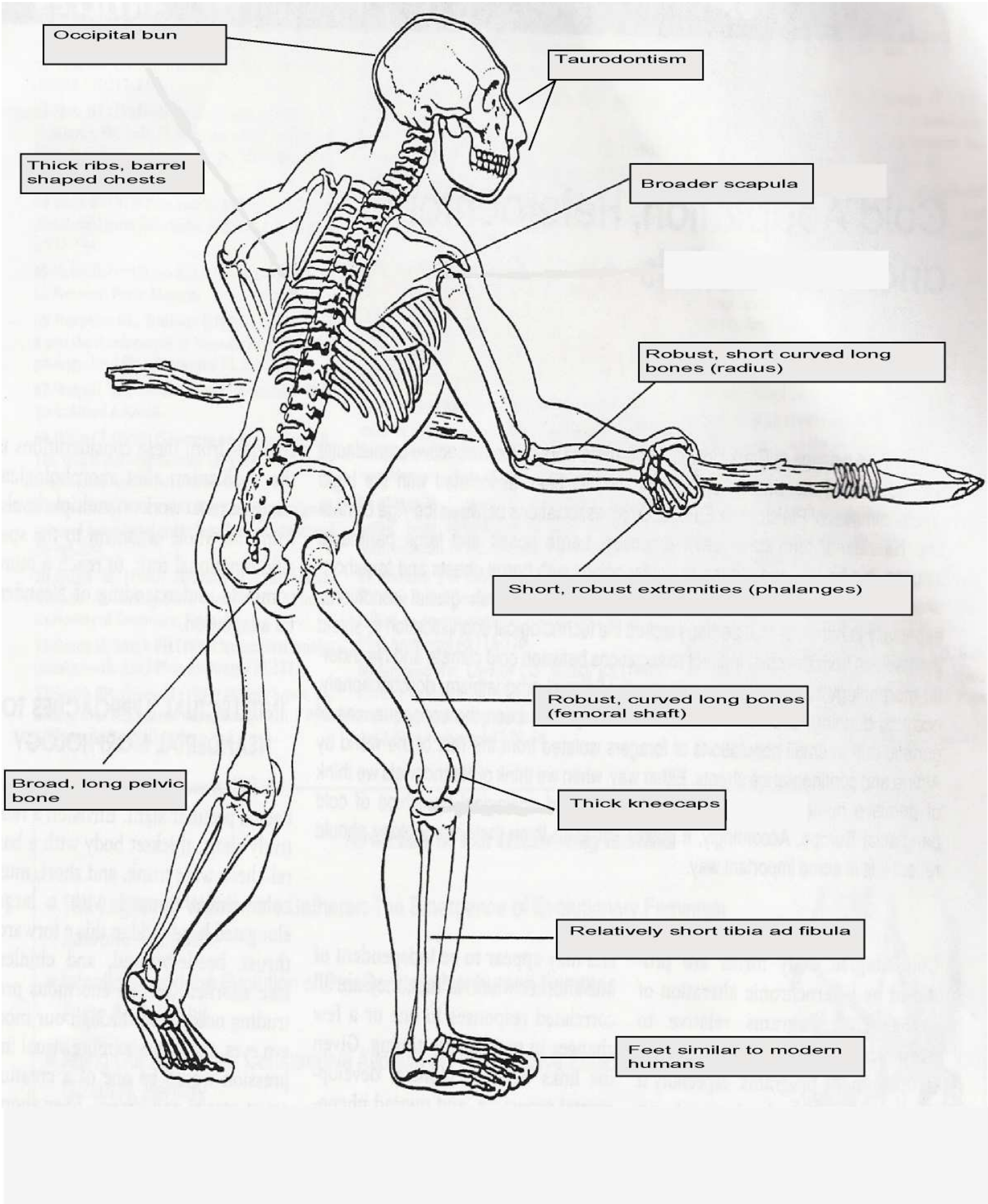


Figure 1.1: Illustration of select Neanderthal features as described in Table 1.1. Skeletal drawing obtained from Churchill, 1998 and modified by D.M. Bradley. Differences between Classic-type and Progressive-type morphological traits are not illustrated.

Figure 1.2: Geographic distribution of Neanderthal skeletal specimens from ~130Ka to 28Ka.

(Jordan, 1999; Poirier and McKee, 1999)

1.2.3 Geographic Location

Definitive evidence of both Neanderthal skeletal remains and Mousterian artifacts has been found through most of Europe into the Middle East as far as Iraq (Figure 1.2). Remains of more than 275 individual specimens have been identified from over 70 sites in Europe and the Mediterranean (Poirier and McKee, 1999). However, some possible Neanderthal or Neanderthal-like morphological traits have been identified as far as Eastern Asia and possible into Northern Africa (Poirier and McKee, 1999).

1.2.4 Time

Temporally, Neanderthals are confined to a range of approximately 130Ka to 28Ka BP (Poirier and McKee, 1999). However, some pre-Neanderthal or Neanderthal-like traits are recognized in the

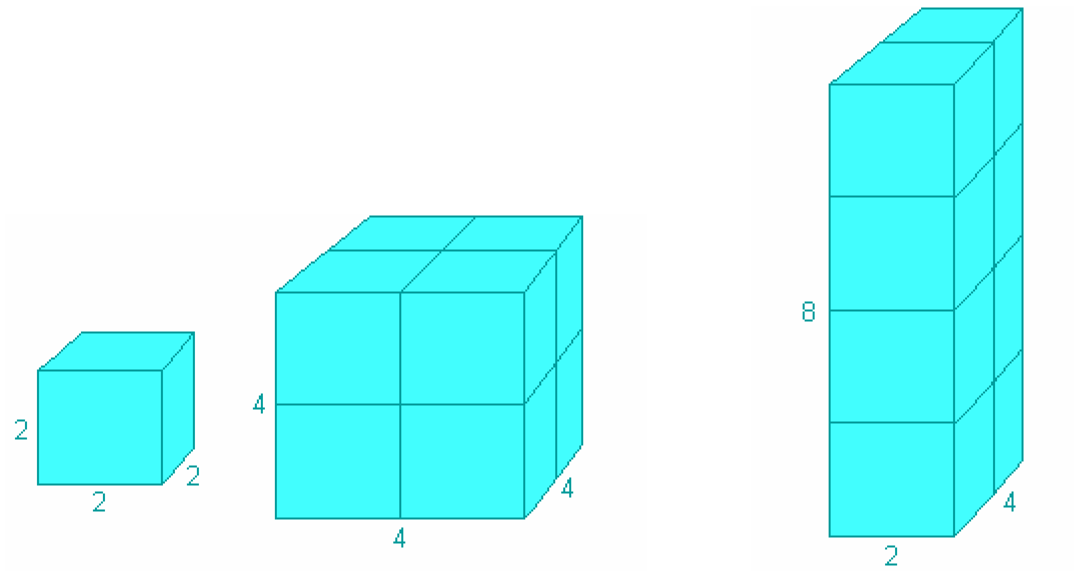
fossil record as far back as 240Ka BP (Poirier and McKee, 1999). Recent finds place Neanderthal existence as late as 27-25Ka BP (Stringer et al., 2003).

1.3 Morphological Link to Paleoclimate

The distinct suite of cranial and post-cranial Neanderthal traits has been explained as adaptations to an extremely cold glacial climate (Poirier & McKee, 1999; Jordan, 1999). The distinction between the robust and gracile Neanderthal traits supports this claim (Ruff, 1991). Cranially, features such as the increased size of facial sinuses are thought to have insulated the face and nasal passages (Kennedy, 1975). The prognathic or forward placement of the nose would distance the incoming cold air from the nasal cavities allowing it to achieve as much warmth and humidity as possible before reaching delicate brain tissue (Stringer and Gamble, 1993). Post-cranially, modern analogs and application of Bergmann's and Allen's rules support a cold climate adaptation.

1.3.1 Bergmann's Rule

In the late 19th century, Carl Bergmann (1847) concluded that the larger the body mass the more heat it produced. He observed that members of a species living in colder climates tend to be larger than their counterparts in warmer climates to counterbalance the temperature variations (Holliday, 1997). Larger animals have smaller surface areas relative to body mass and consequently conserve more heat (Figure1.3). Additionally, increasing body mass increases the amount of metabolizing tissue, therefore increasing internal heat gain (Holliday,1997).



Surface Area = 24
Volume = 8

Surface Area = 96
Volume = 64

Surface = 112
Volume = 64

Figure 1.3: Cubic representation of Bergmann's and Allen's rules. In Bergmann's boxes, a smaller surface area to volume ratio results from increasing the mass (left and center). In Allen's boxes (right and center), increasing length increases the surface area while maintaining volume. Diagrams from O'Neil, 2004.

1.3.2 Allen's Rule

Allen's rule relates limb proportion to thermoregulatory function (Stewart, 2005). Joel Allen (1877) proposed that environmental temperature determined not only body mass but the size of the body appendages. According to this rule, the size of an appendage affects the amount of heat lost. Longer appendages release heat due to a greater surface area to volume ratio and shorter appendages conserve heat due to a smaller surface area to volume ratio (Figure 1.3). For example, populations of a species living near the equator tend to have longer protruding body parts (i.e. legs) than do populations of the same species farther away from the equator (Holliday, 1997).

In combining Bergmann's and Allen's rules, a thin body frame with relatively long appendages is less compact and subsequently has more surface area per body mass, increasing the amount of heat lost (Holliday, 1997). Accordingly, this body type would be found in hot, dry climates. Likewise, a stocky body frame with shorter appendages, like those of the Artic Inuits, would be found in cold climates (Stringer and Gamble, 1993; O'Neil, 2004). The Inuits benefit from a reduced surface area and short appendages that keep heat in (Stringer and Gamble, 1993; O'Neil, 2004).

1.3.3 Application of rules to Neanderthal Post-Cranial Morphology

Neanderthals had large, barrel-shaped chests, very wide trunks and relatively short hand-limb (crural) and fore-limb (brachial) indices, much like modern Inuits (Stringer and Gamble, 1993; Holliday, 1997; Stewart, 2005). To apply Bergmann's and Allen's rules to Neanderthal features, Ruff (1991) employed a cylindrical representation of surface area to volume comparison, with the breadth of the iliac (pelvic) bone equaling the diameter of the cylinder. In doing so, the lateral surface area to volume ratio would not change as stature increases or decreases (Pearson, 2000).

With this model, cold climate morphological implications on Neanderthal robusticity could be made using the two rules for support. Ruff (1991) completed a study comparing a Neanderthal specimen from Israel (Kebara 2) to fossil African hominids, as well as modern African and European specimens. He found that the Neanderthal pelvis was

absolutely wider than any of the fossil African hominids of the same time frame or the modern European and African specimens he sampled (Table 1.2).

1.3.4 Alternative Theories

Bergmann and Allen's rules are not unequivocally an explanation for Neanderthal morphology. As part of the Stage 3 Project, Aiello and Wheeler (2003) concluded that the Neanderthal form would only provide a modest advantage (1^{o}C) over anatomically modern humans in their lower critical and minimum sustainable temperatures, even with the insulating effect of increased muscle mass and an elevated dietary energy intake. In the same project, van Andel et al. (2003) correlated assumed warm and cold phase time-slices between 74-25Ka BP and the location of Neanderthal sites in Europe during those time-slices. They could not draw any definitive conclusions concerning a link between climatic change and Neanderthal migratory patterns.

A cold climate adaptation is not the only explanation for Neanderthal morphological traits. Stewart et al. (2005) proposed that the

Table 1.2
Comparison of pelvic size of Neanderthal specimen circa 60ka BP from Israel to modern European, fossil African and modern African specimen. Note Neanderthal larger bi-iliac (pelvic) breadth but shorter stature (height). Table reconstructed from Ruff, 1991.

Specimen	*Bi-iliac Breadth (cm)*	*Bi-iliac Stature (cm)*	*Height (cm)*
Kebara 2 (Neanderthal)	31.8	0.241	107
Fossil African (KNM-WT)	23.0	0.144	160
Modern African	23.1 – 26.3	0.148 – 0.174	137 – 175
Modern European	27.4 – 29.8	0.160 – 0.188	156 – 176

short distal limbs (legs) are a product of loccomotory demands rather than thermoregulatory ones. The large facial features could be attributed to heavy chewing pressure or the use of the jaws as tools (Mellars, 1998). Yet while evidence against a strict cold-adapted morphology continues to grow, it traditionally remains the dominant theory (Weaver, 2003).

1.4 Climate

1.4.1 Present Climate

The present climate of the study area is best defined using the Koeppen classification scheme (Figure 1.4). This classification method is empirically based on observed temperatures and precipitation amounts (Ritter, 2003; Strahler and Strahler, 1984). Climatic types are first broken down into five main classes (A-Tropical, B-Dry, C- Temperate, D- Cold and E- Polar) with each class being further subdivided by other factors

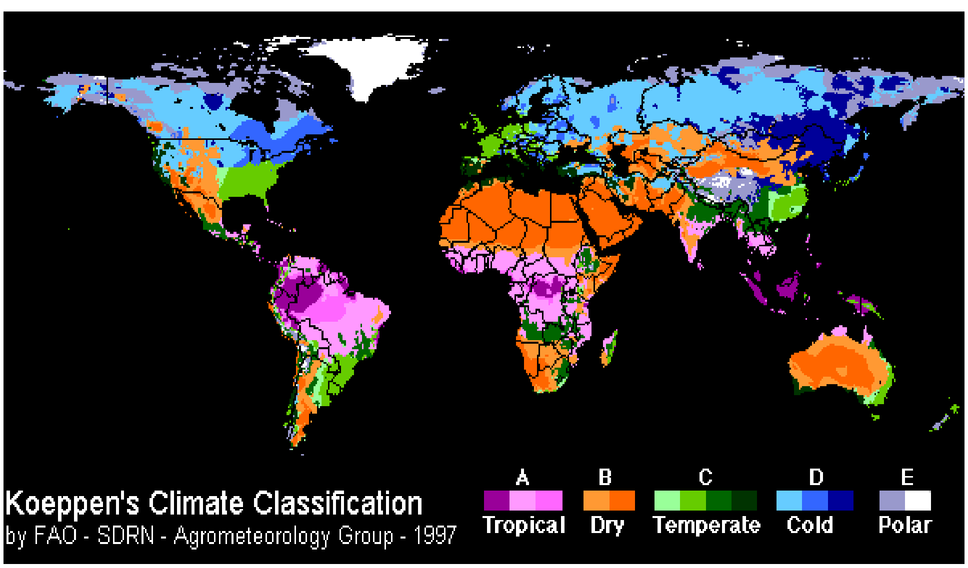


Figure 1.4: Biomes of the world based on Koeppen's Climate Classification. Image obtained from Ritter (2003)

(Ritter, 2003). Koeppen-defined biomes related to the study can be viewed in Table 1.3.

The Iberian Peninsula (Spain, Portugal and Andorra) and areas along the Mediterranean coast are dominated by a temperate dry climate (referred to as Sclerophyll (Cs) or Mediterranean climate). By definition, the area experiences moderate temperatures but lacks precipitation in the winter (Lydolph, 1985).

The majority of western or peninsular Europe (France, Belgium, most of Germany and Italy and parts of Austria and Hungary) falls into a temperate moist, oceanic category (Ritter, 2003). This climate is characterized by consistent light precipitation and temperature variations resulting in four distinct seasons (Lydolph, 1985).

Moving eastward, a temperate continental or grassland climate becomes dominant (Lydolph, 1985). This climatic type extends through most of continental Europe, which includes Poland, Slovakia, eastern Slovenia, Romania, most of Ukraine and parts of Hungary, Austria and Turkey. These regions experience cool summers and moderate to meager rainfall amounts (Lydolph, 1985). The grassland climate is dominated by grass/forb* vegetation.

A dry, desert climate dominates in Israel, Iran and Iraq, as well as parts of Syria and Turkey. While the area bordering the Mediterranean and Black Sea receive moderate rainfall amounts, the inland areas are

*Forb is a broadleaved herb other than grass, especially one growing in a field, prairie or meadow.

Table 1.3 Current biomes found in the European and Mediterranean region and their properties. Biomes given as name/abbreviation from the Koeppen climate classification system. From Strahler and Strahler, 1984.

Biome (Koeppen)	*Region*	*Average Temperatures*	*Vegetation:*	*Other:*
Alpine (Highland) (H)	Alps	-12^{o}C to 10^{o}C summer	tussock grasses, dwarf trees,	cold and dry
Temperate Forest (Cf)	NW into France/Germany NE Europe south into Romania	70^{o}C summer average <0^{o}C winter	varies	4 distinct seasons
Grassland (Bs)	East Ukraine/Hungary Parts of Turkey, Iran, Iraq	38^{o}C summer -40^{o}C winter	perennial grasses/forbs	temperate steppes in study region
Sclerophyll (Cs)	Iberian peninsula Coastal Mediterranean areas	10^{o}C summer 40^{o}C winter	shrubs/low growing	aka Mediterranean climate long dry period in summer
Desert (BWh)	Israel, Iran, Iraq	>18^{o}C annually	little vegetation (low shrubs/ ; woody trees); Cacti	15-26cm rainfall annually

*Tussock- clump or tuft
**Forb is any broad-leaved herb other than grass, especially one growing in a field, prairie or meadow.

dry. All areas experience large temperature extremes (Lydolph, 1985).

1.4.2 Paleoclimate during the Neanderthal time

The Pleistocene period is characterized by a succession of glacial and interglacial intervals, described as oxygen isotope or marine isotope stages. The oxygen isotope stages are based on the fluctuation of the $^{18}O/^{16}O$ ratios as reconstructed from marine core samples and related to the glacial advances and retreats over time (Mager and Fitzsimmons, 2002). Oscillations of warm interstadial and colder stadial events often occurred within each marine isotope stage (van Andel, 2003a; Meese et al., 1997). The Greenland ice cores have become the chronological standards of European climate (van Andel, 2003a). In this study, the GRIP core is used to establish dates for each stage (Figure 1.5).

The Neanderthal existed in the late Pleistocene, their appearance corresponding with the transition from a glacial stage (MIS 6) to the last interglacial (MIS 5e) (Jordan, 1999; Poirier and McKee, 1999). Evidence of Neanderthal disappears from the fossil record near the end of MIS 3, before the beginning of the last glacial maximum period (Jordan, 1999; Poirier and McKee, 1999).

This study begins at the transition into MIS 5, an interglacial period broken into five substages (a through e) (Klotz et al., 2004). MIS 5e, commonly called the Eemian in Europe, is the closest analogue to current Holocene climatic conditions in terms of homogenous vegetation types and temperature reconstructions and a major global sea level high

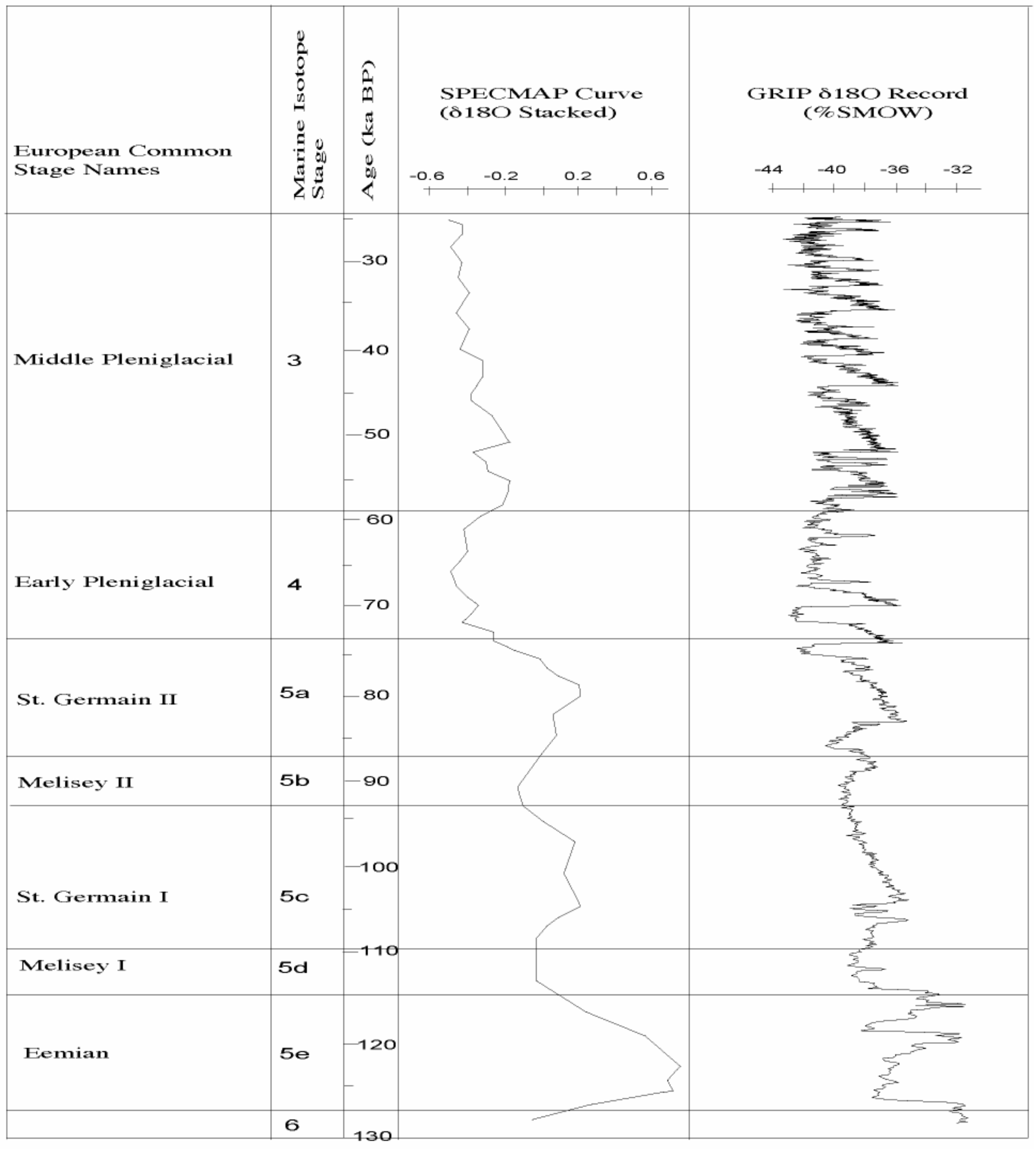


Figure 1.5: Climatic record for the late Pleistocene period as seen in both the SPECMAP $\delta^{18}O$ (stacked) curve and the $\delta^{18}O$ record GRIP ice core. Correlations to both marine isotope stages (second column from left) and common European climatic stage names (far left) are given. Ages are based GRIP record as seen in Klotz et al., 2004. Note high frequency changes even in presumed warm or cold events in GRIP record. GRIP curve created using data from the Greenland Summit Ice Cores CD-ROM. 1997; SPECMAP created using data from Imbrie et al., 1990

event (Guitar et al.,2003; Cheddadi et al., 1998). This substage has a characteristic interglacial vegetation succession recognized in almost all European pollen diagrams (van Andel and Tzedakis, 1996; Tzedakis and Bennett, 1995; Anklin et al., 1993). The end of this interglacial occurred as a slow climatic cooling as evident in subsequent substages (Anderson et al., 2004). Both MIS 5c and 5a (St Germain I and II respectively) are temperate interstadial periods with warm, frost-free winters, though not quite to the extent as MIS5e (van Andel and Tzedakis, 1996). The three warm episodes of 5e (128-115Ka), 5c (110-93Ka) and 5a (86-74Ka) are separated by two cold stadials- MIS 5d or Melisey I (115-110Ka) and MIS 5b or Melisey II (93-86Ka).

The last interval of glaciation, called the Weichselian Pleniglacial in Europe, began with MIS 4, approximately 74-59Ka BP (Klotz, 2004; Huijzer and Vandenberghe, 1998; Broeker, 1995). This stage is commonly referred to as the Early Pleniglacial and is considered a stadial event culminating with a large increase in global ice volume (Huijzer and Vandenberghe, 1998; van Andel and Tzedakis, 1996). This first peak of glaciation was short lived and most likely failed to reach the southern and western shores of the Baltic Sea nor was ice predicted to have capped the Alps or Pyrenees mountains (van Andel, 2003a).

The Middle Pleniglacial corresponds to MIS 3, approximately 59 to 24Ka BP (Klotz, 2004). Reconstructed temperatures indicate conditions oscillated greatly in terms of reconstructed temperature

averages and can be generalized as two warm events separated by one cold event (Alfano et al., 2003; Guiter et al., 2003). Within these fluctuations, the climate continued to deteriorate, until a cold phase comparable to the last glacial maximum occurred around 37Ka BP (Barron et al., 2003).

In reality, the Greenland ice core records show a number of sharp, short-lived oscillations between warmer and colder conditions extending through MIS3 back to late MIS5a (Figure 1.5). Twenty-one such events are recognized by low $\delta^{18}O$ values and referred to as Dangaard-Oeschger events (Huntley and Allen, 2003; Broeker, 1995; Dansgaard et al., 1993).

CHAPTER 2: METHODS

2.1 Paleoclimatic Data

2.1.1 Biome Reconstruction from established pollen diagrams

In order to establish climatic variations during the Neanderthal time frame, biomes were reconstructed using established pollen diagrams from previously studied terrestrial lacustrine cores. Biomes are characteristically defined by their bioclimatic limits including cold and warm month temperature extremes and minimum precipitation amounts (Seppa et al., 2004; Huntley and Allen, 2003). By defining the biomes, temperature changes of specific time-slices are approximated and related to Neanderthal type-morphological traits and migration patterns based on location of Neanderthal sites.

2.1.1.1 Pollen Assemblages

Fossil pollen data assembled from terrestrial lacustrine cores across Europe was gathered through literary review (Figure 2.1). While many of the cores in Western Europe are continuous from 128Ka to 25Ka, most of the cores in Eastern Europe only spanned a relatively short amount of time (Table 2.1). This made a complete biome reconstruction of the entire study area difficult. A few short pollen data assemblages were available and used to complete the most accurate picture as possible across the study area.

A major problem in using the previously established fossil pollen data sets was the uncertainty with respect to chronology. Radiocarbon dates were

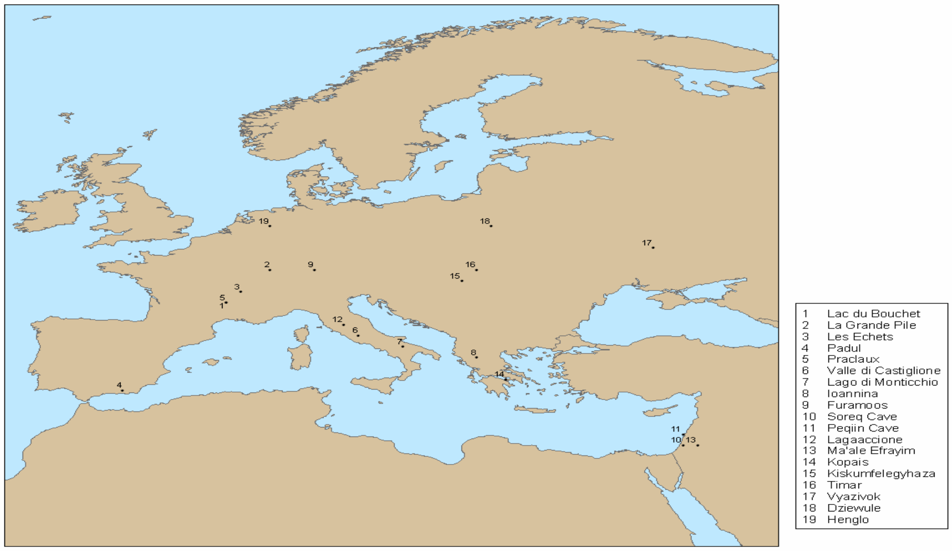


Figure 2.1: Site localities from which biomes were reconstructed and the three East Mediterranean speleothem cave sites. Map created using references in Table 2.1.

available for a few cores, but these dates are only reliable up to 50Ka at best (Prothero and Dott, 2004; Huntley and Allen, 2003; Rapp and Hill, 1998). Basic chronology had been established in the literature for all cores through stratigraphic correlation to marine cores or other established terrestrial cores (Turner, 2002; Kukla et al., 2002; Allen and Huntley, 2000; Cheddadi et al., 1998; Pons et al., 1989). Often the pollen assemblages were broken into pollen zones. These pollen zones were then associated with an established marine oxygen isotope stage.

To solve the issue of chronology in this study, the pollen assemblages were grouped according to their original recognized correlation to a marine isotope stage (MIS) as assigned in the previously established study. Then, each pollen zone was designated as occurring either “early,” “mid,” or “late” in each marine isotope stage. The placement of a pollen zone into a time-slice

Table 2.1: Sites from which data were compiled, their geographical location, ages of pollen reconstruction within core as applicable to study, proxy used for paleoclimatic reconstruction and source from which data was obtained.

Site Name	Country	Longitude	Latitude	Age span	Proxy	Source
La Grande Pile	France	06^o 30'E	47^o 44'N	128-25Ka	Pollen	Beaulieu & Reille, 1992; Woillard, 1978; Woillard & Mook, 1982
Les Echets	France	04^o 56'E	45^o 54'N	128-25Ka	Pollen	Reille & Beaulieu, 1990; Beaulieu & Reille, 1989; Beaulieu & Reille, 1984
Lac du Bouchet	France	03^o 47'E	44^o 55'N	128-25Ka	Pollen	Reille & Beaulieu, 1990; Reille et al., 1997
Padul	Spain	03^o 04'W	37^o 00'N	110-34Ka; 29-25Ka	Pollen	Pons & Reille, 1988
Furamoos	Germany	09^o 53'E	47^o 59'N	128-40Ka	Pollen	Muller et al., 2003
Dziewule	Poland	22^{o}23' 60E	52^{o}2'60'N	128-90Ka	Pollen	Binka & Nitychoruk, 2003
Lago Grande di Monticchio	Italy	15^o 36'E	40^o 57'N	~110-25Ka	Pollen	Allen et al., 2000; Brauer et al., 2000
Lago di Bolsena (Lagaccione)	Italy	11^o 49'E	42^o 34'N	110-25Ka	Pollen	Magri, 1999; Narcisi, 1999
Kopais	Greece	23^o 08'E	38^o 27'N	128-29Ka	Pollen	Okuda et al., 2001; Tzedakis, 1999
Ioannina	Greece	20^o 51'E	39^o 40'N	128-110Ka	Pollen	Tzedakis et al., 2003
Timar	Hungary	21^o 28'E	48^{o}10'N	110-90Ka	Pollen	Jarai-Komlodi, 1991
Kiskumfelegyhaza	Hungary	19^o 51'E	46^o 42'N	110-73Ka	Pollen	Jarai-Komlodi, 1991
Vyazivok	Ukraine	32^o 55'E	49^o 57'N	115-40Ka	Pollen	Rousseau et al., 2001; Frechen et al, 1999: Musson & Wintle, 1994
Hengelo	Netherlands	06^{o}47'60E	52^{o}16'40"N	34-25Ka	Pollen	Ran, T.H. et al., 1990
Soreq Cave	Israel	35^{o}05' E	31^{o}45'N	128-25Ka	Speleothem	Bar-Matthews et al., 2003b
Peqiin Cave	Israel	35^{o}19'E	32^o 58'N	128-29Ka	Speleothem	Bar-Matthews et al., 2003b
Ma'ale Efrayim	Israel	35^{o}22'E	32^{o}05'N	67-29Ka	Speleothem	Vaks et al., 2003b

depended on 1) the relative age of the pollen zone as assigned in the existing study and 2) the occurrence of the increase or decrease in pollen abundances as shown in the pollen data from the study.

When available, radiocarbon dates were used to aid in assigning a pollen zone into a time-slice. This allowed for establishment of more specific chronological constraints for 50Ka to 25Ka (MIS3) time slices. Recalibration of older radiocarbon dates was necessary as discussed in a later section. This recalibration was done using a standard calibration curve available through the CALPAL program (Davies et al., 2003). Ages of marine isotope stages are based on those established in GRIP ice core as seen in Klotz et al (2004). The end product was the assignment of 21 time-slices:

128-115Ka Early	(MIS5e)	86-74Ka Mid	(MIS5a)
128-115Ka Mid	(MIS5e)	86-74Ka Late	(MIS5a)
128-115Ka Late	(MIS5e)	74-59Ka Early	(MIS4)
115-110Ka Early	(MIS5d)	74-59Ka Mid	(MIS4)
115-110Ka Late	(MIS5d)	74-59Ka Late	(MIS4)
110-93Ka Early	(MIS5c)	59-50Ka	(MIS3)
110-93Ka Mid	(MIS5c)	50-40Ka	(MIS3)
110-93Ka Late	(MIS5c)	40-34Ka	(MIS3)
93-86Ka Early	(MIS5b)	34-29Ka	(MIS3)
93-86Ka Late	(MIS5b)	29-25Ka	(MIS3)
86-74Ka Early	(MIS5a)		

The time-slices are arranged to allow for slight overlap on sequential maps, as precise dates were not available for all paleoclimatic data points. This also allows for some leeway in assigning a percentage value to each taxon in each time slice, as pollen percentages did not necessarily vary at the exact same time for each taxa.

2.1.1.2 Biome Creation (Biomization)

The biomization procedure translates fossil pollen percentages as inferred from pollen data into defined biomes. First, the percentage of a pollen taxon at each paleoclimatic data point for each assigned time-slice is calculated. The percentage of a taxon available from a studies pollen data implies the abundance of a taxon during a specific time-slice. Second, each identified pollen taxon is assigned into a plant functional type (PFT) (Table 2.2). Third, each PFT is assigned into one or more biome categories (Table 2.3). Fourth, pollen percentages obtained from the established pollen data are converted into an affinity index score and added to the total tally for a biome. These affinity scores are then summed for each biome for each time-slice (Prentice et al., 1996, Tarasov et al., 1998; Huntley and Allen, 2003). Finally, a biome is assigned to a data point according to which biome type had the highest total affinity score. The steps below outline the procedure in more detail:

1 Each pollen diagram was examined to determine availability of pollen genera/species available for use (this varied from study to study). The pollen data was then "separated" to fit into the pre-defined time-slices. The percentages of each pollen taxon were averaged to establish a mean pollen percentage for each time-slice. These percentages would be necessary in later steps to determine the affinity index score

2 . Pollen taxa available in the previously documented pollen diagrams were assigned into a PFT group (Huntley and Allen, 2003; Prentice et al., 1996; Tarasov et al., 1998). Assignment to a PFT is dependant on the stature,

Table 2.2: Pollen taxa used in the study and PFT assignment. Based on data from Prentice et al., 1996, Tarasov et al., 1998 and Huntley and Allen, 2003.

Code	PFT	Pollen taxa (used in the study)
bec	boreal evergreen conifer	*Picea*
bec/cbc	boreal evergreen/cold boreal coniferous tree	*Pinus* (*Haploxylon*)
bec/ctc	boreal evergreen/cool-temperate coniferous tree	*Abies*
bs	boreal summer green	*Betula, Larix*
ctc_1	intermediate temperate conifers	*Taxus, Cedrus*
ec	eurythermic conifer	*Juniperus, Pinus (Diploxylon)*
ts	temperate summer green	*Quercus* (deciduous), *Acer, Viscum, Fraxinus (excelsior)*
bs/ts	boreal/temperate summergreen tree/shrub	*Alnus, Salix, Populus*
ts_1	cool-temperate summer green	*Bruckenthalia, Carpinus, Corylus, Fagus, Tilia, Ulmus,*
ts_2	warm-temperate summer green	*Fraxinus(ornus),Ostrya/Carpinus Platanus,* Rhamnaceae, *Zelkova*
wte	warm-temperate broad leaved evergreen	*Quercus-ilex* (evergreen)
wte_1	cool-temperate broad-leaved evergreen	*Buxus, Hedera, Ilex*
wte_2	warm-temperate sclerophyll shrub	*Olea, Pistacia, Cistus*
wgs	warm grass/shrub	Brassicaeae, *Armeria, Hypericum,* Labiatae
cgs	cool grass/shrub	*Hippophae, Rumex*
sf	steppe forb/shrub	*Astragalus/Oxytropis,* Roseaceae, Asteraceae, *Thalictrum, Helianthemum,* Caryophyllaceae Rubiaceae, Umbelliferae
df	desert forb/shrub	*Ephedra*
sf/df	steppe/desert forb/shrub	*Artemisia,* Chenopodiaceae
aa	artic-alpine dwarf shrub	*Salix*
ab	artic, boreal herb	*Rubus chamaemorus*
g	grass	Poaceae
s	sedge	Cyperaceae
h	heath	Ericales, *Calluna*

leaf form, phenology and climatic adaptation of the plant species/genus which produced the pollen (Prentice et al., 1992). These assignments are shown in Table 2.2.

3 Next, a PFT is assigned into a biome or multiple biome towards which it will contribute to the total affinity score (Allen et al., 2000; Prentice et al., 1996). Assignment of a PFT into a biome or biomes is dependant on a number of factors, including the climatic conditions which the pollen taxa defining a PFT

group require for survival. For this, biomes as defined by Huntley and Allen (2003) were used (Table 2.3). Their study encompassed the same area as this study and overlapped in time frame during the MIS3 interval. Additionally, these definitions allow for determination between warm steppe and cool steppe biomes and identify biome types that do not occur in the present but may have occurred in the past (Huntley and Allen, 2003; Tarasov et al., 1998).

4 Affinity index scores were calculated using the percentage of pollen taxa as evident in each pollen diagram for each time-slice. Affinity score was calculated using the equation:

$$A_{ik} = \Sigma_j \delta_{ij} (\{\max[0, (p_{jk}-\theta_j)]\})^{1/2}$$

where A_{ik} is the affinity score of taxon k for biome i; summation is over all taxon j; δ_{ij} is the assignment of taxon j to biome i as defined in Table 2.3 (1 if taxon occurs in biome; 0 if it does not), p_{jk} is the percentage of taxon j at interval k; θ_j is the threshold pollen percentage and the square root function both increases the sensitivity to less abundant taxa and stabilizes variance (Prentice et al., 1996; Overpeck et al., 1985). A universal threshold pollen percentage (θ_j) of 0.5% is the standard accepted for all taxa. This value was established via trial and error by Prentice et al. (1996) and adopted by both Huntley and Allen (2003) and Tarasov et al (1998; 2000). This allowed the best reconstruction by accounting for small percentages in determining biome reconstruction (Prentice et al., 1996). Once an affinity index score had been established for each taxon, it was associated to a specific biome or biomes

Table 2.3: Biomes identified, assigned PFTs and estimated pollen taxon used to identify each biome for this study. PFTs in brackets are restricted to only part of assigned biome. Based on Huntley and Allen, 2003, Prentice et al., 1996, and Tarasov et al., 1998

Biome (abbrev.)	PFT assigned	Pollen taxon used
evergreen taiga/montane forest (ETMF)	[h], bec, bec/cbc, bs, bec/ctc, ec, bs/ts, ab	*Betula, Larix, Pinus, Picea, Alnus, Juniperus, Abies*
cold mixed forest (CMF^1)	[h], bs, ctc_1, bec/ctc, ec, bs/ts, [ts_1]	*Fraxinus (excelsior), [Carpinus, Corylus, Fagus, Tilia, Ulmus], Alnus, Juniperus, Pinus, Abies, Taxus, Betula, Larix*
temperate conifer forest (TCF)	[h], bec, bec/cbc, bs, bec/ctc, ec, bts, bs/ts, [ts_1]	*Carpinus, Corylus, Fagus, Tilia, Ulmus, Alnus, Juniperus, Pinus, Abies, Betula, Larix Picea*
temperate deciduous forest and temperate woodland (TDF)	[h], bs, ctc_1, bec/ctc, ec, bts, bs/ts, ts, ts_1, [ts_2], [wte_1]	*Fraxinus (excelsior & [ornus]), Carpinus, Corylus, Fagus, Tilia, Ulmus,* (Rhamnaceae, *Ostrya), Quercus* (deciduous), *Alnus, Juniperus, Pinus, Abies, Taxus, Betula, Larix,* [*Buxus, Hedera, Ilex*] *Artemisia*, Chenopodiaceae
cool mixed forest (CMF^2)	[h], bec, bec/cbc, bs, bec/ctc, ec bts, bs/ts, ts, ts_1	*Fraxinus (excelsior & ornus), Carpinus, Corylus, Fagus, Tilia, Ulmus, Quercus* (deciduous), *Acer, Viscum, Alnus, Juniperus, Pinus, Abies, Betula, Larix, Picea*
warm mixed forest (WMF)	[h], ec, [bts], bs/ts, ts, ts_1, ts_2, wte wte_1	[*Buxus, Hedera, Ilex*], *Quercus-ilex* (evergreen), *Fraxinus* (*excelsior* & *ornus*), Rhamnaceae, *Ostrya, Carpinus, Corylus, Fagus, Tilia, Ulmus, Quercus* (deciduous) *Alnus, Juniperus, Pinus* (Diploxylon)
temperate sclerophyll woodland/scrub (TSWS)	g, ec, wte, wte_2	*Olea, Pistacia, Quercus-ilex* (evergreen), *Juniperus*
temperate grassland (TG)	cgs, sf, sf/df, g	Compositae, *Thalictrum*, Caryophyllaceae, *Helianthemum*, Roseaceae, *Artemisia*, Chenopodiaceae, Poaceae
steppe tundra/ warm steppe (STWS)	wgs, sf, sf/df, g	Compositae, *Thalictrum*, Caryophyllaceae, *Helianthemum*, Roseaceae, *Artemisia* Chenopodiaceae, Poaceae, Brassicaeae
desert: shrubland and steppe (DSS)	df, sf/df	*Artemisia*, Chenopodiaceae, *Ephedra*
shrub/ dwarf-shrub tundra (SDST)	g, h, s, aa, ab	Poaceae, *Salix*, Cyperaceae

using the PFT as the common factor. A total score was summed for each biome using all possible affinity scores.

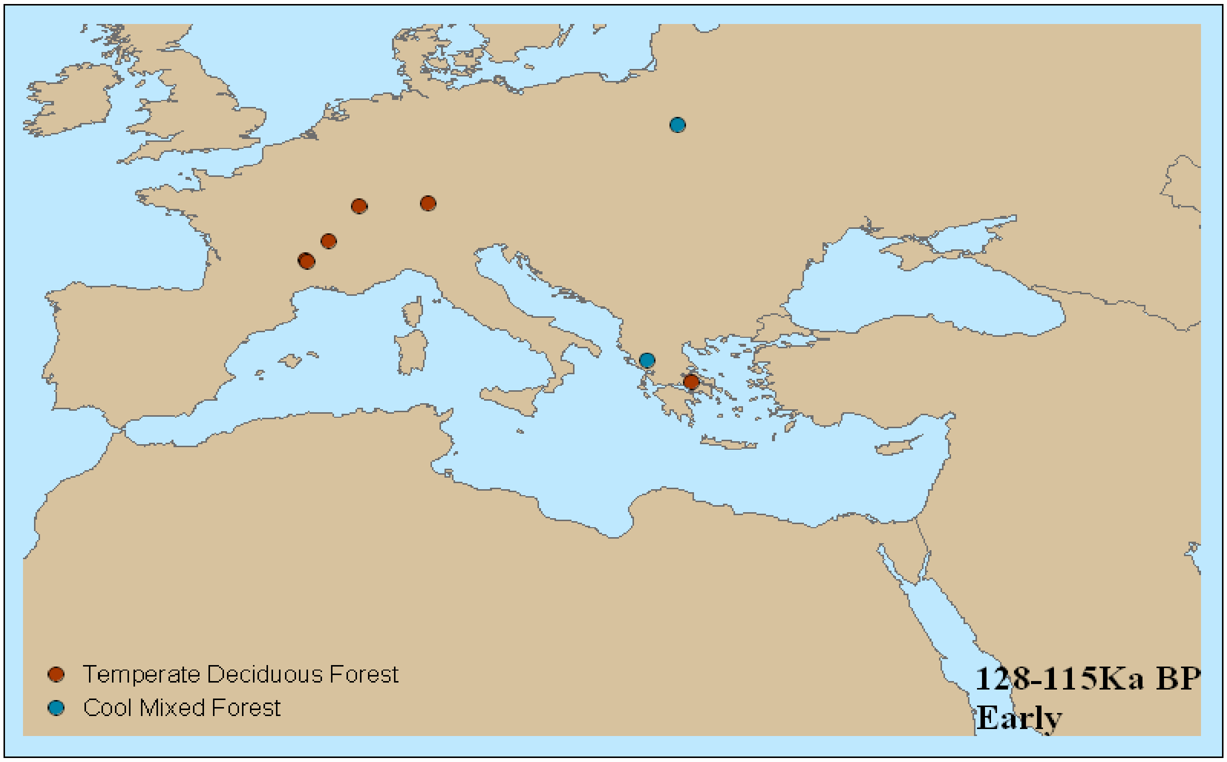
5 The biome with highest total affinity score was assigned to each site in the time-slice. In a case where two biomes have the same high score, the biome that contains the least amount of defining PFTs was assigned (Huntley and Allen, 2003; Tarasov et al., 1998; Prentice et al., 1996).

The above outlined procedure was repeated for the pollen data of each study for each time-slice. To best express the compiled biome data, a series of GIS-generated maps were created. Each map covered one assigned time-slice and expressed the biome reconstructed at each site (Figure 2.2).

The biomes reconstructed are inherently limited in climatic conditions likely to occur by their PFT members. Bioclimatic limits such as maximum/minimum average temperature of the coldest month can be determined for a biome by defining such limits of the PFTs belonging to the biome. Using the bioclimatic limits of Table 2.4, annual average temperatures were established for the biomes recognized in each time-slice.

Table 2.4 Temperature ranges of the coldest month as defined by PFT's bioclimatic limits. (Alfano et al., 2003; Allen et al., 2000; Tarasov et al., 1998; Peyron et al., 1998; Prentice et al, 1996)

Biome (used in this study)	**Minimum T_c (°C)**	**Maximum T_c (°C)**
Evergreen Taiga/Montane Forest (ETMF)	-25	0
Temperate Coniferous Forest (TCF)	-15	-2
Temperate Deciduous Forest (TDF)	0	5
Cool Mixed Forest (CMF2)	-15	-2
Steppe Tundra/Warm Steppe (STWS)	-3	15
Temperate Grassland (TG)		15
Shrub Tundra/Dwarf-Shrub Tundra (SDST)		5



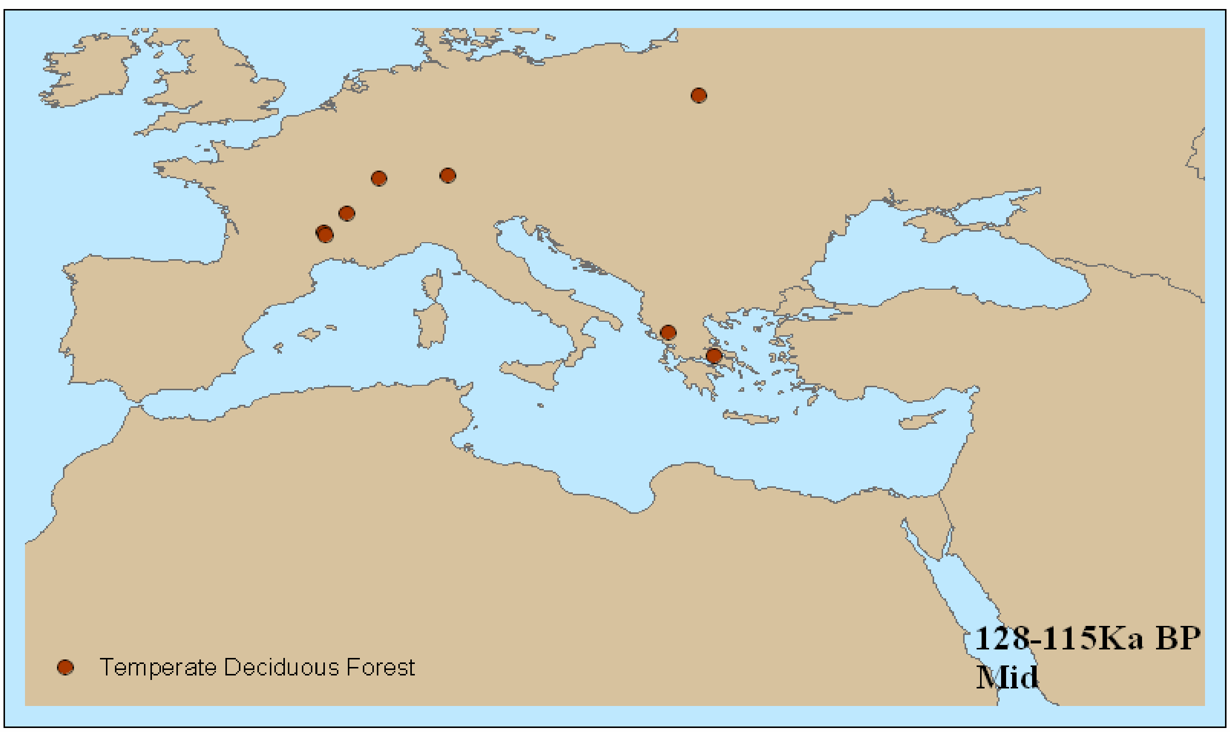


Figure 2.2.: Biome reconstruction from MIS 5e: Early (top) and Mid (bottom) 128-115Ka BP time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

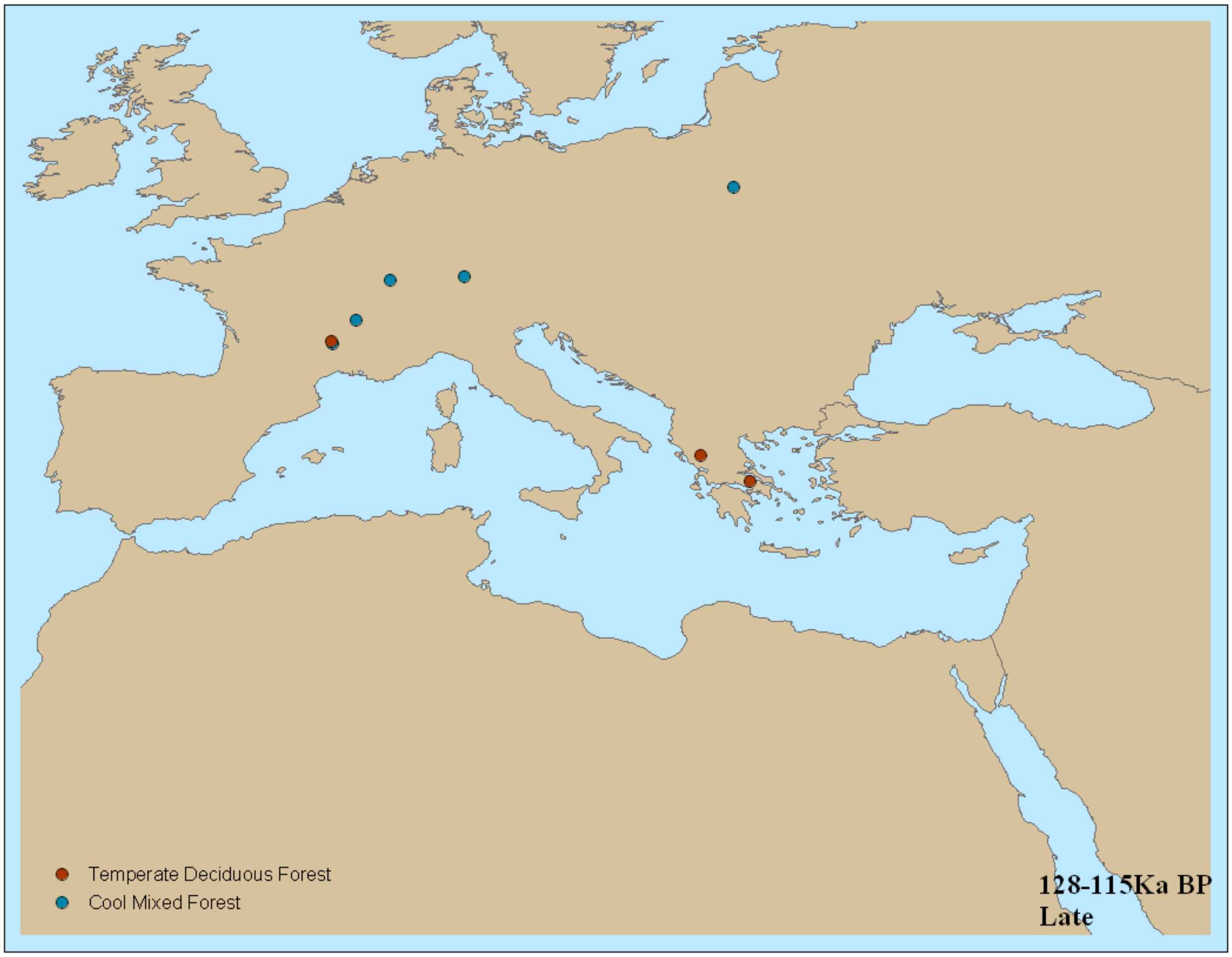
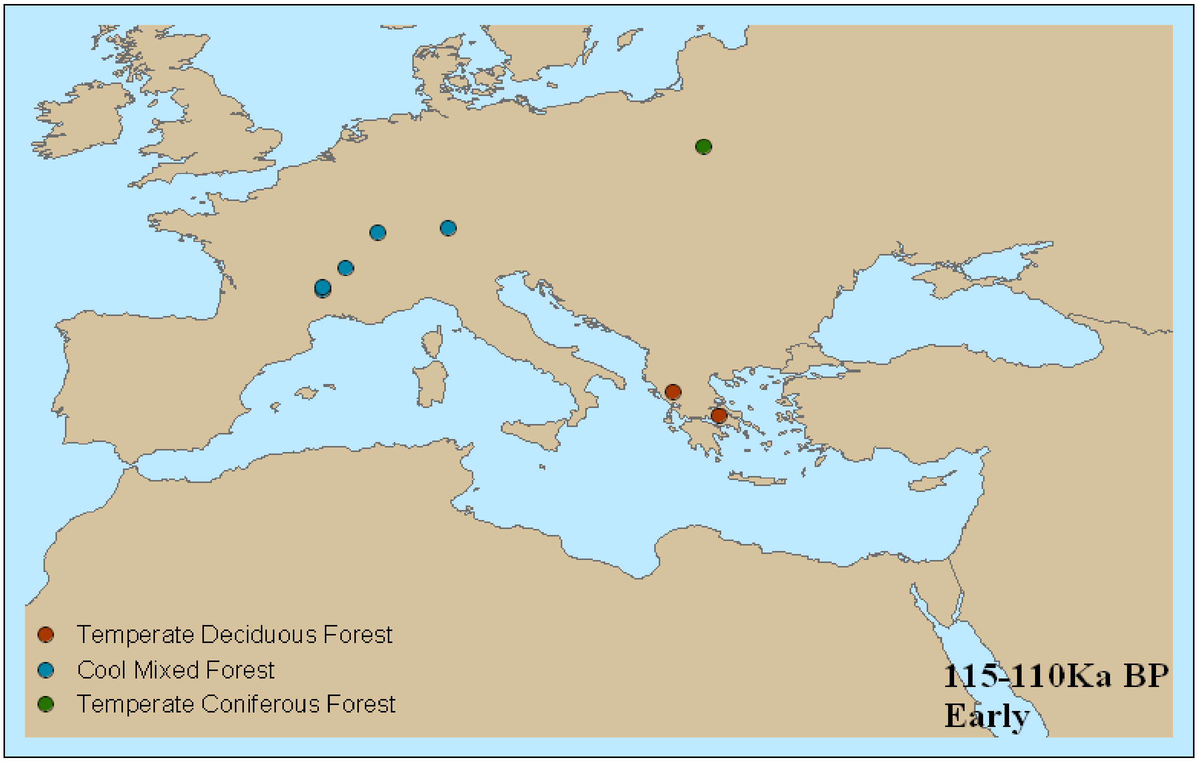


Figure 2.2 continued: Biome reconstruction from MIS 5e: Late128-115Ka BP time-slice. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points



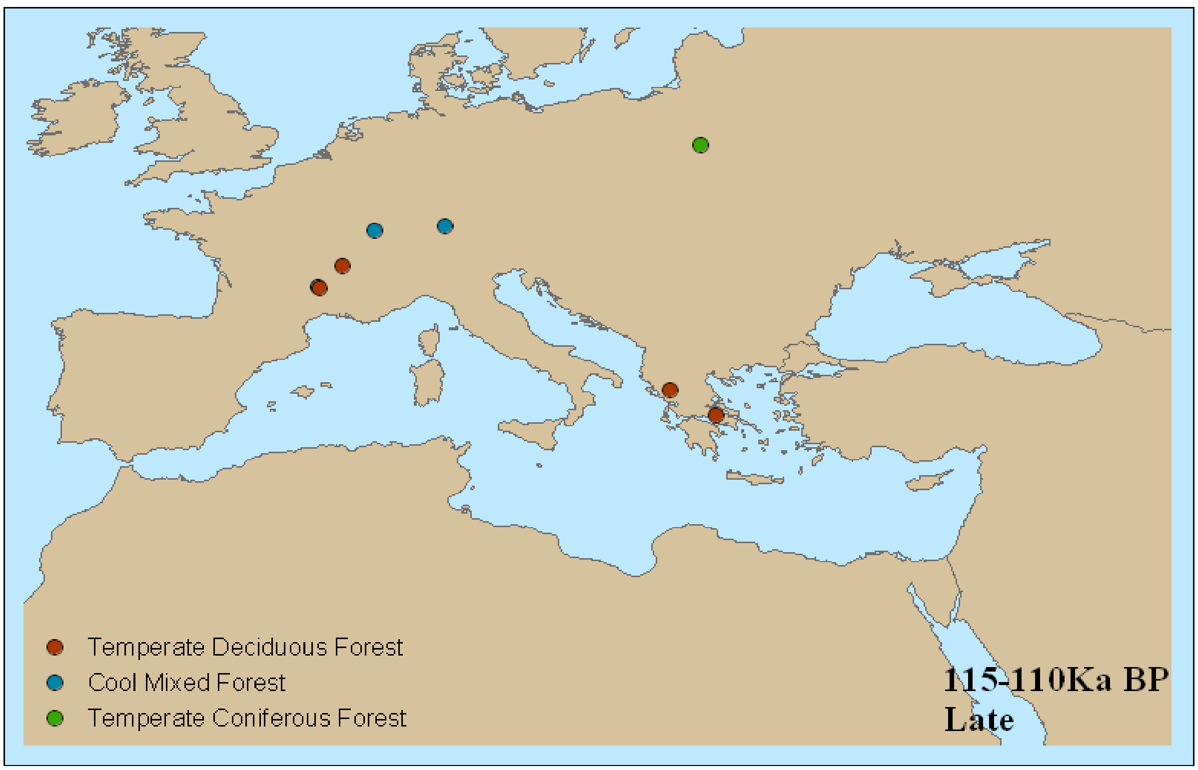


Figure 2.2 continued: Biome reconstruction from MIS 5d: Early (top) and Late (bottom) 115-110Ka BP time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

Figure 2.2 continued: Biome reconstruction from MIS 5c: Early (top) and Mid (bottom) 110-93Ka BP time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points

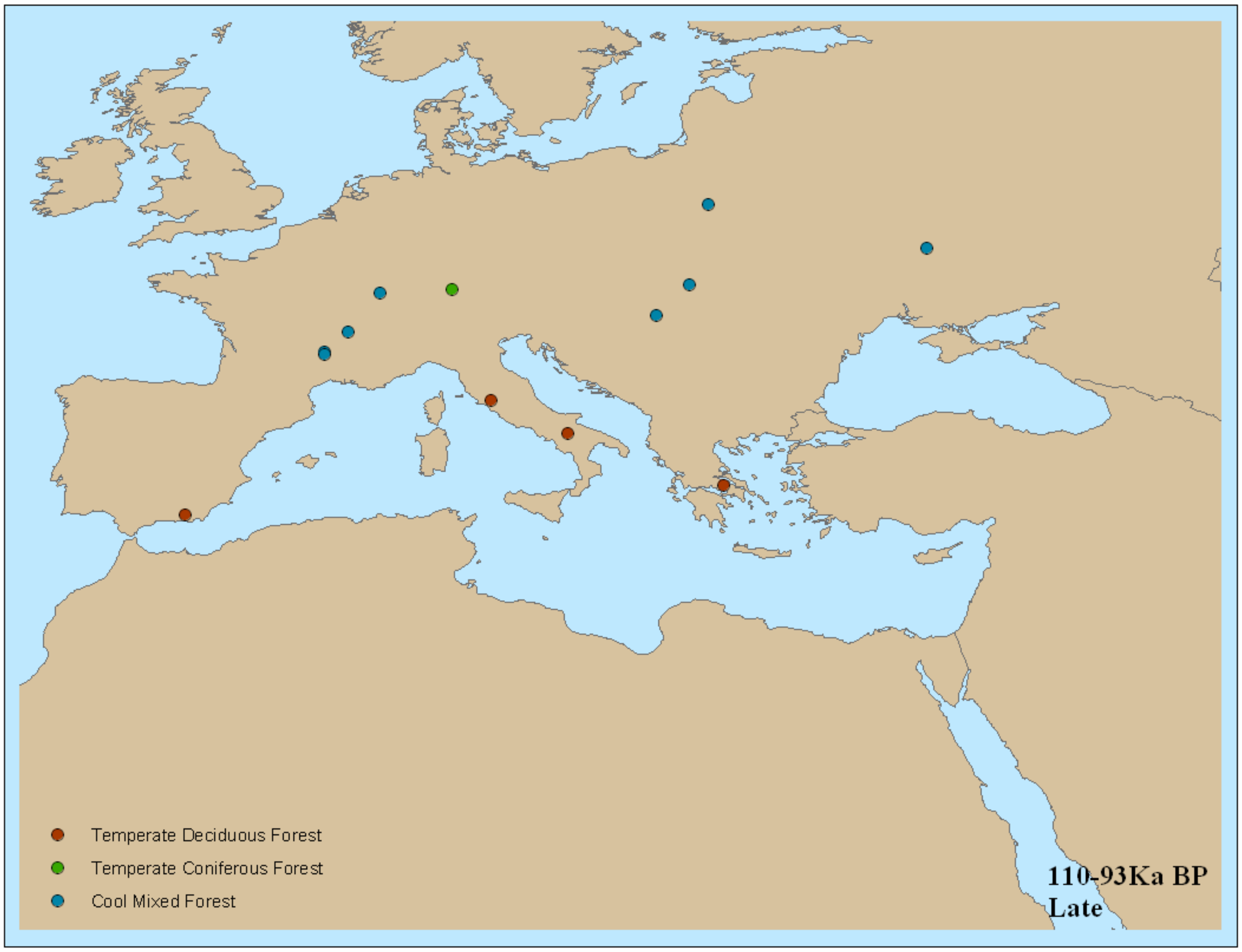
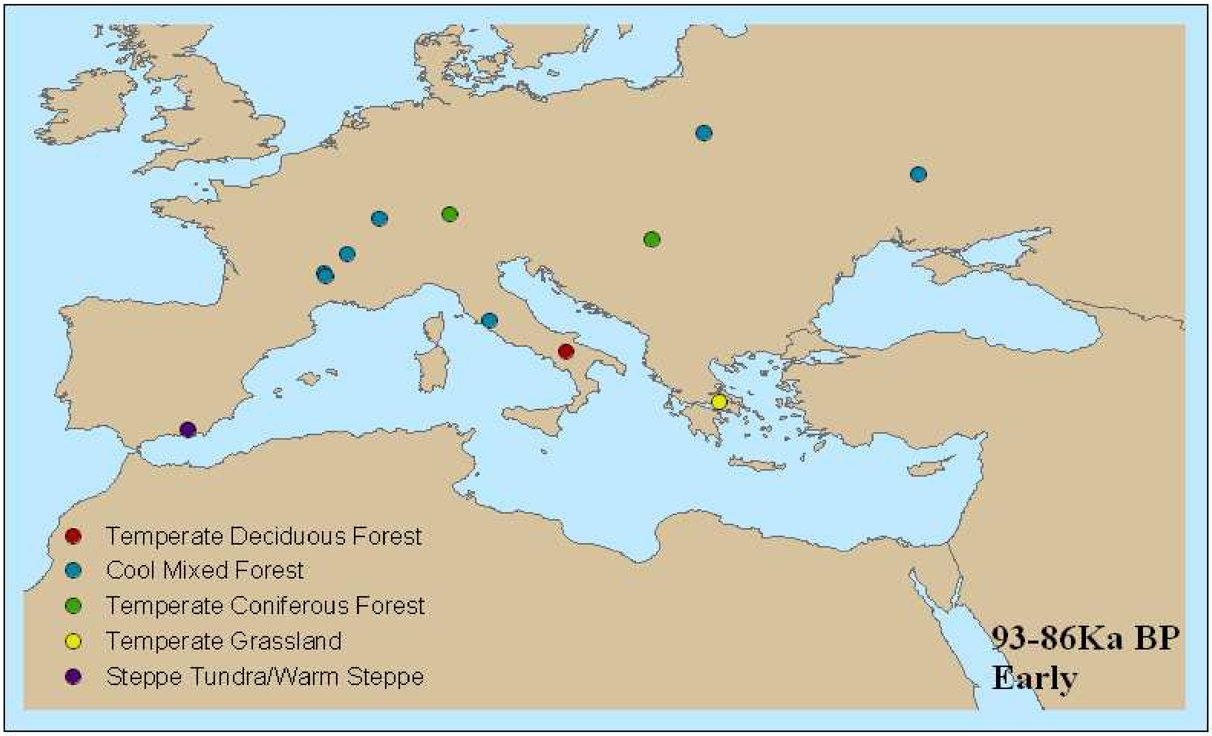


Figure 2.2 continued: Biome reconstruction from MIS 5cLate 110-93Ka BP time-slice. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.



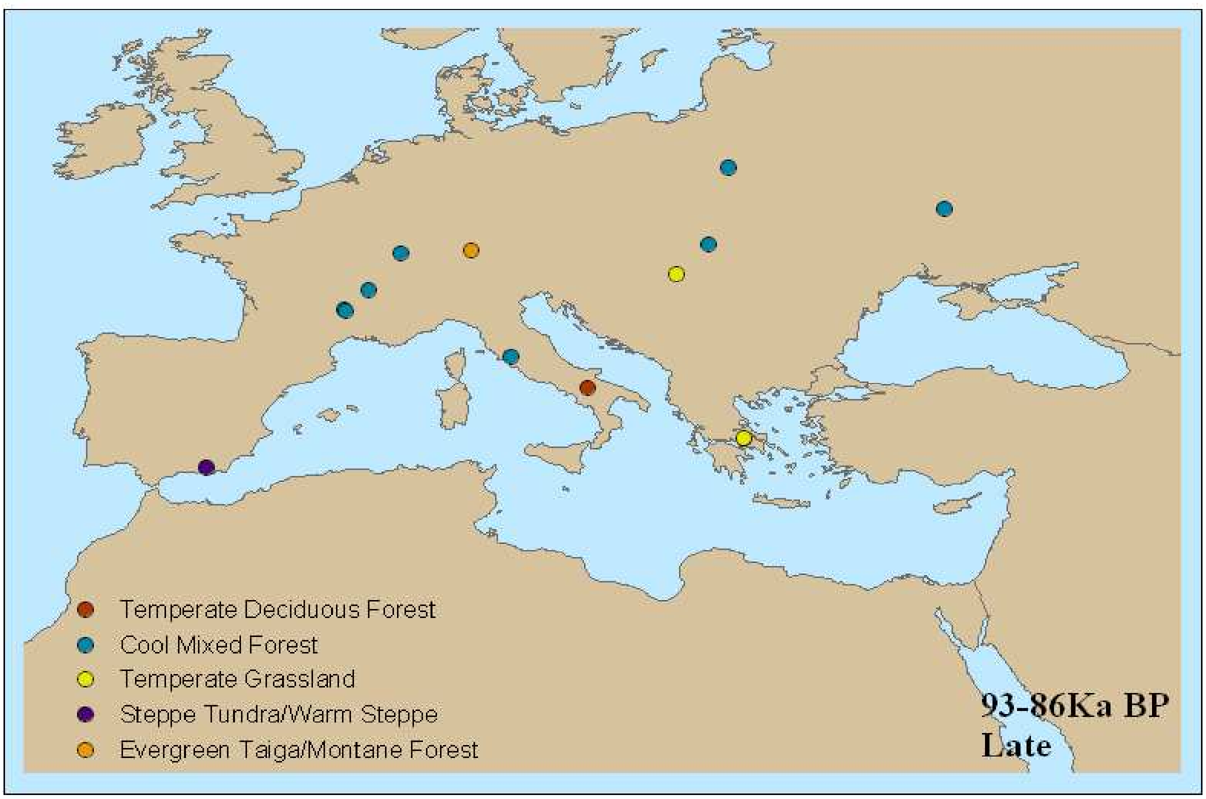
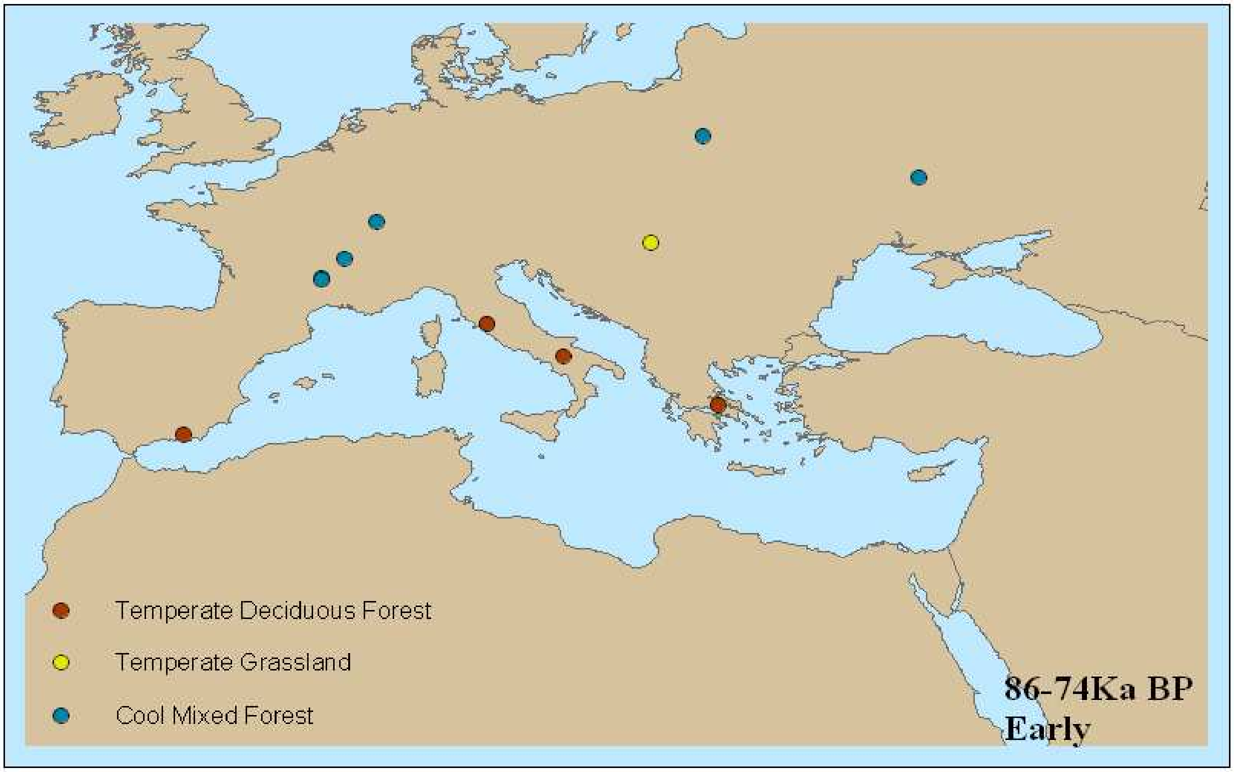


Figure 2.2 continued: Biome reconstruction from MIS 5b: Early (top) and Late (bottom) 93-86Ka BP time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.



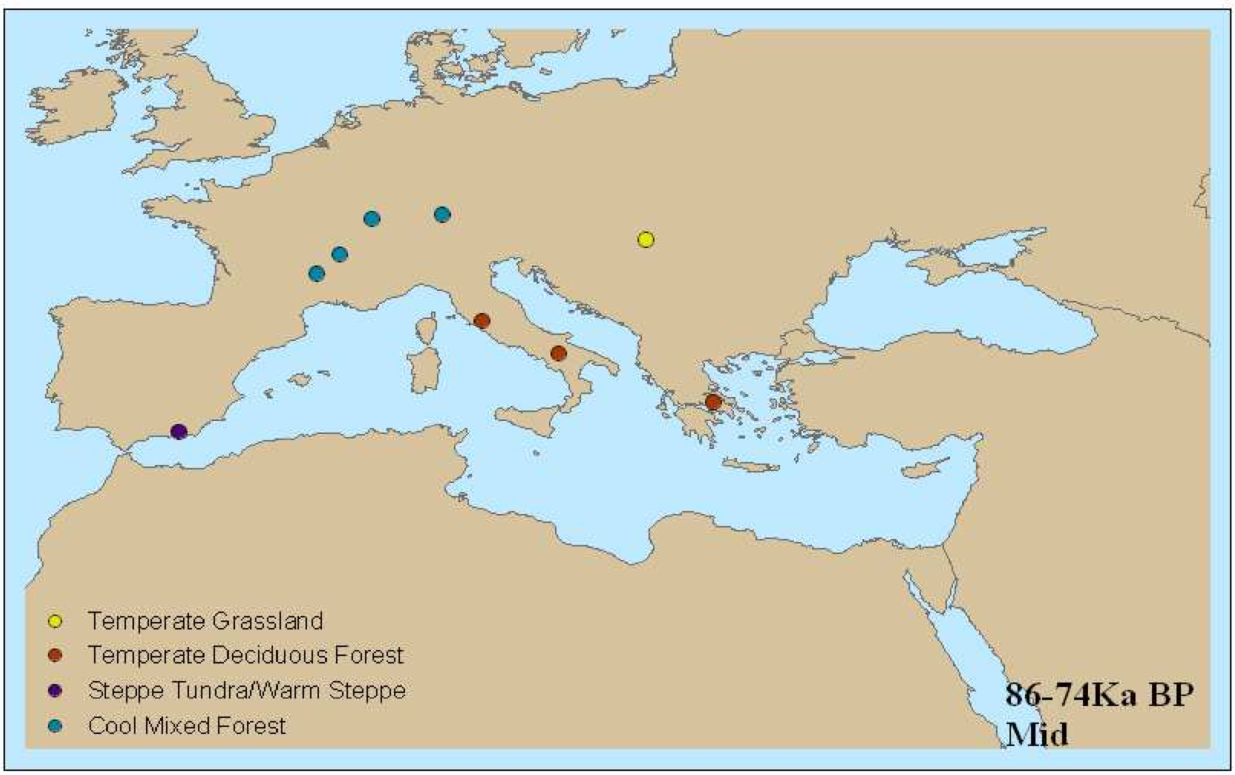


Figure 2.2 continued: Biome reconstruction from MIS 5a: Early (top) and Mid (bottom) 86-74Ka BP time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

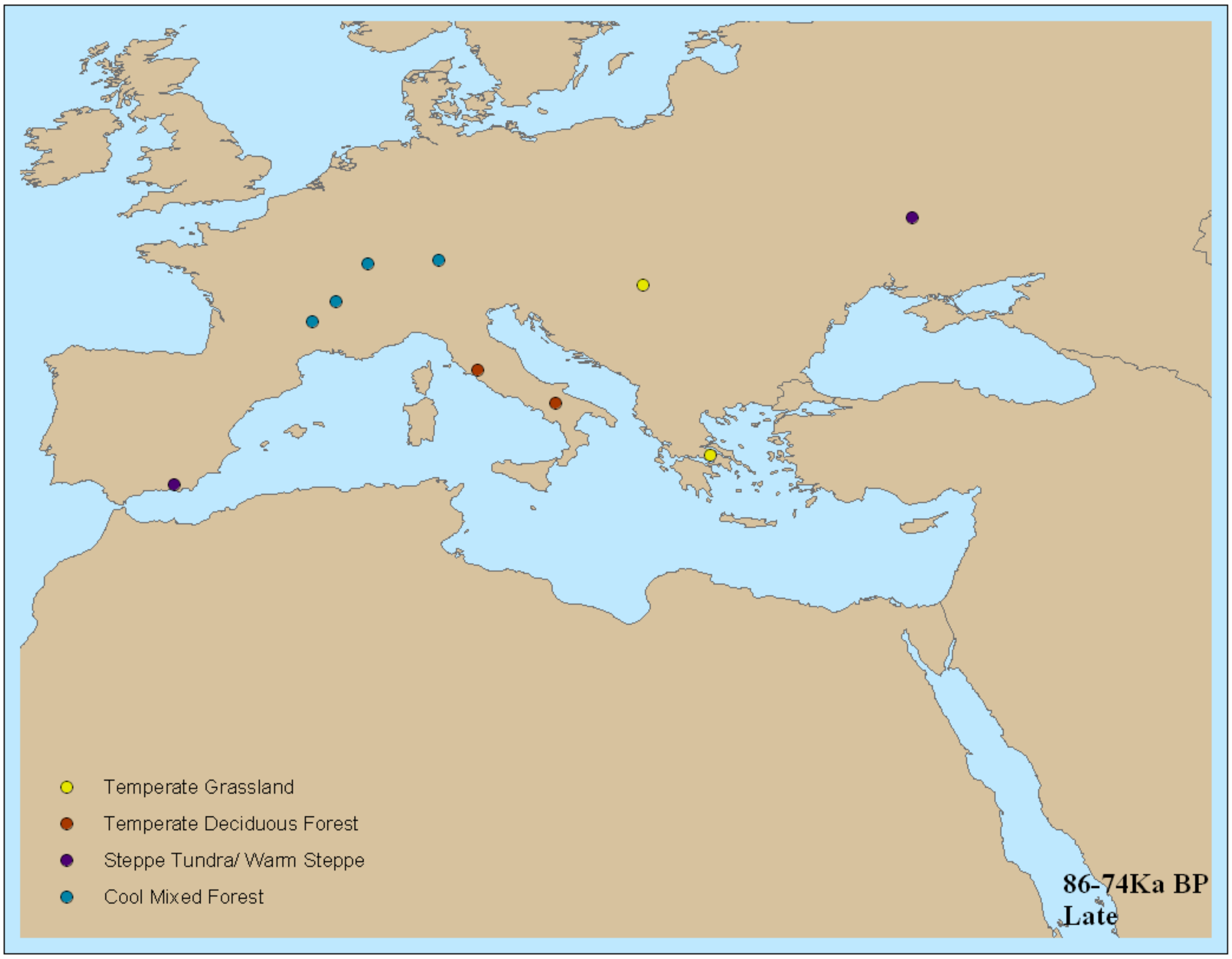
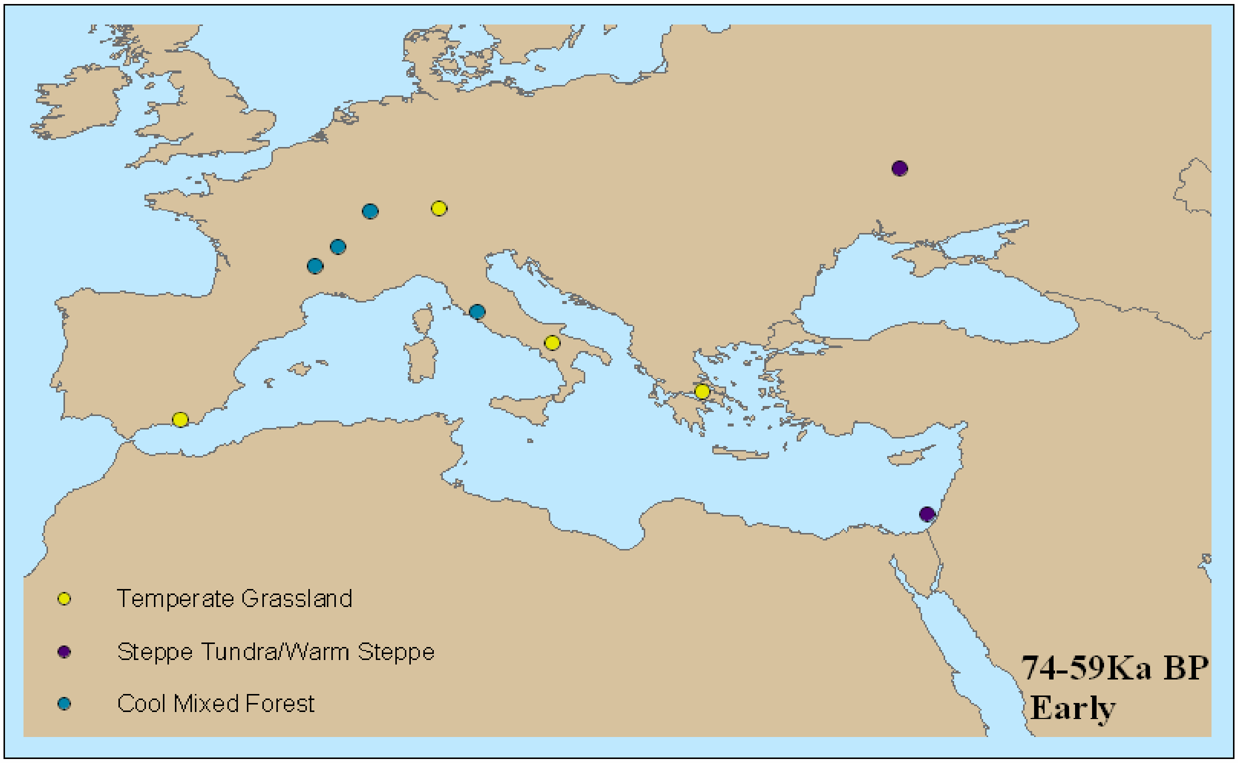


Figure 2.2 continued: Biome reconstruction from MIS 5a Late 86-74Ka BP time-slice. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.



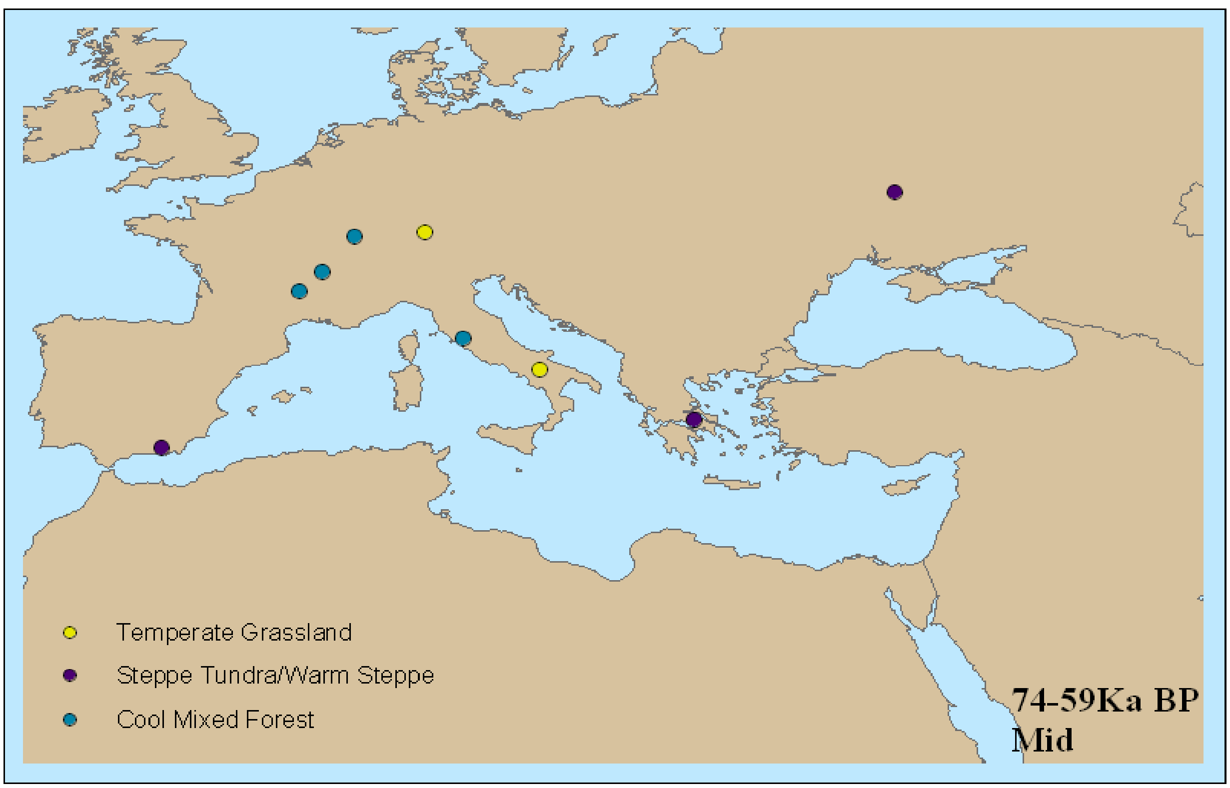


Figure 2.2 continued: Biome reconstruction from MIS 4: Early (top) and Mid (bottom)74-59Ka BP time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

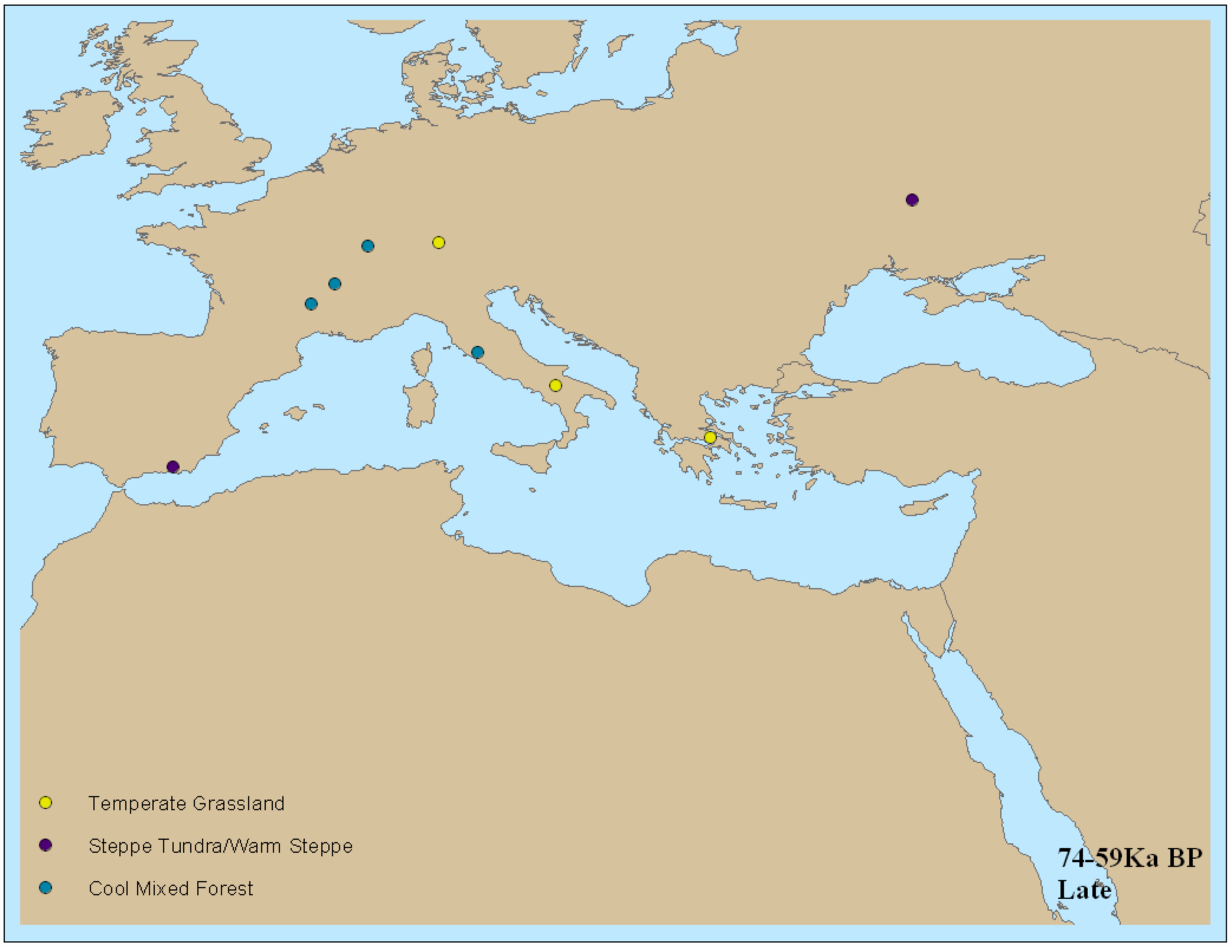


Figure 2.2 continued: Biome reconstruction from MIS 4: Late 74-59Ka BP time-slice. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

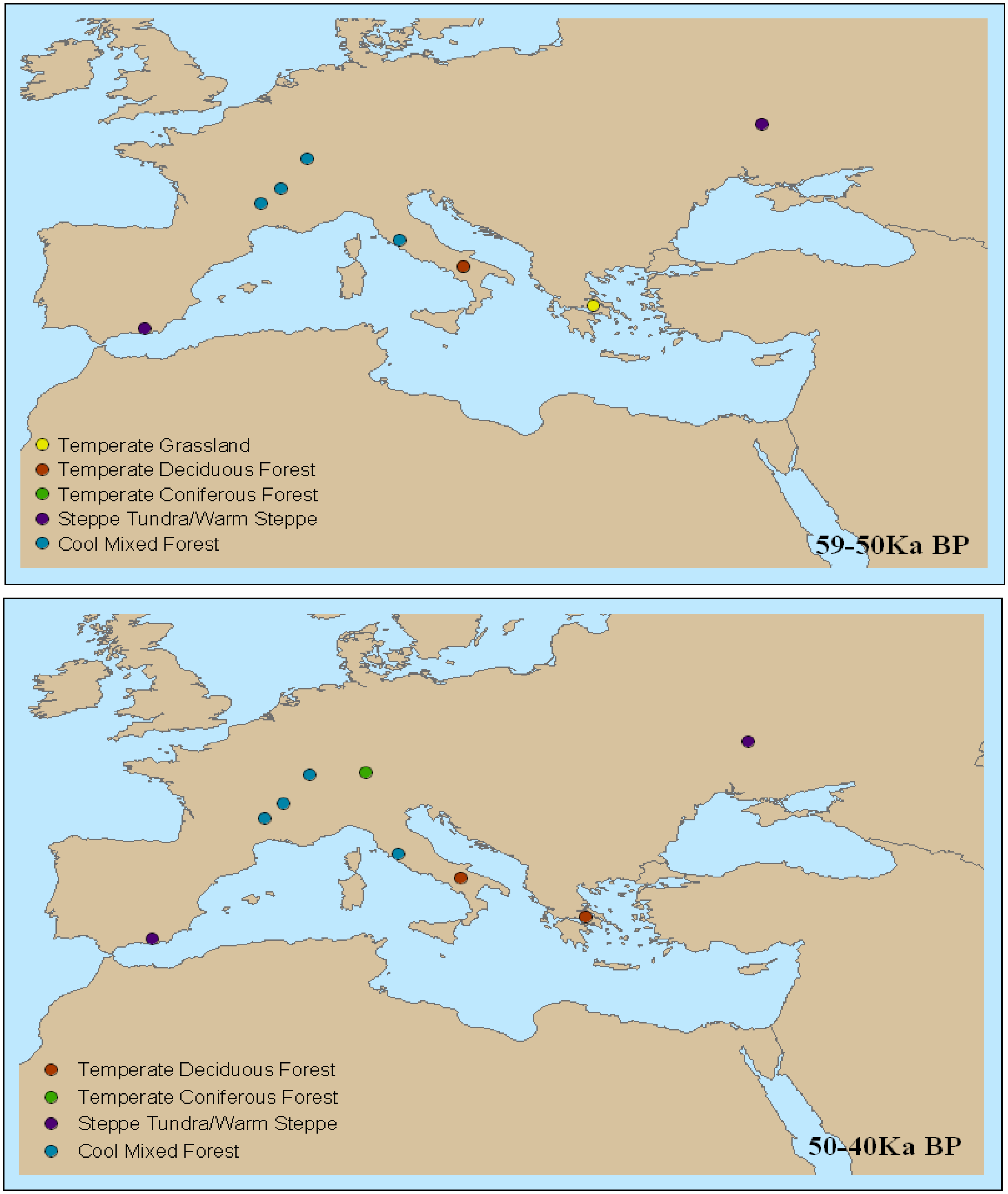
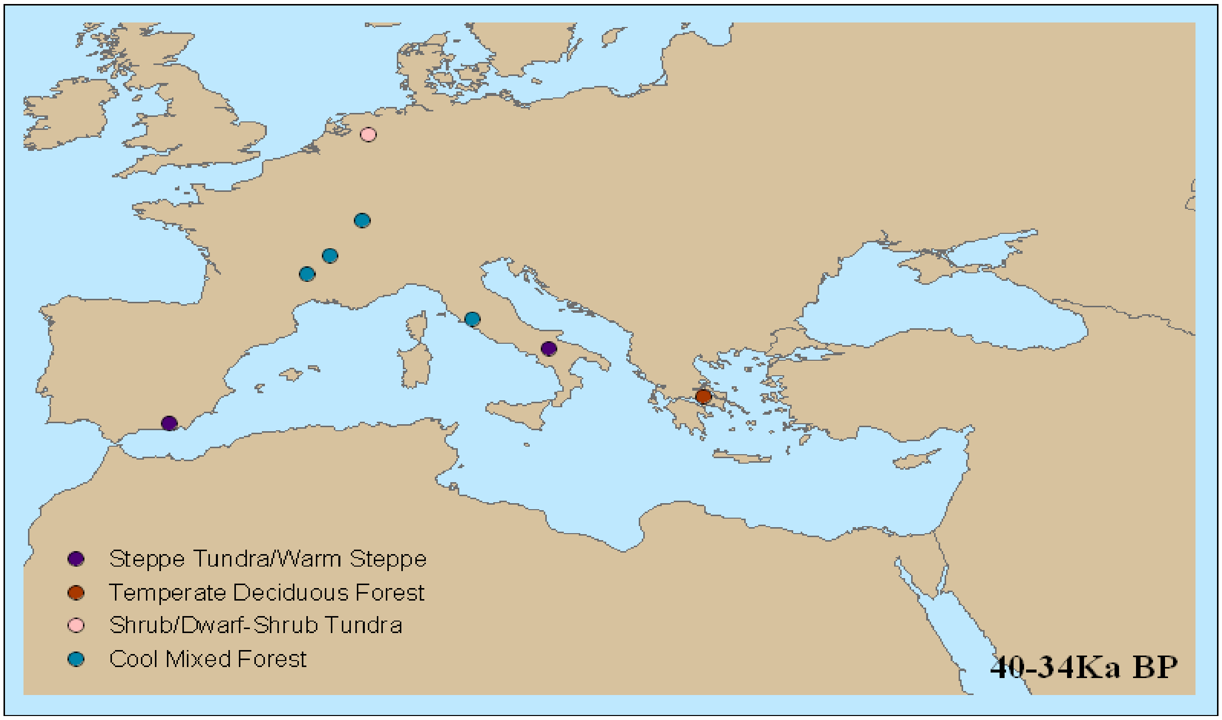


Figure 2.2 continued: Biome reconstruction from MIS 3: 59-50Ka BP (top) and 50-40Ka BP (bottom) time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.



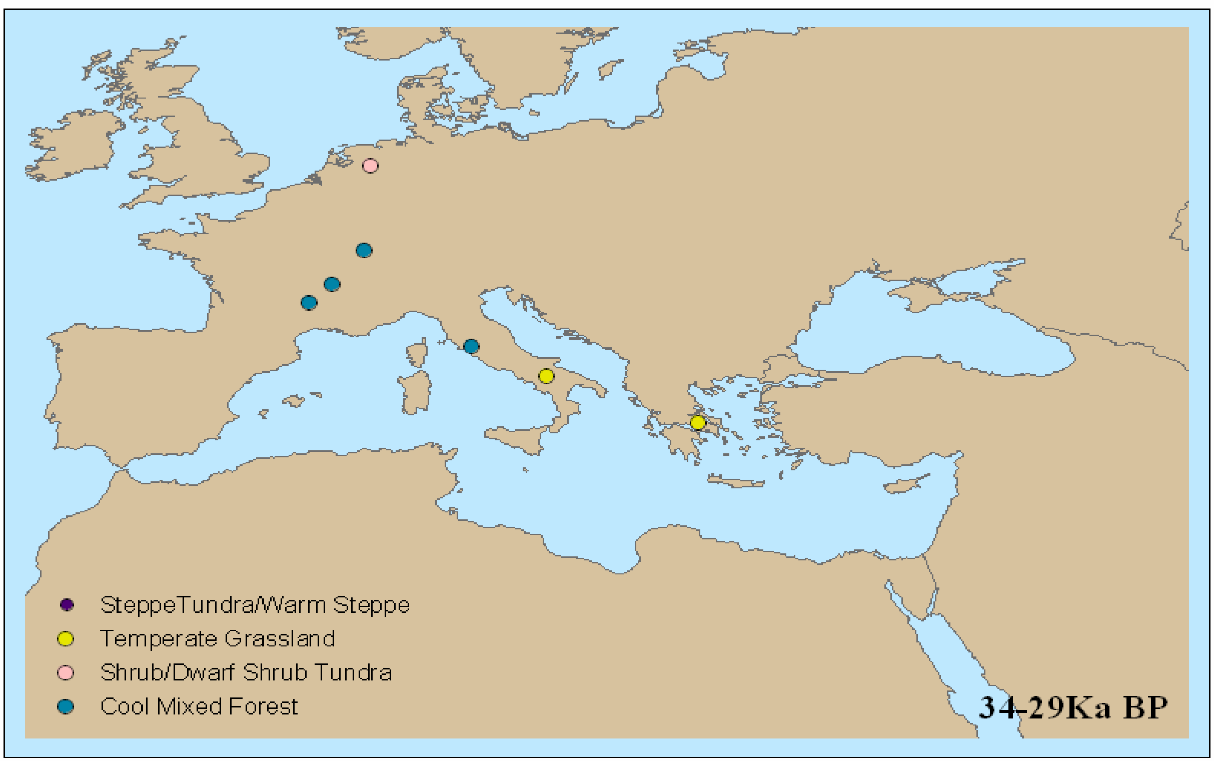


Figure 2.2 continued: Biome reconstruction from MIS 3: 40-34Ka BP (top) and 34-29Ka BP (bottom) time-slices. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

Figure 2.2 continued: Biome reconstruction from MIS 3: 29-24 Ka BP time-slice. Dots marking site location are not to scale. Some points may obscure others due to close proximity of points.

2.1.2 Temperature reconstruction using speleothem

In the Eastern Mediterranean region (Israel, Turkey, Iran, Iraq, Syria), there was a lack of available, long-term pollen assemblage data for use. Site-specific biome reconstruction had been done for cool and warm events during MIS 3 from two sites in this area: Ghab in Syria and Lake Zeribar in Iran (Huntley and Allen, 2003). Attempts to obtain these pollen assemblages were made but could not be obtained within the time constraints of this study. The previously completed reconstructions for this area from Huntley and Allen (2003) were noted but could not be confidently assigned to any of the predefined time-slices.

In place of biome reconstruction, $\delta^{18}O$ and $\delta^{13}C$ records in speleothems were used to reconstruct average annual temperature changes and make basic climatic inferences. Similar studies have completed such climatic reconstructions from speleothem data for the Holocene and Last glacial stage (Bar-Matthews et al., 1999; Bar-Matthews et al., 1998)

2.1.2.1 Paleotemperature from $\delta^{18}O$ records

Speleothems may record the annual external air temperatures provided 1) they are deposited in isotopic equilibrium with the cave waters, 2) the cave was a closed cave system and 3) the cave is not situated in close proximity to major flowing streams (Bar-Matthews et al., 1995; Winograd et al., 1992). Soreq, Peqiin and Ma'ale Efrayim caves have been proven to meet these requirements in the independent studies of Bar-Matthews et al. (1995), Bar-Matthews et al. (1998), and Vaks et al. (2003).

The $\delta^{18}O$ of the carbonate is approximately equal to the $\delta^{18}O$ of water from which the carbonate precipitated, thus allowing the calculation of temperature at time of deposition using the carbonate paleotemperature scale (Epstein et al., 1953; O'Neil, 1969; McGarry et al., 2004). The steps below outline how the $\delta^{18}O$ (PDB) recorded in speleothems from Soreq, Peqiin and Ma'ale Efrayim caves was used to infer average cold and warm month surface air temperature ranges.

1. $\delta^{18}O$ (PDB) records for each cave site available through the WDC for Paleoclimatology Mirror website were downloaded (Bar-Matthew et al., 2003b; Vaks et al., 2003b).

2. $\delta^{18}O$ (PDB) of the speleothems were converted to $\delta^{18}O$ (SMOW) using the equation:

$$\delta^{18}O_{SMOW} = 1.03086(\delta^{18}O_{PDB}) + 30.86$$ (Friedman and O'Neil, 1977)

3. Average paleotemperature was calculated using the equation:

$$10^3 \ln\alpha_{c\text{-}w} = 2.78(10^6 T^{-2}) - 2.89$$

where $10^3 \ln\alpha_{c\text{-}w} = \Delta_{c\text{-}w} = \delta_c - \delta_w$, c = $\delta^{18}O$ of the calcite, w = $\delta^{18}O$ of the cave water at the time of deposition and T is in Kelvin (O'Neil et al., 1969). It is understood that paleotemperatures reconstructed using this equation are not absolute, as other factors may influence the amount of $\delta^{18}O$ and the $\delta^{18}O$ of the past meteoric water of the cave is not accurately known and depends largely on regional climatic conditions (Bar-Matthews et al., 1998).

Without direct access to the speleothem for testing and lacking any definitive published numbers on the $\delta^{18}O$ of the meteoric water, another approach was necessary to establish estimated paleotemperature from the speleothem records. In reconstructing temperatures from 25Ka to the present, Bar-Matthews et al. (1997) used range combinations from -7.0 to -2.7‰ depending upon the inferred general climatic situation. Lowest value inferred to occur at the peak of the winter season and highest value inferred to occur during the peak of the summer season (Bar-Matthews et al., 1995). By correlating the $\delta^{18}O$ values recorded in the speleothems to those recorded in the GRIP ice core, warmer or cooler

times were inferred for each time-slice and related to conventional marine isotope stages (Figure 2.3).

To find the average annual temperature for the time slices in this study, a low temperature range and high temperature range were calculated for the available data at each dated point. Following the values established by Bar-Matthews et al. (1997), $\delta^{18}O_w$ values of -7 to -4.9‰ were used to calculate temperature during the cold periods and $\delta^{18}O_w$ values of -4.8 to -2.7‰ were used to calculate the warm periods. Using the $\delta^{18}O$ records for the Israeli speleothems and the values established by Bar-Matthews et al. (2000), extreme temperatures ranges were reconstructed for conditions at each data point during the coldest months. To fit into the time-slice maps defined during biome temperature reconstruction, the U-Th date associated with each data point was used to group data points by age (Bar-Matthews et al., 2003b; Vaks et al., 2000b). Then, the temperature range restrictions were averaged within a time-slice to produce a mean cold temperature and mean warm temperature range for each time-slice. As only cold month temperature ranges were established in the biome reconstructions, only cold month temperature ranges are listed in Table 2.5 and used for comparison to the Neanderthal data.

2.1.2.2 Paleoclimate inferred from $\delta^{13}C$ records

The $\delta^{13}C$ fluctuations available in the established speleothem data of Bar-Matthews et al. (2003b) and Vaks et al. (2000b) supplemented the paleoclimatic conditions inferred from the $\delta^{18}O$. The $\delta^{13}C$ values

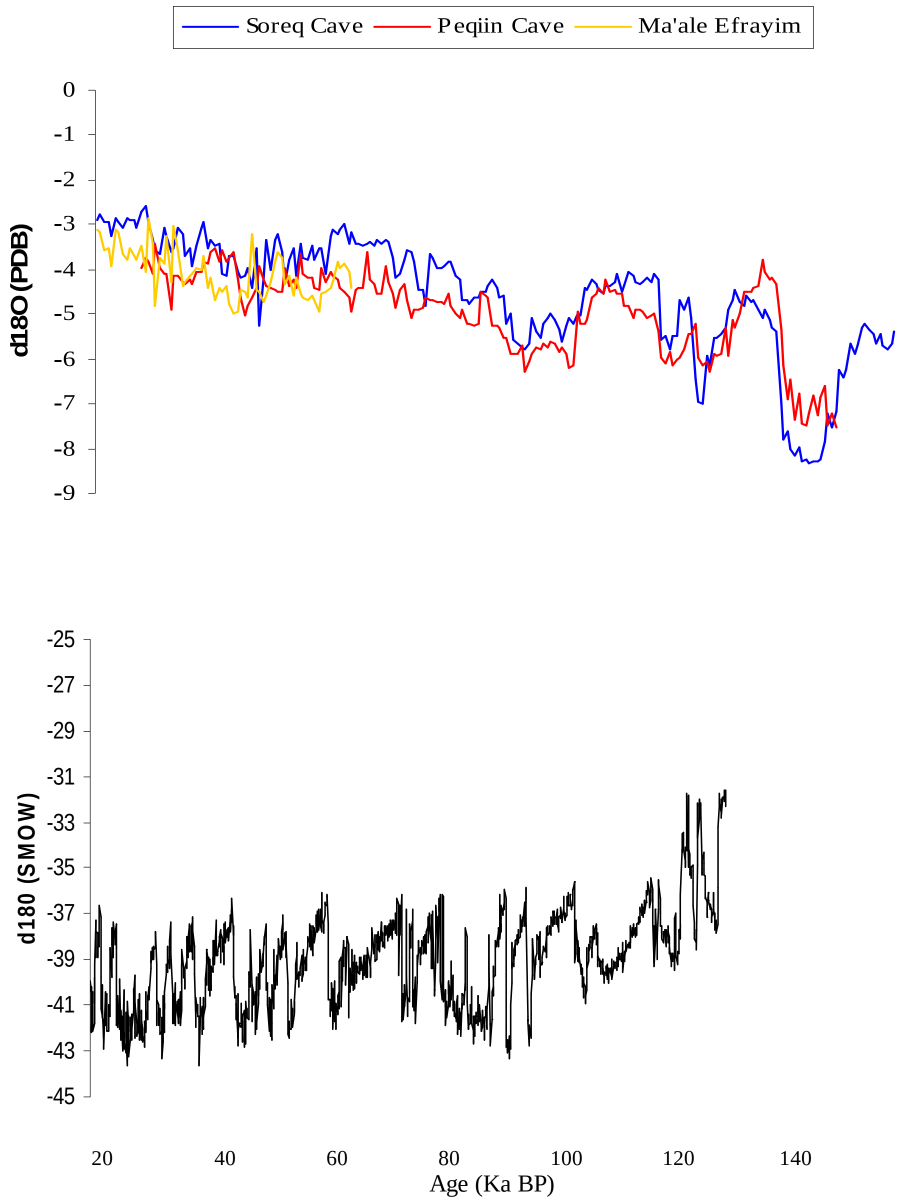


Figure 2.3: Comparison of $\delta^{18}O$ record from the three Eastern Mediterranean speleothems to the $\delta^{18}O$ record from the GRIP ice core (shown in black, bottom). Frequencies of inferred warm and cold events show good correlation in terms of timing of events. Compiled using data available from the Greenland Summit Ice Cores CD Rom, 1997, Bar-Matthews et al., 2003b and Vaks et al, 2000b.

provide paleoclimatic information because the carbon isotopic composition of the water seeping into the cave is strongly influenced by the uptake of soil CO_2, depending on the type of vegetation: C_3 or C_4 (Bar-Matthews et

al., 1995). The different way these two types of plants fractionate carbon results in different $^{13}C/^{12}C$ ratios, which can be distinguished in the speleothems $\delta^{13}C$ record (Frumkin et al., 2000). C4 plants (like Gramineae grasses and Chenopodiaceae shrubs) are characteristic of hot, arid environments as they use water more effectively than C_3 plants (Frumkin et al., 2000). Generally, C_4 plants have higher $\delta^{13}C$ ratios (-17 to -9‰) while C_3 plants have lower $\delta^{13}C$ ratios (-32 to -20‰). However, other factors can influence the $\delta^{13}C$ values recorded in the speleothems. The distribution of C_3 and C_4 plants relies not only on temperature and rainfall amounts but may also be affected by changes in atmospheric partial CO_2 pressures in the past (Boom et al., 2001; Frumkin et al., 2000).

For this study, a simplified method as developed by Frumkin et al. (2000) was adopted to aid in identifying four basic climatic conditions: wet/warm, wet/cool, dry/warm and dry/cool. This was accomplished by creating scatter plots using $\delta^{13}C$ – $\delta^{18}O_c$ relationships at specific time intervals, where $\delta^{13}C$ is assumed to reflect predominantly local environmental changes and $\delta^{18}O$ record. is assumed to reflect broader environmental changes. Other factors besides the C_3 and C_4 influence on the $\delta^{13}C$ values are not considered in these plots. The scatter plots were created by dividing the $\delta^{13}C$ – $\delta^{18}O$ data as it fell into the four quadrants with respect to the mean modern $\delta^{13}C$ – $\delta^{18}O_c$ value of -7% $\delta^{13}C$ and -4.9% $\delta^{18}O$ (Frumkin et al., 2000).

Table 2.5 Cold month temperature ranges for Soreq, Peqiin and Ma'ale Efrayim Caves from $\delta^{18}0$ records as grouped into assigned time slices. C_T = Temperature of the coldest month.

	Time-slice (Ka)	*Maximum C_T (rounded) (°C)*	*Minimum C_T (rounded) (°C)*
Soreq Cave	128-115E	30	20
	128-115M	16	7
	128-115L	15	7
	115-110E	14	6
	115-110L	14	6
	110-93E	16	8
	110-93M	17	9
	110-93L	12	4
	93-86E	12	4
	93-86L	12	4
	86-74E	13	4
	86-74M	22	8
	86-74L	10	2
	74-59E	10	2
	74-59M	12	4
	74-59L	9	1
	59-50	9	2
	50-40	7	0
	40-34	7	-1
	34-29	6	-1
	29-25	6	-2
Peqiin Cave	128-115E	23	14
	128-115M	22	13
	128-115L	10	2
	115-110E	12	4
	115-110L	12	4
	110-93E	18	10
	110-93M	18	9
	110-93L	15	6
	93-86E	13	5
	93-86L	13	5
	86-74E	17	8
	86-74M	18	9
	86-74L	14	6
	74-59E	14	6
	74-59M	12	4
	74-59L	12	4
	59-50	12	4
	50-40	11	3
	40-34	10	3
	34-29	11	3
Ma'ale Efrayim	74-59M	11	3
	74-59L	12	4
	59-50	12	4
	50-40	11	3
	40-34	9	2
	34-29	9	1
	29-25	7	0

The values for each climatic condition are:

Wet/warm:	-9 to -5‰ $\delta^{18}O$
	-14 to -7‰ $\delta^{13}C$
Wet/cool:	-4.9 to -2‰ $\delta^{18}O$
	-14 to -7‰ $\delta^{13}C$
Dry/warm:	-9 to -5‰ $\delta^{18}O$
	-7 to 2‰ $\delta^{13}C$
Dry/cool:	-5 to -2‰ $\delta^{18}O$
	-7 to 2‰ $\delta^{13}C$

The results for each time-slice were then compared to the paleotemperature results from the $\delta^{18}O_c$ data for a more complete paleoclimatic reconstruction*.

2.1.2 Temperature Comparison Maps

Biome inferred cold temperature ranges were then combined with the cold temperatures ranges inferred from the speleothem data and used to construct two maps for each time-slice: one documenting the highest possible temperature of the coldest month which could have resulted and one documenting the lowest possible temperature of the coldest month which could have resulted.

2.2 Neanderthal Data

Once the paleoclimatic data had been transformed into GIS-generated maps, the Neanderthal data was compiled from published literature and arranged for the comparison via GIS-generated maps. In this study, the focus is on comparing the identification of Neanderthal occupation during a time-slice as well as comparing the occurrence of robust or gracile Neanderthal morphological features at each site during a specific time-slice (Table 2.6). A majority of data was available for

*Scatter plots can be viewed in the Appendix

download from the Stage Three Project Database webpage (van Andel, 2003c). The Neanderthal data available through this site included Neanderthal site name, location, archaeological evidence recovered (skeletal remains, lithic tools, etc) and associated absolute dates/dating technique, which had been calibrated using the CalPal program (Davies et al., 2003). Since the Stage 3 Project focused on Neanderthal data from MIS3, additional literature research was necessary to collect data from MIS5-4. For this study, only sites at which skeletal remains are identified unequivocally as a Neanderthal specimens were used.

2.2.1 Chronological control

The absolute age determinations are taken from the literature and therefore subject to any errors introduced by the chronology used in the original studies. As with the paleoclimatic data, exact absolute dating for all Neanderthal specimens does not exist. It is generally not the Neanderthal fossil itself that is dated but other materials associated with the fossil such as lithic tools or faunal materials (Poirier and McGee, 1999; Jordan, 1999; Rapp and Hill, 1998). The choice of dating techniques is limited by the materials available for analysis and often varies from site to site (Rapp and Hill, 1998).

Radiocarbon, thermoluminence (TL) and electron spin resonance (ESR) dating have historically been a favored technique for absolute dating in archaeology (Rapp and Hill, 1998; Taylor, 1997). Each of these techniques has inherent problems associated with them.

Table 2.6 Location of Neanderthal fossil specimens, their relative ages (including +/- errors); dating method used; number or nature of specimen recovered; morphological expression; references*

Site	Country	Neanderthal fossil remains	Morphological Features	Age	Dating Technique	References**
Oliveira Cave	Portugal	partial Hand remains	unknown	70-44Ka	U-Th/AMSC14	Davies et al., 2003; Schwartz &Tattersall, 2002
Salemas	Portugal	2 juvenile remains	classic	33-28Ka	C14	Zilhoa, 1998
Gruta Nova (Columbeira)	Portugal	partial skeletal remains	unknown	101-54; 32Ka	C14	Davies et al., 2003
Bombarral (Columbeira)	Portugal	teeth	classic	29-28Ka	U-Th/C14	Davies et al., 2003; Schwartz &Tattersall, 2002
Figueira Brava	Portugal	teeth	classic?	31-30Ka	Th/U	Davies et al., 2003; Schwartz &Tattersall, 2002
Zafarraya Cave	Spain	mandible, femur, pubis bone	classic	36-25Ka	C14	Davies et al., 2003; Schwartz &Tattersall, 2002
Banyoles	Spain	female mandible	unknown	50-25Ka	U-series/C14	Davies et al., 2003
Cariguela	Spain	3 skeletal remains	uknown	48-35Ka	TL	Davies et al., 2003
Devil's Tower	Gibraltar	juvenile remains	classic?	50-30Ka	C14	Davies et al., 2003; Poirier and McGee, 1999
Forbes Quarry	Gibraltar	cranium	progressive	50-40Ka	stratigraphic corr.	Tattersall, 1995
Grotte du Renne	France	infant remains	unknown	38-28Ka	AMS C14	Davies et al., 2003
Jaurens (Nespouls)	France	teeth	unknown	36-33Ka	C14	Davies et al., 2003
Combe Grenal (Domme)	France	juvenile/adult remains; tooth	unknown	61-44Ka	TL	Davies et al., 2003
Regourdou (Montignac)	France	adult remains	classic	57-54Ka	C14	Davies et al., 2003; Schwartz &Tattersall, 2002
La Chapelle-aux-Saints	France	adult male specimen	classic	56-47Ka	ESR (LU)	Davies et al., 2003; Schwartz &Tattersall, 2002
La Falaise (Vergisson)	France	3 partial facials	unknown	34-32Ka	C14	Davies et al., 2003
Montagne de Girault	France	cranial fragments; teeth	unknown	82-75Ka	Th/U	Davies et al., 2003
Le Moustier	France	male specimen	classic	56-40Ka	TL	Davies et al., 2003; Schwartz & Tattersall, 2002; Poirier & McGee, 1999
La Ferrassie	France	8 specimens	classic	75-50Ka	TL	Davies et al., 2003; Schwartz & Tattersall, 2002
Hortus	France	juvenile mandible; cranial fragments; teeth	classic	73-61Ka	Stratigraphic corr.	Schwarz & Tattersall, 2002
Saint Césaire	France	parietal fragments; fibula	classic	42-32Ka	TL	Davies et al., 2003; Schwartz & Tattersall, 2002
La Quina	France	adult & child cranial frags	classic	70-60Ka	Faunal association	Schwartz & Tattersall, 2002
Pech de L'Azé	France	partial child cranium	classic	55-45Ka	Th/U	Davies et al., 2003; Schwartz & Tattersall, 2002
Roc de Marsal	France	partial child skeleton	classic	60-50Ka	Faunal association	Schwartz & Tattersall, 2002
Spy	Belgium	2 skeletal specimens; scapula	classic	29-25Ka	C14	Davies et al., 2003; Schwartz & Tattersall, 2002
Trou Walou	Belgium	teeth	unknown	40-25Ka	TL/ESR	Davies et al., 2003
Trou de l'Abime, Couvin	Belgium	child skeletal remains/teeth	unknown	57/29Ka	C14/AMS C14	Davies et al., 2003
La Naulette	Belgium	mandible	both	128-61Ka	stratigraphic	Schwartz & Tattersall, 2002

Table 2.6 continued…

Site	Country	Neanderthal fossil remains	Morphological Features	Age	Dating Technique	References*
Salzgitter-Lebenstedt	Germany	adult specimen	unknown	72-69Ka	C14	Davies et al., 2003
Feldhofer Cave	Germany	adult specimen	classic	53-40Ka	AMS C14	Davies et al., 2003, Schwartz & Tattersall, 2002
Ehringsdorf	Germany	cranial fragments	classic	127-120Ka	faunal assoc	Schwartz & Tattersall, 2002; Poirier &McGee, 1999
Hahnofersand	Germany	cranial fragments	both	40-31Ka	C14	Schwartz & Tattersall, 2002
Grotta Breuil	Italy	parietal remains	classic	36-33Ka	ESR (EU & LU)	Davies et al., 2003; Schwartz &Tattersall, 2002
Grotta Guattari	Italy	3 adult remains	both	62-44Ka	ESR (EU), U-series	Davies et al., 2003; Schwartz & Tattersall, 2002
Saccopastore	Italy	female remains (nearly complete)	classic	130-120Ka	stratigraphic corr.	Schwartz & Tattersall, 2002
Archi	Italy	child's mandible	classic	128-73Ka	stratigraphic corr. pollen association	Schwartz & Tattersall, 2002
Vindija Cave	Croatia	mandible	progressive	51-45Ka	U-Th	Davies et al., 2003; Schwartz &Tattersall, 2002
Vindija Cave `	Croatia	4 adult skeletal remains	progressive	37-30Ka	AMS C14	Davies et al., 2003; Richards et al., 2000; Schwartz &Tattersall, 2002
Krapina	Croatia	23-38 adult specimens	both	130-115Ka	U-series	Davies et al., 2003; Schwartz & Tattersall, 2002; Poirier & McGee, 1999
Ohaba Ponor	Romania	adult skeletal remains	unknown	45-38Ka	C14	Davies et al., 2003
Bacho Kiro	Bulgaria	child remains; adult parietal	both	43-32Ka	AMS C14	Davies et al., 2003
Zaskal'naya VI	Ukraine	five juvenile remains	unknown	43-34Ka	AMS C14	Davies et al., 2003
Mezmaiskaya	Russia	prenatal infant	unknown	33-30Ka	AMS C14	Davies et al., 2003
Subalyuk Cave	Hungary	adult and juvenile remains	both	70-60Ka	faunal association	Schwartz & Tattersall, 2002
Sipka	Czech Republic	child mandible	both	~120Ka	faunal association	Schwartz & Tattersall, 2002
Kulna Cave	Czech Republic	maxilla	classic	57-42Ka	C14	Davies et al., 2002
		parietal fragments	both	50-45Ka	C14	Davies et al., 2002
Sala	Czech Republic	female frontal bones	unknown	128-115Ka	stratigraphic corr.	Poirier & McGee, 1999; Jordan, 1999
Ochaz	Czech Republic	mandible (jaw)	classic	128-115Ka	stratigraphic corr.	Schwartz & Tattersall, 2002
Teshik-Tash	Uzbekistan	juvenile male remains	unknown	~70Ka	stratigraphic/faunal	Poirier & McGee, 1999
Dederiyeh	Syria	2 infant skeletal remains	unknown	~50Ka	faunal association	Poirier & McGee, 1999
Shanidar Cave	Iraq	9 skeletal remains	classic	60-40Ka	TL/ESR	Poirier & McGee, 1999; Trinkaus, 1983
Amud	Israel	15 partial remains	both	75-60Ka	faunal association	Poirier & McGee, 1999
Kebara	Israel	infant remains; 2 parietals	classic	64-48Ka	TL	Davies et al., 2003; Valladas et al., 1987
Tabun	Israel	female skeletal remains; male Mandible	progressive	92-70Ka	ESR, U-series	Gruin & Stringer, 2000
Lakonis (Gytheion)	Greece	teeth	unknown	44-38Ka	ESR	Harvati et al., 2003

*Davies et al., 2003 refers only to the archaeological database from the Stage 3 Project's website. Original references are listed in that database.

Radiocarbon dating has a maximum upper age determination of 50-60Ka (Prothero and Dott, 2004). The accuracy of radiocarbon declines as age increases and recalibration is required for dates determined in the past (Davies et al., 2003; Taylor, 1997). Other factors can influence the concentration of ^{14}C in a sample other than radioactive decay. The first factor is the amount of cosmic ray intensity in the upper atmosphere (Rapp and Hill, 1998; Bowman, 1990). If ^{14}C production is low during a given period, then samples from that period would have less of the isotope and an earlier inferred date. The second factor affecting ^{14C} production is the variations in the intensity of the magnetic field, which can impact the amount of cosmic rays present (Rapp and Hill, 1998). For example, a weak magnetic field results in an increase in cosmic rays, which in turn results in an increase in ^{14}C production. A third source of error occurs from the mixing of old or "dead" carbon containing no ^{14}C with the carbon of an organic substance. This mixing could result in an older-than-true date (Rapp and Hill, 1998). The final factor is the geochemical fractionation rate. ^{14}C is used at a slower rate than ^{12}C, creating a difference in the ratios of the two isotopes within different organic materials, thereby producing erred dates (Rapp and Hill, 1998). These factors can be compensated for by recalibrating attained radiocarbon dates using a standard calibration curve or in the case of geochemical fractionation, normalizing to a common δ (Rapp and Hill, 1998; Bowman, 1990).

ESR and TL dating have upper age determinations much older than radiocarbon dating (Poirier and McGee, 1999). However, these dates also require some recalibration as radiation dose rates change over time (Poirier and McGee,

1999). TL dating in particular is vulnerable to "clock resetting" which results in dates younger than the actual age (Prothero and Dott, 2004). ESR errors can occur because of changes due to grinding, bleaching, humic acid radicals, pressure effects and thermal stability of the trapped electrons during the dating process (Rapp and Hill, 1998). Despite inaccuracies, these are the three dating methods prevalently used to determine the ages of Neanderthal fossil specimens and therefore available for use in this study.

Even if completely accurate absolute dates were available, the exact age of a Neanderthal specimen is difficult, sometimes impossible, to determine. As previously noted, it is not the Neanderthal fossil that is dated but artifacts or other faunal remains in association with the fossil that are used to determine age. Different materials and different dating techniques could result in different ages, producing an age range for the stratigraphic layer in which the Neanderthal fossil specimen occurred. The result is an age range in which the Neanderthal fossil was originally deposited.

With a single component site (one occupation), it is possible for a relatively narrow age range to be placed on a Neanderthal specimen. With a multi-component site (multiple occupation), it is slightly more difficult to narrow the exact range of the fossil, particularly if the associated stratigraphic layer is thick or any disturbance of the stratigraphy has occurred (Rapp and Hill, 1998). All Neanderthal data available through the Stage 3 Project website had an absolute date or date range associated with all skeletal remains (Davies et al., 2003). The Neanderthal data collected through literature review had fewer

absolute dates associated with a Neanderthal specimen, instead relying on relative dating techniques such as stratigraphic or faunal correlation available. The date range assigned to a specimen in the original literature was used for this study (Table 2.6).

2.2.2. Site Location

Each Neanderthal site was grouped into one of the assigned paleoclimate time-slices. The placement of a Neanderthal site into a time-slice or into multiple time-slices does not imply continuous occupation of the site over the entire time-slice. The placement of a Neanderthal site into a time-slice only means that the specimen recovered from a site was dated to an age within the time-slice.

2.2.3. Classic versus Progressive Features

The Neanderthal specimen recovered at each site has robust morphological features, gracile Neanderthal features or multiple Neanderthal specimens at one site expressing traits of both robust and gracile Neanderthals as defined in Table 1.1. Each site locale on the time-slice map is identified as having Neanderthal remains with Classic-type morphology, Neanderthal remains with Progressive-type morphology, Neanderthal remains with both Classic and Progressive-type morphology (not on the same specimen) or Neanderthal remains of which neither Classic nor Progressive-type morphology could be distinguished (Table 2.5). The same technique for placement of a site into a time-slice applies to the placement of robust/gracile identification at a site into a time-slice.

CHAPTER 3: RESULTS

3.1 Temperature range reconstruction

From the bioclimatic limits associated with each PFT established in Europe, a range of cold temperatures was assigned to each biome reconstructed at each site (Table 2.5). Reconstructed cold temperature ranges from the δ^{18}O record were also assigned to each Eastern Mediterranean speleothem site. The results show the limits for maximum temperature of the coldest month and minimum temperature of the coldest month for each time-slice in a series of GIS-generated maps (Figures 3.1-3.8). Temperature ranges generalized by region for all time-slices can be viewed in Tables 3.1through 3.8.

3.1.1 Marine Isotope Stage 5e: 128-115Ka Time-slices

The 128-115Ka temperature reconstructions are limited by the amount of data reliably available for these time-slices (Figure 3.1; Table 3.1). Despite this, the milder winter temperatures expected during an interglacial time are adequately represented (Johnson et al., 1997; Cheddadi et al., 1995). The French and German data points express a mild winter month temperature range (0 to 5 ^{o}C) in all three 128-115Ka time-slices. Only one Eastern European data point (Dziewule, Poland) was available during this time. This site remained cooler in the early 128-115Ka (ranging between -15 and -2 ^{o}C) but expressed the same warm winter month temperatures of the French cores in the mid and late time-slices. Both Greek sites fall into the Western European temperature range with one exception: the northernmost site (Ioannina) remained in a

Table 3.1. Summary table of results for the 128-115Ka Time-slice. Temperature range variations are tracked according to geographic location defined as Western Europe (peninsular), Southern Europe (bordering the Mediterranean Sea), East and Central Europe (continental) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

EARLY 128-115Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	5°C	-2 to 5 °C	-2 °C	22 to 30 °C
Minimum C_{temp}	0 °C	-15 to 0 °C	-15 °C	15 to 20 °C
Classic Neanderthal	1	2	1	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	1	0
Neither Trait	0	0	1	0

MID 128-115Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	5°C	5 °C	5 °C	16 to 22 °C
Minimum C_{temp}	0 °C	0 °C	0 °C	7 to 13 °C
Classic Neanderthal	0	2	1	0
Progressive Neanderthal	0	0	0	0
Both Traits	2	0	2	0
Neither Trait	0	0	2	0

LATE 128-115Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	5°C	5 °C	5 °C	10 to 15 °C
Minimum C_{temp}	0 °C	0 °C	0 °C	2 to 7 °C
Classic Neanderthal	0	2	0	0
Progressive Neanderthal	0	0	1	0
Both Traits	2	0	1	0
Neither Trait	0	0	1	0

Figure 3.1: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS5e time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = Early 128-115Ka Time-slice, Middle = Mid 128-115Ka Time-slice, Bottom = Late 128-115Ka Time-slice. Larger maps can be viewed in Figures 3.9 – 3.11.

cooler range (-15 and -2 °C) in the early 128-115Ka time-slice before warming up in the subsequent time-slices.

The temperature ranges reconstructed from the Israeli speleothem sites vary more, but show a progressive decline in winter temperatures. Early MIS5e values are high, ranging from 15 to 30°C, while mid and late MIS5e saw a drop in cold month temperatures from 7 to 22°C and 2 to 15°C respectively.

3.1.2 Marine Isotope Stage 5d: 115-110Ka Time-slices

Cold month temperature ranges fell during both 115-110Ka time-slices to -15 to -2 °C across most of Europe (Figures 3.2; Table 3.2). Both cores in Greece correlated to a cold temperature range of 0 to 5 °C. Temperatures reconstructed from speleothems also express a temperature drop, ranging from 4 to 16°C; however they remained significantly warmer than those of Europe. During the late 115-110Ka time-slice, two of the French data points (Lac du Bouchet and Les Echets) were reconstructed at temperatures slightly higher (0-5 °C) then the surrounding area.

3.1.3 Marine Isotope Stage 5c: 110-93Ka Time-slices

In the 110-93Ka time-slices, possible cold month temperatures for most of Europe remained in the -15 to -2 °C range, while an increase of a few degrees into the 0 to 5 °C range was seen across southern Europe at the Padul and Kopais data points in addition to the Italian data point (Figures 3.3; Table 3.3). The range also increased slightly as expressed in the speleothems records of the early 110-93 time-slice to 8-18 °C, remaining high at 9-18 °C through the mid 110-93 time-slice before dropping slightly in the late 110-93 time-slice to 4-15 °C.

Table 3.2. Summary table of results for the 115-110Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain), East and Central Europe (continental) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

EARLY 115-110Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	5°C	-2°C	12 to 16°C
Minimum C_{temp}	-15°C	0°C	-15°C	4 to 6°C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	0
Both Traits	0	0	0	0
Neither Trait	0	0	0	0

LATE 115-110 Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 5°C	5°C	-2°C	12 to 16°C
Minimum C_{temp}	-15 to 0°C	0°C	-15°C	4 to 6°C
Classic Neanderthal	0	2	0	0
Progressive Neanderthal	0	0	1	0
Both Traits	2	0	1	0
Neither Trait	0	0	1	0

Figure 3.2: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS5d time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = Early 115-110Ka Time-slice; Bottom = Late 115-110Ka Time-slice. Larger maps can be viewed in Figures 3.12 and 3.13.

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Table 3.3. Summary table of results for the 110-93Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain), East and Central Europe (continental) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

EARLY 110-93Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	5 °C	-2 °C	16 to 18 °C
Minimum C_{temp}	-15 °C	0 °C	-15 °C	8 to 10 °C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	0	0
Neither Trait	0	0	0	0

MID 110-93 Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 5°C	5 °C	-2 °C	17 to 18 °C
Minimum C_{temp}	-15 to 0 °C	0 °C	-15 °C	9 °C
Classic Neanderthal	0	0	1	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	0	0
Neither Trait	0	0	0	0

LATE 110-93Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	5 °C	-2 °C	12 to 15 °C
Minimum C_{temp}	-15 °C	0 °C	-15 °C	4 to 6 °C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	0	0
Neither Trait	1	0	0	0

Figure 3.3: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS5c time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = Early 110-93Ka Time-slice; Middle = Mid 110-93Ka Time-slice; Bottom = Late 110-93Ka Time-slice. Larger maps can be viewed in Figures 3.14 – 3.16.

3.1.4 Marine Isotope Stage 5b: 93-86Ka Time-slices

In the early 93-86Ka time-slice, most of Europe remained in the -15 to -2 ^{o}C range, with the Italian cores showing a drop into this same temperature range (Figure 3.4; Table 3.4). Temperature range estimates changed at both the Padul (Spain) and Kopais (Greece) core sites. Padul's reconstruction estimated its coldest temperatures possibly reaching from -3 to 15 ^{o}C, while Kopais had a maximum temperature limit of 15 ^{o}C but no minimum limit. Speleothem temperature reconstructions remained low at 4 to 15 ^{o}C. In the late 93-86Ka time-slice, estimated temperature ranges remained the same, except for the Kopais core which then had a minimum cold temperature limit of -3 ^{o}C associated with it's reconstructed biome (Figure 3.4).

3.1.5. Marine Isotope Stage 5a: 86-74Ka Time-slices

Slight changes were seen in the 86-74Ka time-slices (Figure 3.5; Table 3.5). The early 86-74Ka reconstruction were the same for most of Europe- ranging from -15 to -2 ^{o}C, except for Mediterranean Europe which ranged from 0 to 5 ^{o}C. Speleothem reconstructions changed slightly to range from 4 to 17 ^{o}C. During the mid 86-74Ka time-slices, reconstruction temperatures in Europe fluctuated only at the Padul data point (-3 to 15 ^{o}C) and at the Eastern European Vyazivok data point (no minimum cold limit, but a maximum cold limit of 15 ^{o}C). Speleothem data expressed an increase in lowest possible temperatures, ranging from 8-22 ^{o}C. Reconstructed temperature ranges remained the same in the late 86-74Ka, changing only at the Kopais data point (no lower limit, upper limit of 15 ^{o}C) and the speleothem data points (2-14 ^{o}C) shown in Figure 3.5 and Table 3.6).

Table 3.4. Summary table of results for the 93-86Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain), East and Central Europe (continental) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

EARLY 93-86Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	-2 to 15 °C	-2 °C	12 to 13 °C
Minimum C_{temp}	-15 °C	-15 to -3 °C	-15 °C	4 to 5 °C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	0	0
Neither Trait	1	0	0	0

LATE 93-86Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 10 °C	-2 to 15°C	-2 °C	12 to 13 °C
Minimum C_{temp}	-25 to -15°C	-15 to 0 °C	-15 °C	4 to 5 °C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	1
Both Traits	1	0	0	0
Neither Trait	1	0	0	0

Figure 3.4: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS5b time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = Early 93-86Ka Time-slice; Bottom = Late 93-86Ka Time-slice. Larger maps can be viewed in Figures 3.16-3.18.

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Table 3.5. Summary table of results for the 86-74Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain), East and Central Europe (continental) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

EARLY 86-74Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	5°C	-2 to 15 °C	13 to 17 °C
Minimum C_{temp}	-15 °C	0 °C	less than-15 °C	4 to 8 °C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	1
Both Traits	1	0	0	0
Neither Trait	0	0	0	0

MID 86-74Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 °C	5 to 15 °C	15 °C	18 to 22 °C
Minimum C_{temp}	-15 °C	-3 to 0 °C	none	8 to 9 °C
Classic Neanderthal	0	1	0	0
Progressive Neanderthal	0	0	0	1
Both Traits	1	0	0	0
Neither Trait	0	0	0	0

LATE 86-74Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 °C	5 to 15°C	15 °C	10 to 14 °C
Minimum C_{temp}	-15°C	-3 to 0 °C	less than -3 °C	2 to 6 °C
Classic Neanderthal	2	2	0	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	0	2
Neither Trait	0	0	0	0

Figure 3.5: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS5a time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = Early 86-74Ka Time-slice; Middle = Mid 86-74Ka Time-slice; Bottom = Late 86-74Ka Time-slice. Larger maps can be viewed in Figures 3.19 – 3.21.

3.1.6 Marine Isotope Stage 4: 74-59Ka Time-slices

Quite a few range variations are seen in the 74-59Ka time-slices (Figures 3.6; Table 3.6). In the early 74-59Ka time-slice, the four data points in France and the Lagaccione, Italy data point remained within the -15 to -2 ^{o}C temperature range. However, the German data point (Furamoos), Spanish data point (Padul), Lago di Monticchio (Italy) data point and Greek (Kopais) data point fell into a temperature range limited only by it's maximum possible temperature during the cold months- no higher than 15^{o}C. The lone eastern European data point (Vyazivok) fell into the -3 to 15 ^{o}C range and the speleothem data points ranged from 2 to 14 ^{o}C. The temperature ranges reconstructed changes slightly in the mid 74-59Ka time-slice. The Padul and Kopais data points fell into the -3 to 15 ^{o}C range, while the speleothem data points ranged from 3 to 12 ^{o}C. Only the speleothem ranges changed in the late 74-59Ka time-slice, dropping slightly to 1 to 12 ^{o}C.

3.1.7 Early to Middle Marine Isotope Stage 3: 59-50Ka and 50-40Ka Time-slice

In the 59-50Ka time-slice, only three temperature ranges varied from the previous time-slices (Figure 3.7; Table 3.7). The southernmost Italian data point (Lago di Monticchio) range fell into the 0 to 5 ^{o}C range, the Furamoos (Germany) data point matched the French data points with a range of -15 to -2 ^{o}C and speleothems minimum temperature rose slight altering the range to 4 to 12 ^{o}C.

Table 3.6. Summary table of results for the 74-59Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain but excluding French coast), East and Central Europe (continental, including Uzbekistan) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

EARLY 74-59Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 15°C	-2 to 15°C	15 °C	10 to 14 °C
Minimum C_{temp}	less than -15 °C	less than -15 °C	-3 °C	2 to 6 °C
Classic Neanderthal	3	0	1	0
Progressive Neanderthal	0	0	0	0
Both Traits	1	0	1	2
Neither Trait	3	0	0	0

MID 74-59Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 15°C	-2 to 15°C	15 °C	10 to 12 °C
Minimum C_{temp}	less than -15 °C	-15 to -3 °C	-3 °C	3 to 4 °C
Classic Neanderthal	4	0	1	0
Progressive Neanderthal	0	0	0	1
Both Traits	1	0	1	1
Neither Trait	3	0	0	0

LATE 74-59Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 15°C	-2 to 15°C	15 °C	9 to 12 °C
Minimum C_{temp}	-15°C	-15 to -3 °C	-3 °C	1 to 4 °C
Classic Neanderthal	3	0	0	1
Progressive Neanderthal	0	0	0	0
Both Traits	1	1	1	1
Neither Trait	4	0	0	0

Figure 3.6: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS4 time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = Early 74-59Ka Time-slice; Middle = Mid 74-59Ka Time-slice; Bottom = Late 74-59Ka Time-slice. Larger maps can be viewed in Figures 3.22 – 3.24.

Little variation in temperature range is seen between the 59-50 and 50-40Ka time-slices. In the 50-40Ka time-slice, only the Kopais data point changed to a range between 0 to 5 ^{o}C. The range of the speleothem data points also changed to 0 to 11 ^{o}C (Figure 3.7; Table 3.7).

3.1.8 Mid to Late Marine Isotope Stage 3: 40-34Ka, 34-29Ka and 29-25Ka Time-slices

After the 50-40Ka time-slice, no pollen data was available for analysis from Eastern Europe. Additionally, a gap in the pollen record from the Furamoos data point occurred from ~40 Ka to ~20Ka (Muller et al., 2003). From the remaining data points in time-slice 40-34Ka, only the range from the speleothems changed, cooling slightly to a range of -1 to 10 ^{o}C (Figure 3.8; Table 3.8).

During the 34-29Ka time-slice, a gap occurs between the two cores which make up the Padul record, leaving Iberian Peninsula without an estimated cold month temperature range (Pons and Reille, 1988). The southernmost Italian data point (Lago di Monticchio) and Greek data point (Kopais) are the only two which fluctuated from the previous time-slice (Figure 3.8; Table 3.8). In this time-slice, both expressed an upper cold temperature limit of 15 ^{o}C but no lower limit. Temperature range of the speleothem data points fluctuated slightly between -1 to 11 ^{o}C.

The final time-slice examined in this study, ~29-25Ka, remained in the -15 to -2 ^{o}C temperature range for most Western European data points (Figure 3.9). Data available from Padul during this time-slice allowed for a -3 to 15 ^{o}C

Table 3.7. Summary table of results for the 59-34Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain but excluding French coast), East and Central Europe (continental, including Uzbekistan) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

59-50Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	-2 to 15°C	15 °C	9 to 12 °C
Minimum C_{temp}	-15 °C	-15 to 0 °C	-3 °C	2 to 4 °C
Classic Neanderthal	6	0	1	1
Progressive Neanderthal	0	1	1	0
Both Traits	0	1	1	2
Neither Trait	3	0	0	1

50-40Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 15°C	-2 to 15°C	15 °C	7 to 11 °C
Minimum C_{temp}	-15 °C	-15 to 0 °C	-3 °C	0 to 3 °C
Classic Neanderthal	7	0	0	1
Progressive Neanderthal	0	1	1	0
Both Traits	0	1	1	1
Neither Trait	1	3	3	1

40-34Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 5°C	-2 to 15°C	unknown	7 to 10 °C
Minimum C_{temp}	less than -15°C	-15 to -3 °C	unknown	-1 to 3 °C
Classic Neanderthal	4	2	0	0
Progressive Neanderthal	0	1	1	0
Both Traits	1	0	2	0
Neither Trait	4	2	1	0

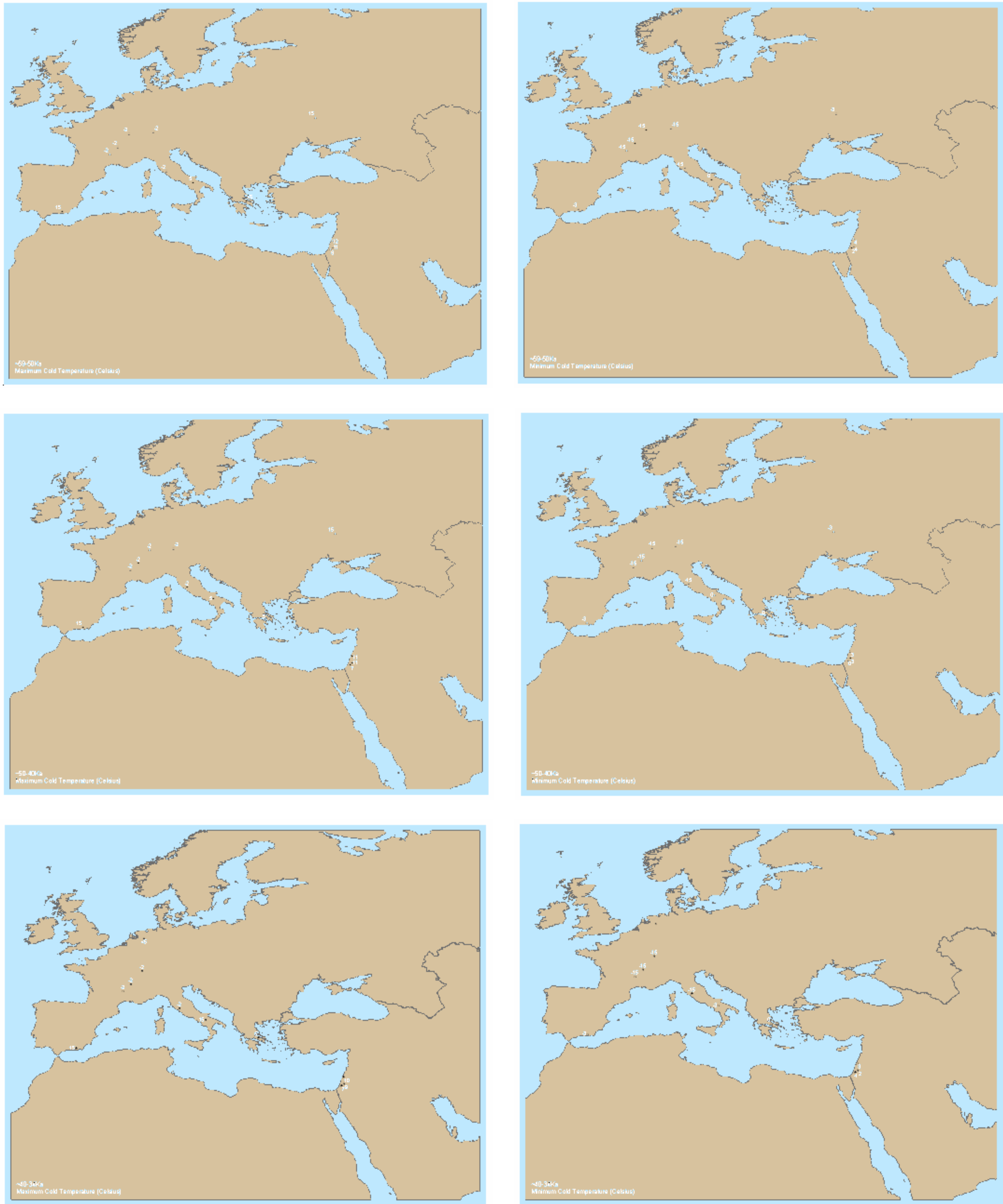


Figure 3.7: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the MIS3 time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = 59-50Ka Time-slice; Middle = 50-40Ka Time-slice; Bottom = 40-34Ka Time-slice. Larger maps can be viewed in Figures 3.25 – 3.27.

Table 3.8. Summary table of results for the 34-25Ka Time-slices. Temperature range variations are tracked according to geographic location defined as Western Europe (most of peninsular), Southern Europe (bordering the Mediterranean Sea including east coast of Spain but excluding French coast), East and Central Europe (continental, including Uzbekistan) and the Eastern Mediterranean (Israel, Iraq, Syria, Iran). C_{temp}= Temperature of the coldest month. Neanderthal information refers to number of sites with Neanderthal remains expressing specified morphological traits. Both traits = both Classic and Progressive type morphology identified; Neither Traits = morphological type could not be definitively determined.

34-29Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2 to 5°C	-2 to 15°C	unknown	6 to 11 °C
Minimum C_{temp}	-15 °C	-15 to 0 °C	unknown	-1 to 3 °C
Classic Neanderthal	3	2	0	0
Progressive Neanderthal	0	0	1	0
Both Traits	0	0	1	0
Neither Trait	4	2	2	0

29-25Ka BP

	Western Europe	*Southern Europe*	*Central/Eastern Europe*	*East Mediterranean*
Maximum C_{temp}	-2°C	-2 to 15°C	unknown	6 to 7 °C
Minimum C_{temp}	-15 °C	-15 to -3°C	unknown	-2 to 0 °C
Classic Neanderthal	2	0	0	0
Progressive Neanderthal	0	0	0	0
Both Traits	0	0	0	0
Neither Trait	4	1	0	0

Figure 3.8: Maximum (left) and minimum (right) temperature reconstructions of the coldest months for all paleoclimatic data points during the late MIS3 time-slices. Black dots represent paleoclimate data point, number is degrees Celsius. Due to close proximity, some data points may obscure others. Top = 34-29Ka Time-slice; Bottom = 29-25Ka Time-slice. Larger maps can be viewed in Figures 3.28 and 3.29.

temperature range to be reconstructed (Figure 3.8). Temperature estimates varied lower for the speleothem data points to fall between -2 to 7 ^{o}C.

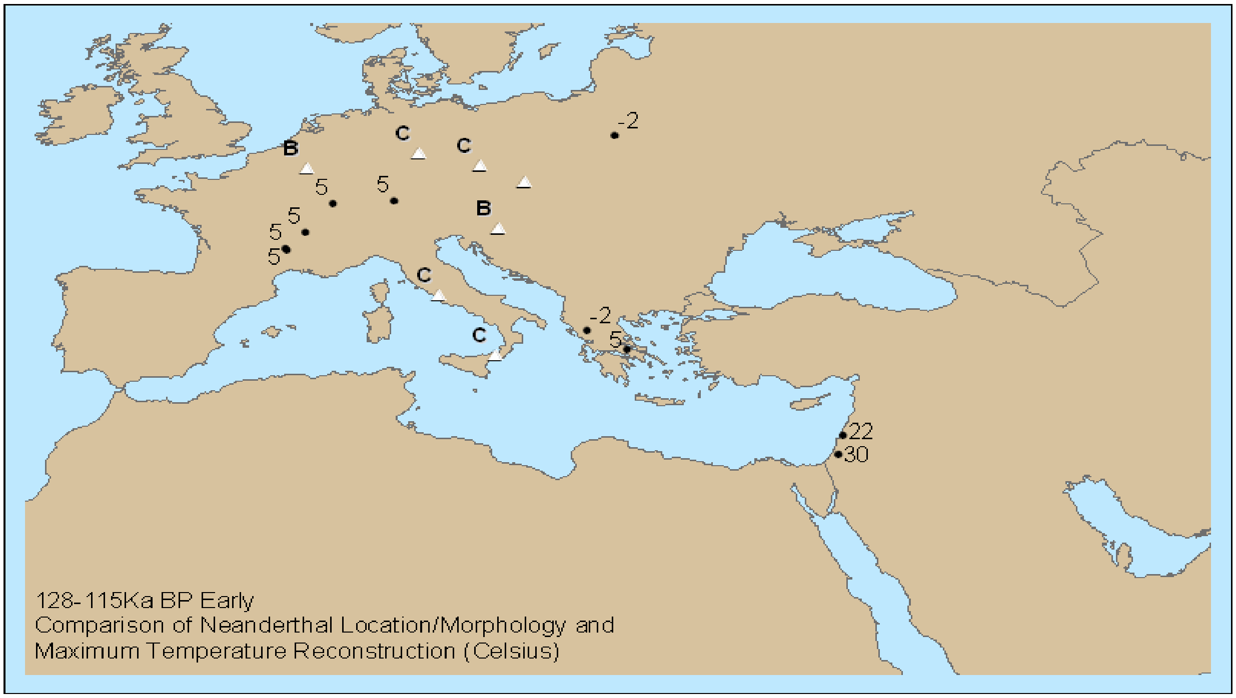
3.2 Comparison to Neanderthal Data

In this series of GIS-generated time-slice maps, the location of definitive Neanderthal skeletal remains is plotted relative to the cold temperature range possible (Figures 3.9 to 3.29; Tables 3.1-3.8). Again, placement of Neanderthal occurrence at a site within a time-slice does not imply continuous occurrence throughout the entire time-slice, but instead implies occurrence within a portion of the time-slice.

3.2.1 MIS 5e (128-115Ka) and MIS 5d (115-110Ka) Time-slices

In these time-slices, sites identified as having Neanderthal skeletal remains are restricted to the European area (Tables 3.1 and 3.2). Seven sites correlate to the early 128-115Ka time-slice: four with identified Classic Neanderthal morphological traits, two with both Progressive and Classic traits at two of the sites and one with no definition between Classic or Progressive traits (Figure 3.9; Table 3.1). Eight sites correlate to the mid 128-115Ka time-slice: three with Classic traits, four with both Classic and Progressive traits and one with neither trait defined (Figure 3.10). Seven sites correlate to the late 128-115Ka time-slice: two with Classic traits identified, two with Progressive traits identified, three with both trait types identified and one with neither trait type defined (Figure 3.12).

Only two sites were linked to the early 115-110Ka time-slice: one in northwest Europe with both Classic and Progressive-types and one in southern Italy with Classic-type. Seven sites could also be placed into the late 115-110Ka time-slice: two with Classic Neanderthal morphological traits identified, one with



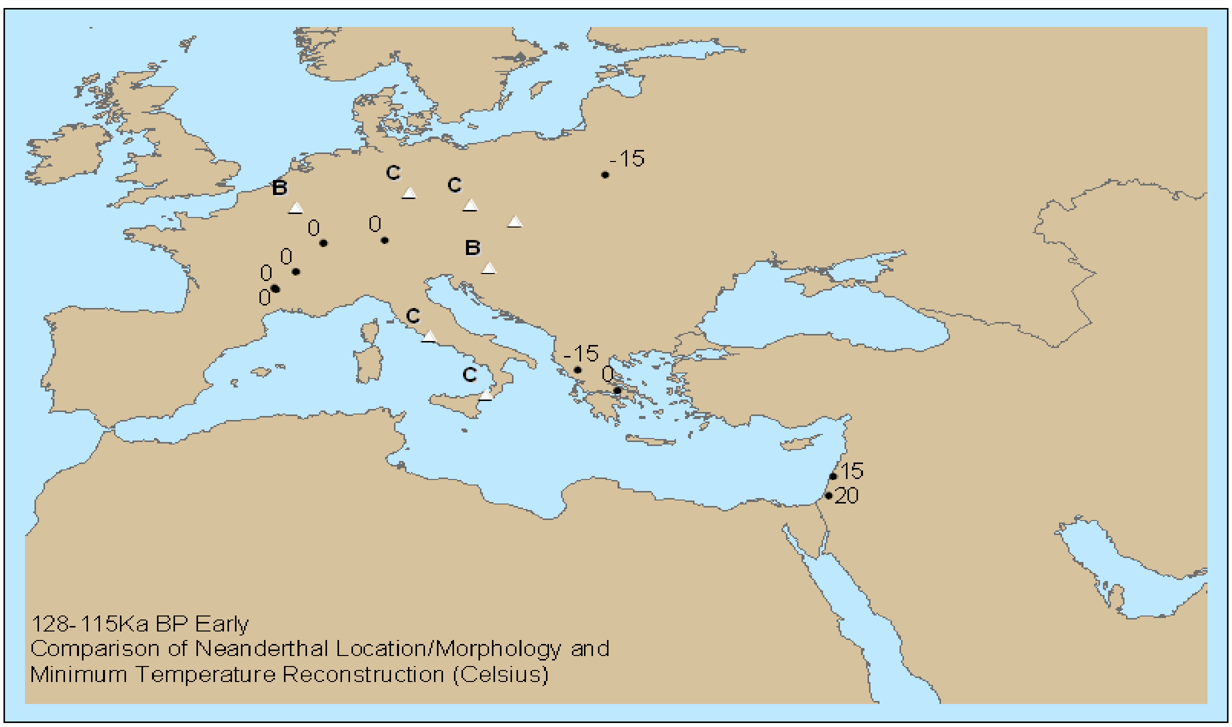
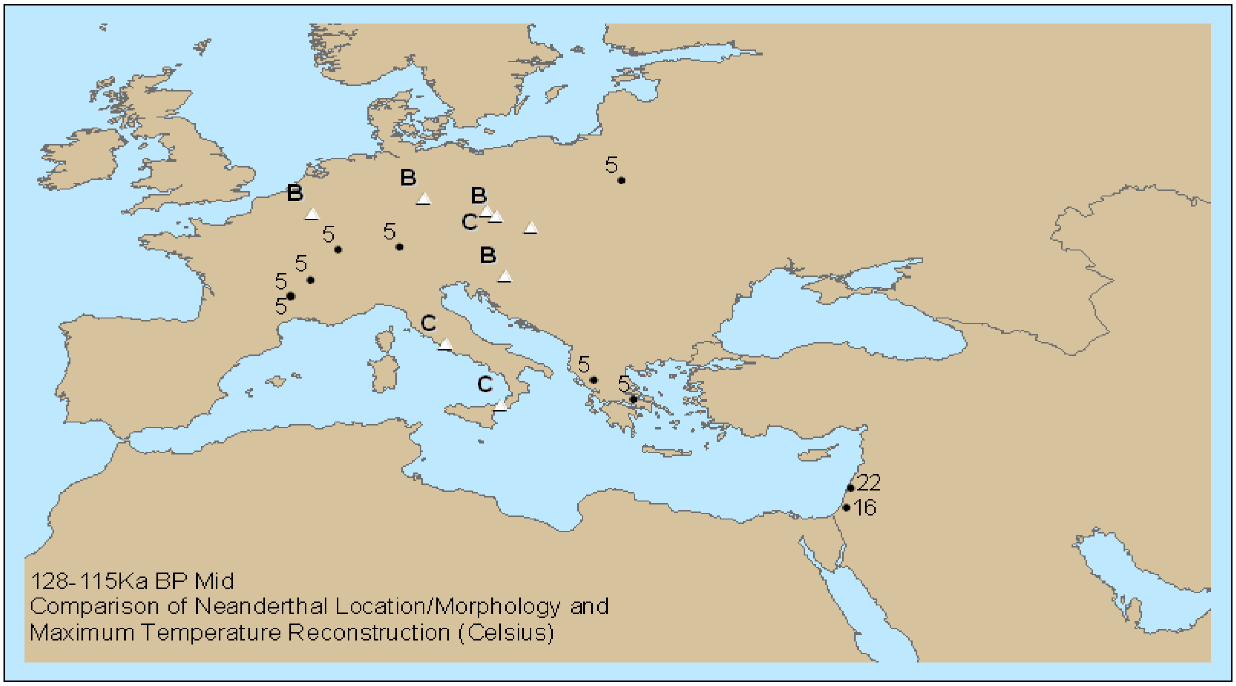


Figure 3.9: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS5e time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others.



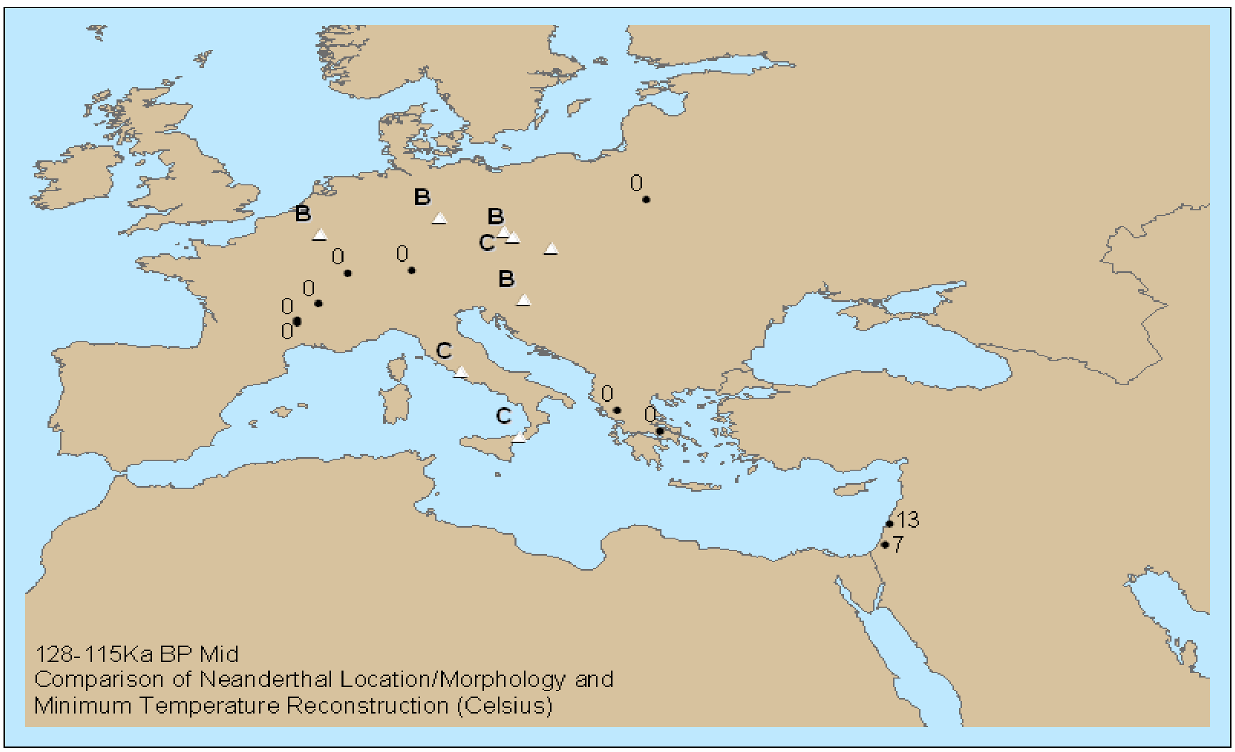


Figure 3.10: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid MIS5e time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others.

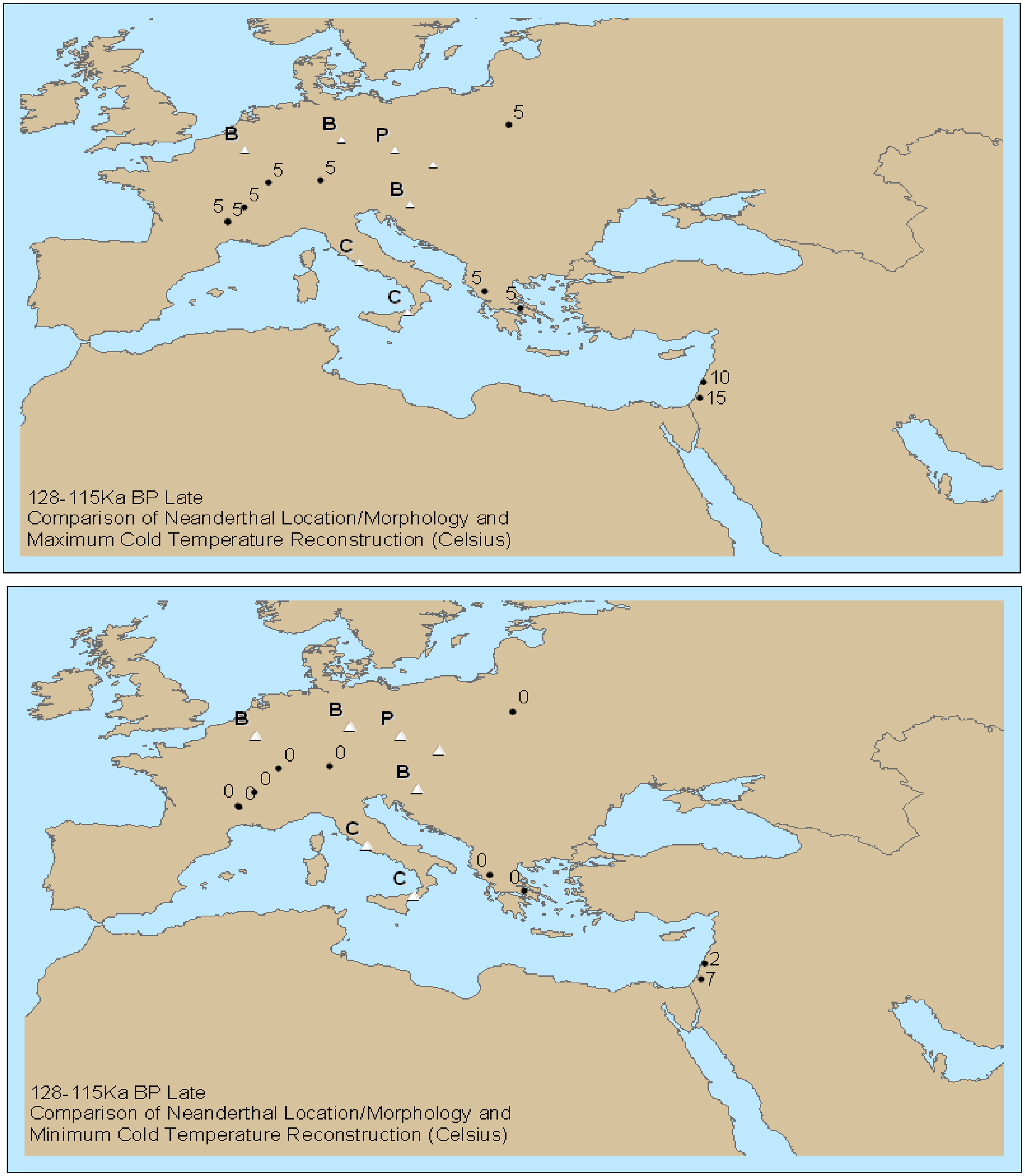


Figure 3.11: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS5e time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others.

Progressive Neanderthal morphological traits identified, one with both Classic and Progressive morphological traits identified and one with neither morphological type identified (Figures 3.13).

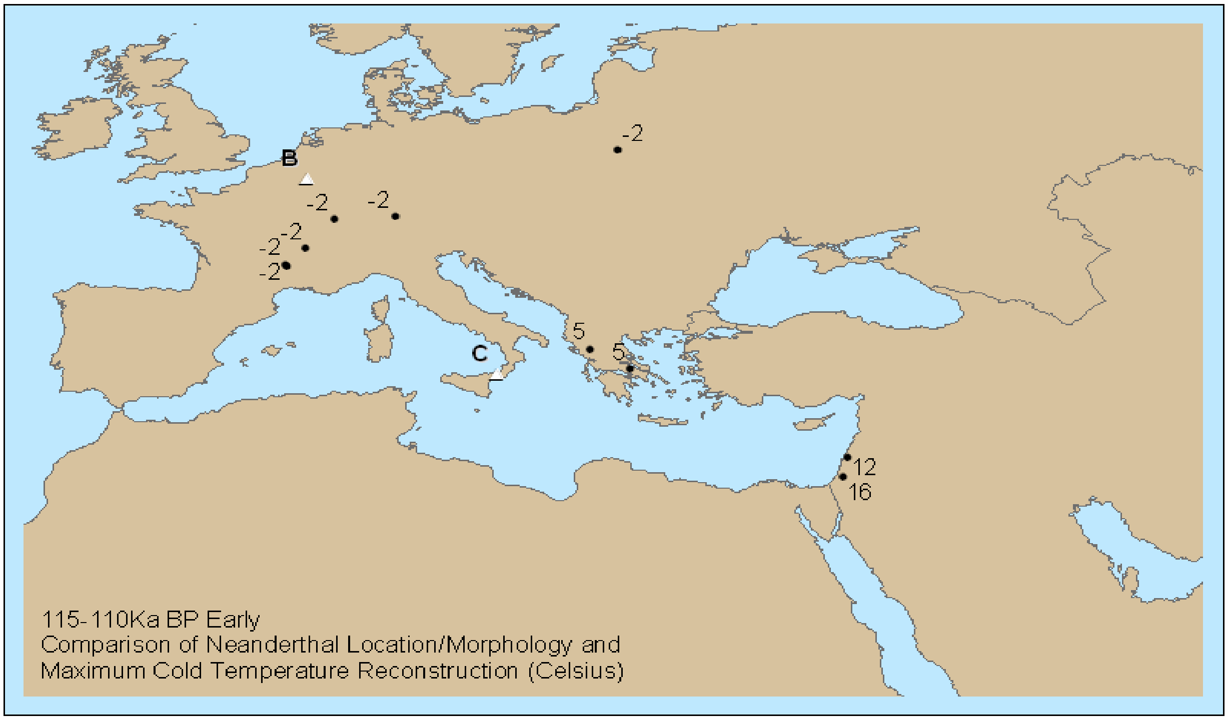
3.2.2. MIS 5c (110-93Ka) and MIS 5b (93-86Ka) Time-slices

Two sites with identified Neanderthal traits can be placed into the early and mid 110-93Ka time-slice (Figures 3.14-3.15). One site lies at the southern tip of Italy, with Neanderthal remains exhibiting Classic-type morphology. The other site is in northwest Europe and is described as having skeletal remains with both Classic and Progressive traits. Three sites occur in the late 110-93Ka and early 93-86Ka time-slice: one in Italy with Classic-type morphology identified, on in northwest Europe with both morphology types identified and one on the west coast of Spain with neither morphology identified (Figure 3.15-3.17; Table 3.3-3.4).

The late 93-86Ka time-slice has the first occurrence of Neanderthal remains in the Eastern Mediterranean. The Progressive-type Neanderthal morphology is identified here (Tables 3.3-3.4).

3.2.3. MIS 5a (86-74Ka) and MIS 4 (74-59Ka) Time-slices

In the early 86-74Ka time-slice, the same three sites- two in Europe and one in the Eastern Mediterranean- occur (Figure 3.19; Table 3.5). The northwest European site has both Progressive and Classic morphological traits identified, the site in Southern Italy has Classic traits identified and the Eastern Mediterranean site has Progressive traits identified. The mid 86-74Ka time-slice contains the above three sites plus one extra in the western European area with undefined Neanderthal morphological traits (Figure 3.20). Seven sites were identified as falling into the late



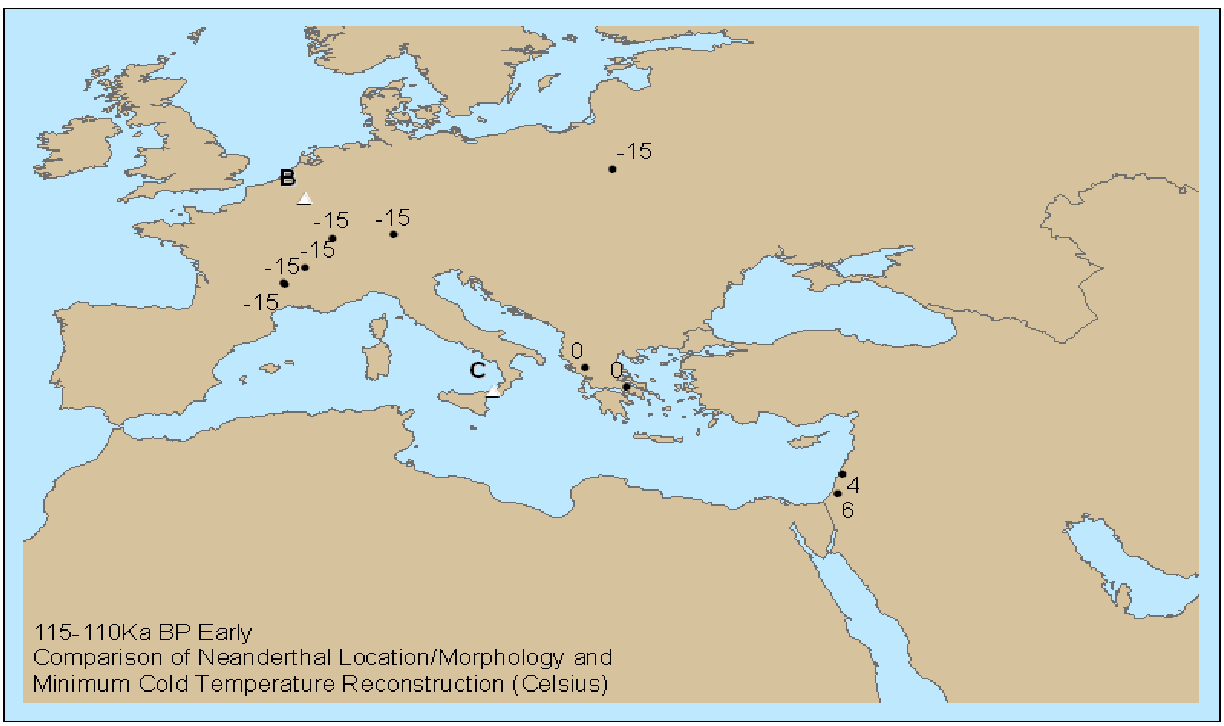
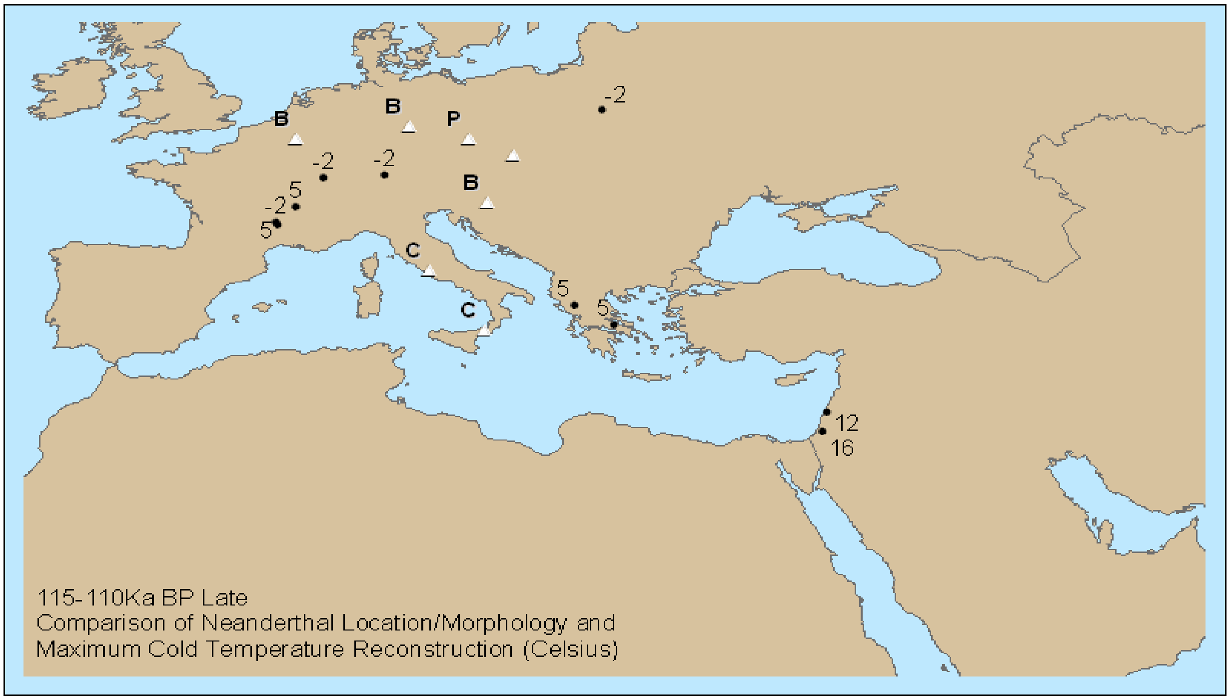


Figure 3.12: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS5e time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others.



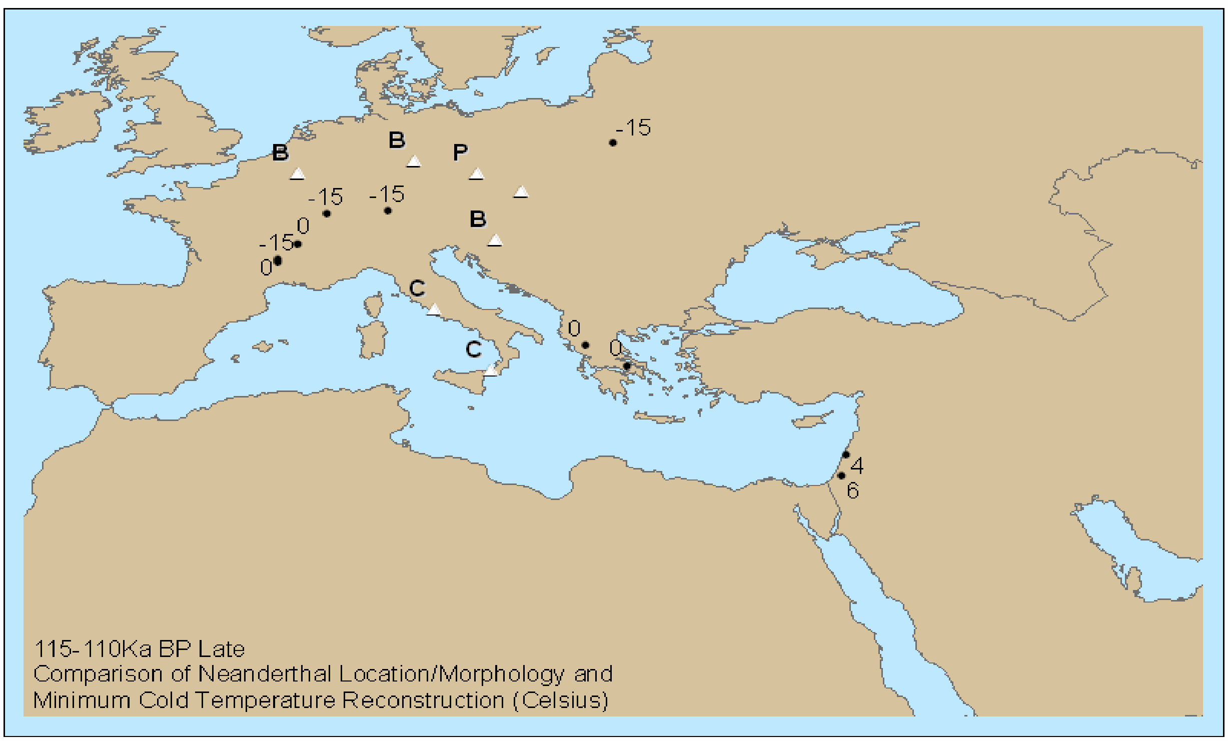
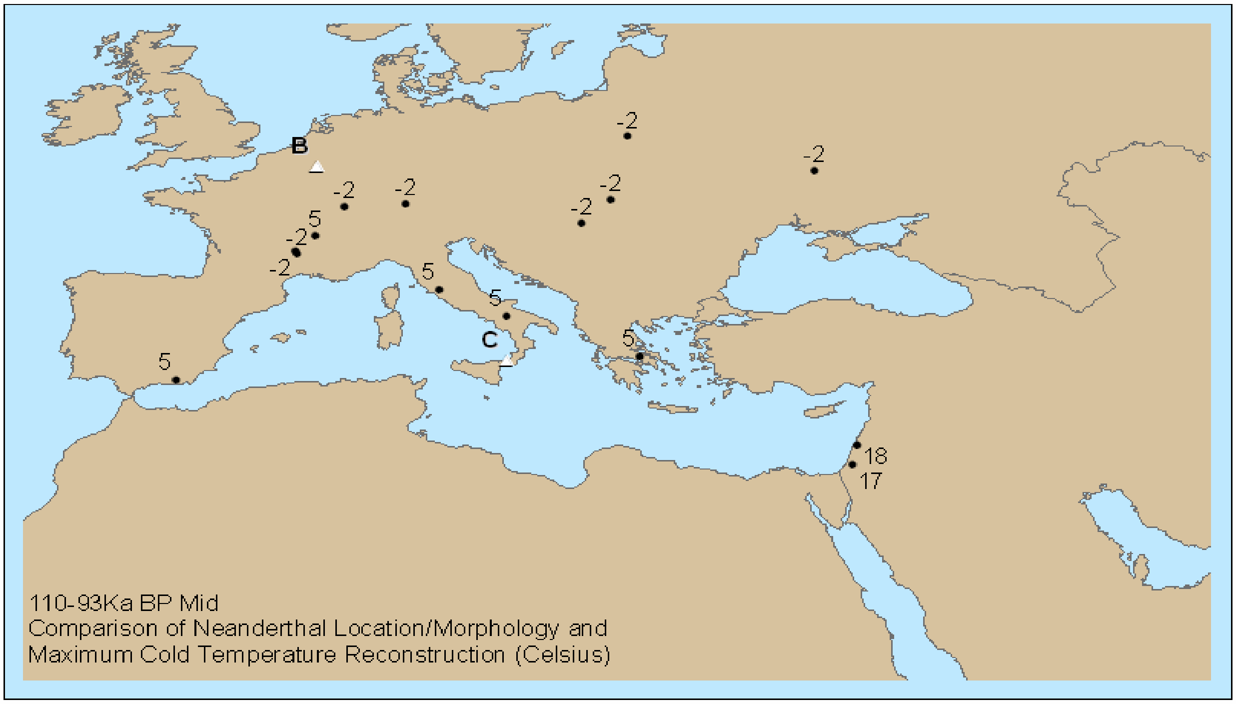


Figure 3.13: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS5d time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others

Figure 3.14: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS5c time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



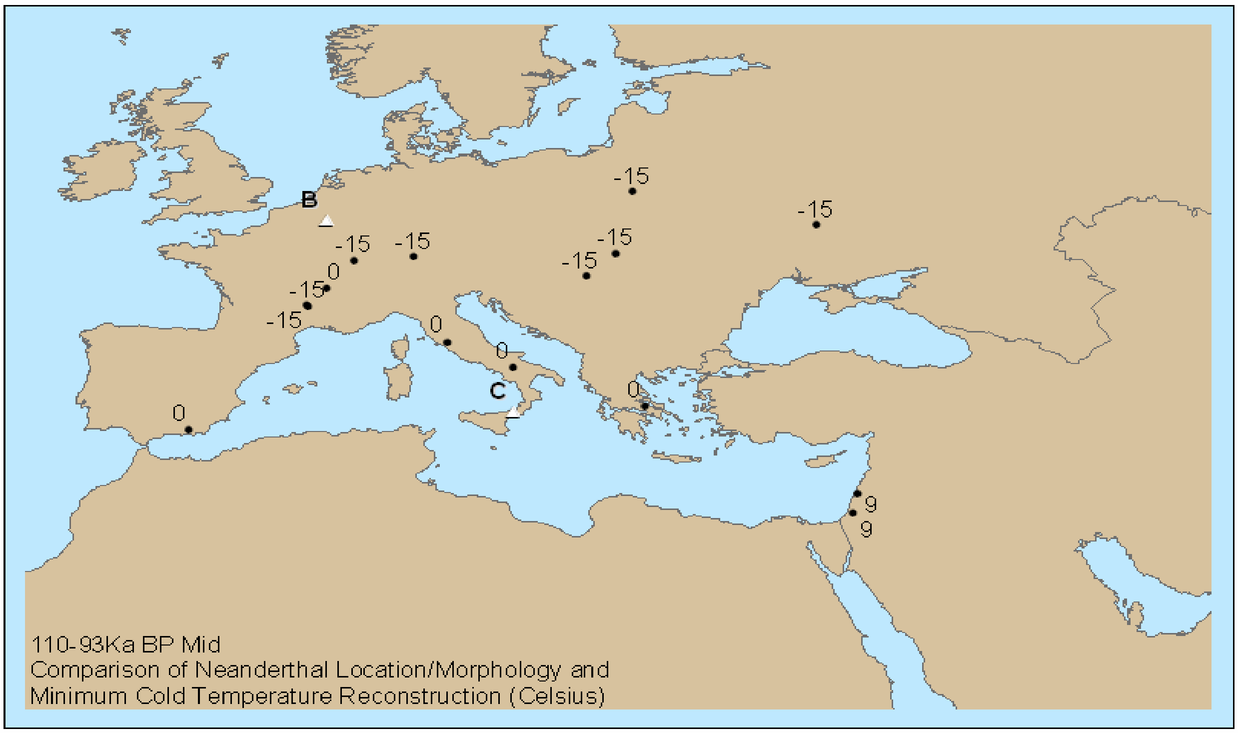
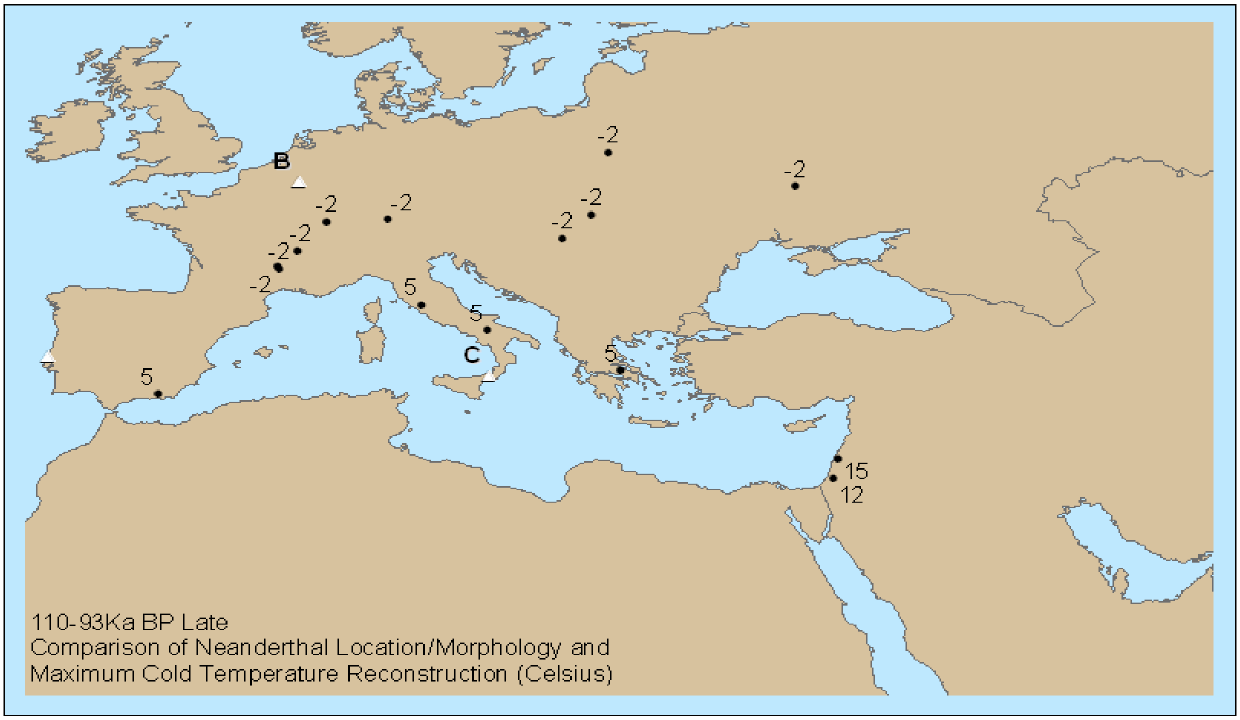


Figure 3.15: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid MIS5c time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



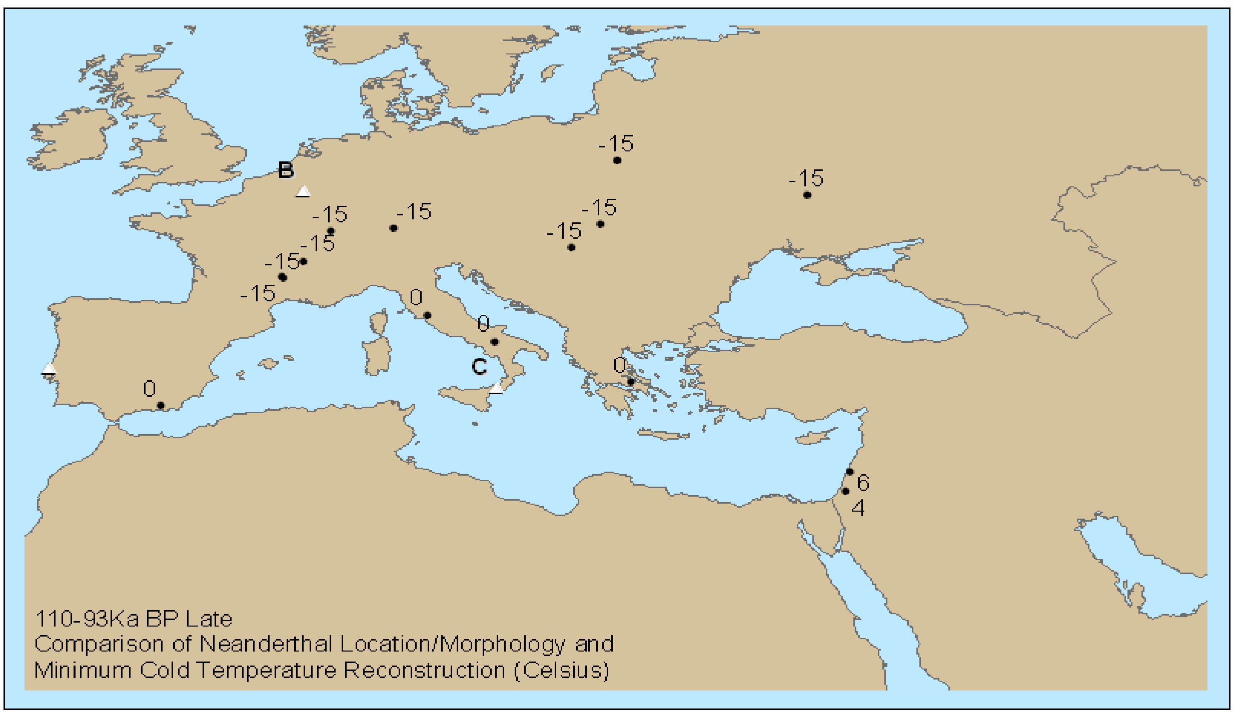
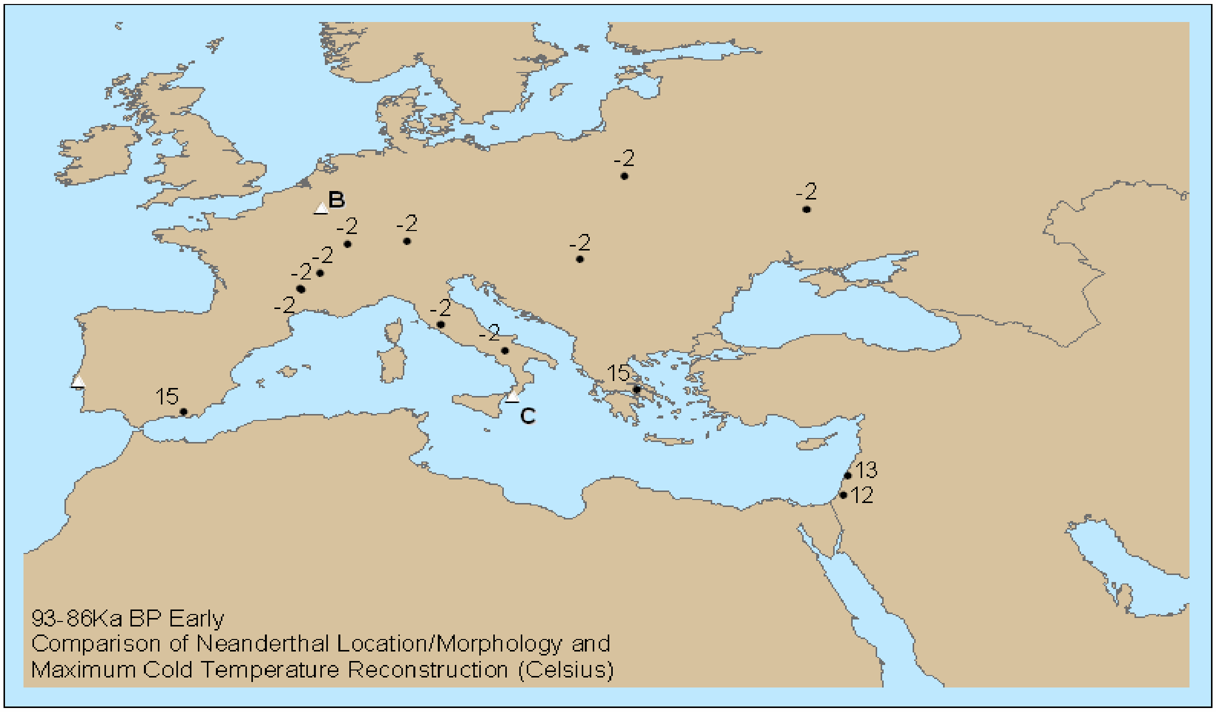


Figure 3.16: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS5c time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



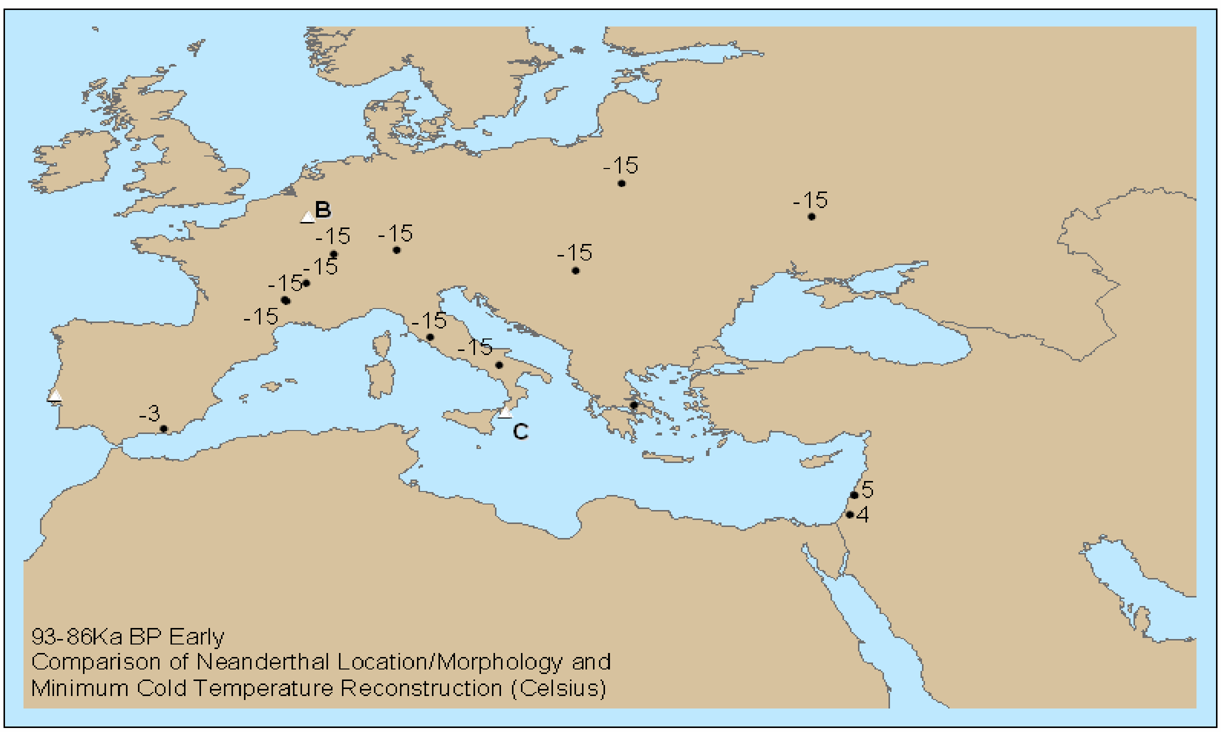
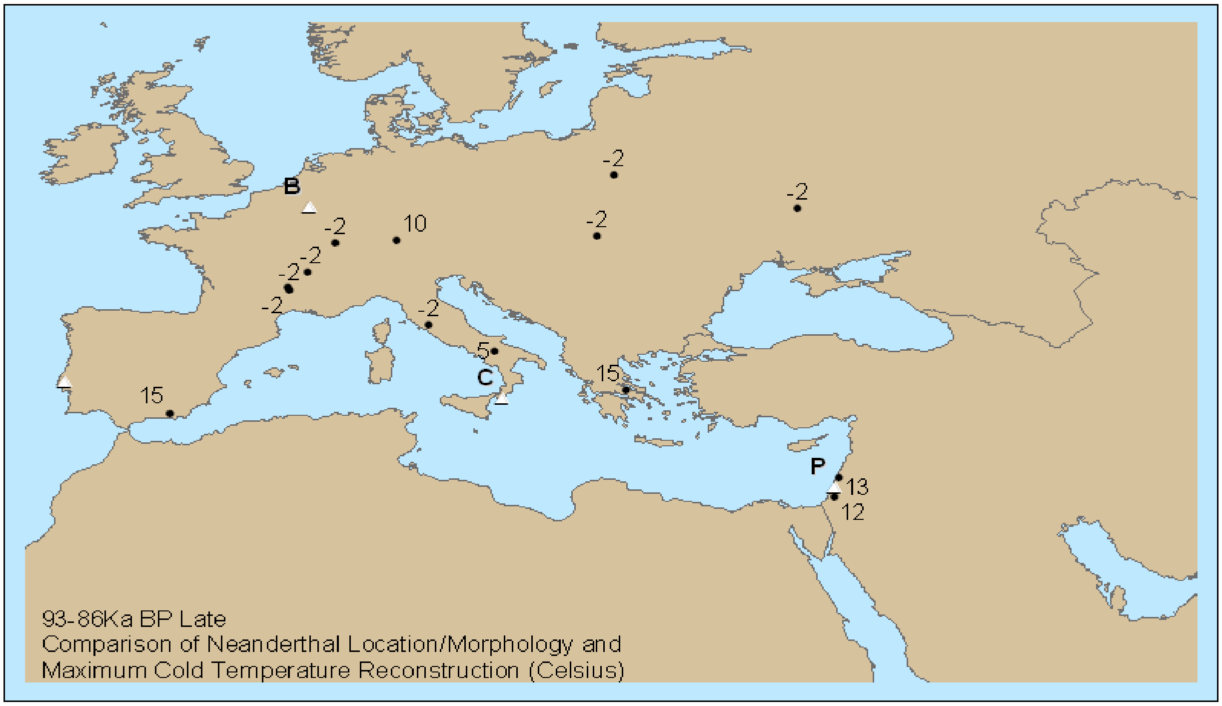


Figure 3.17: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS5b time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



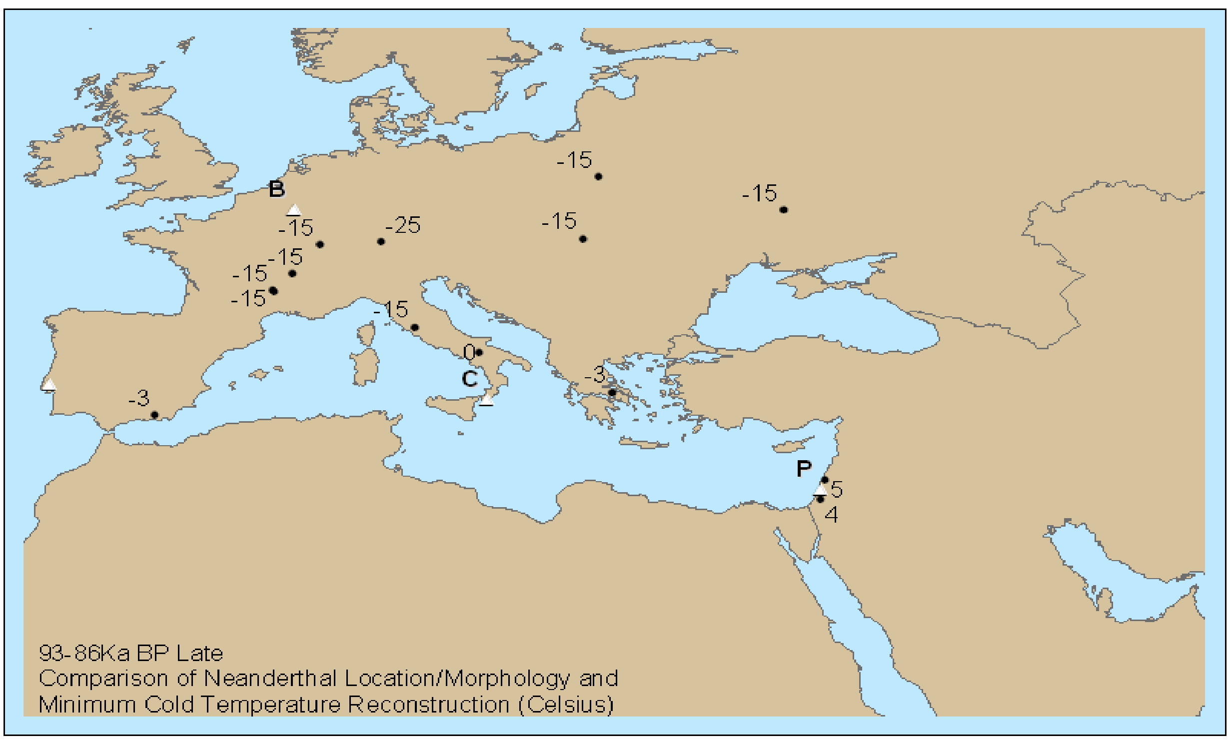
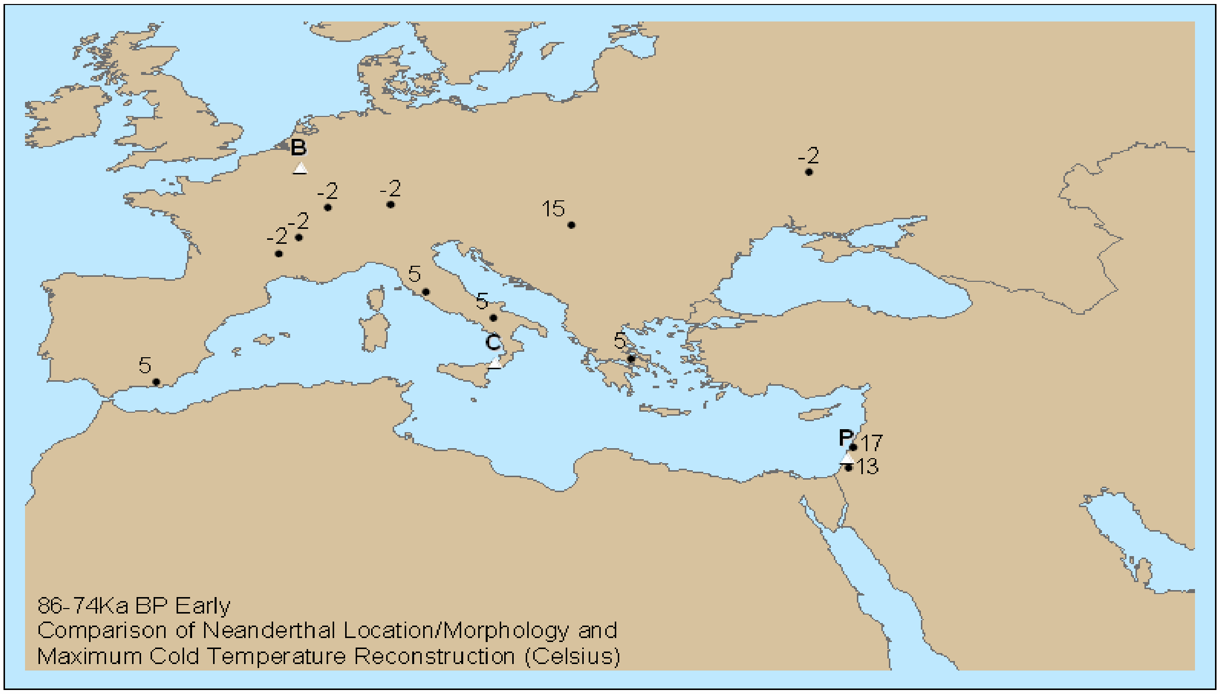


Figure 3.18: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS5b time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



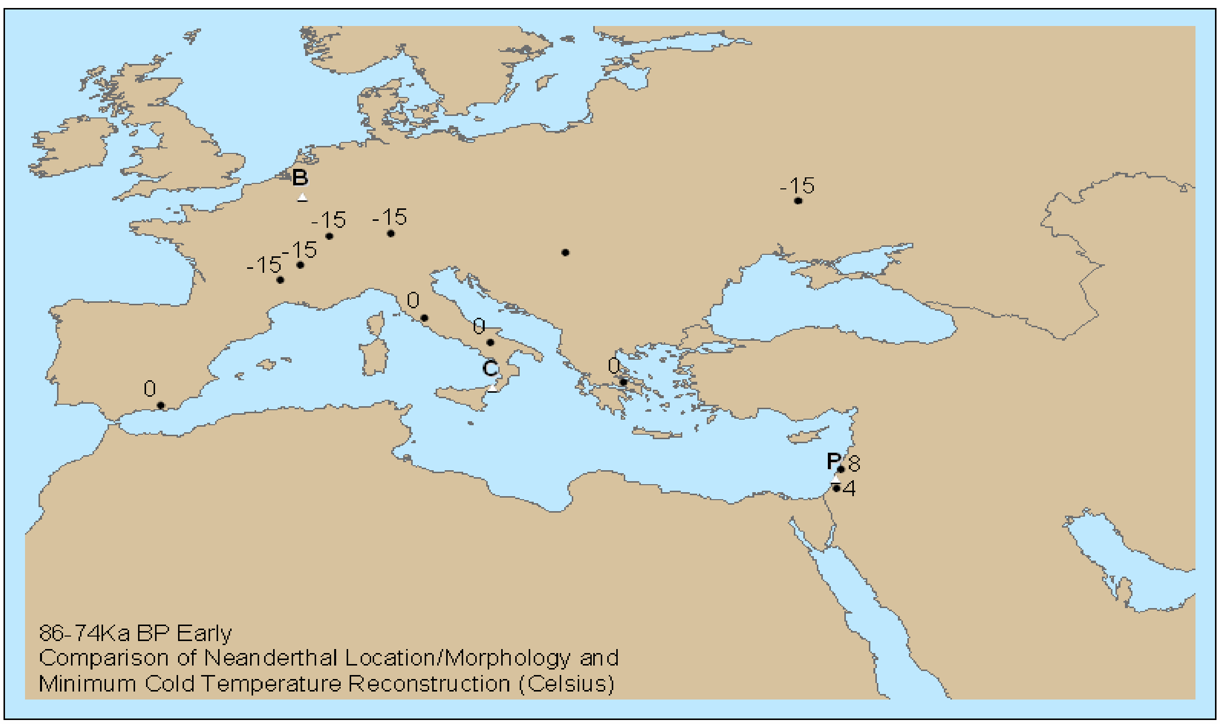
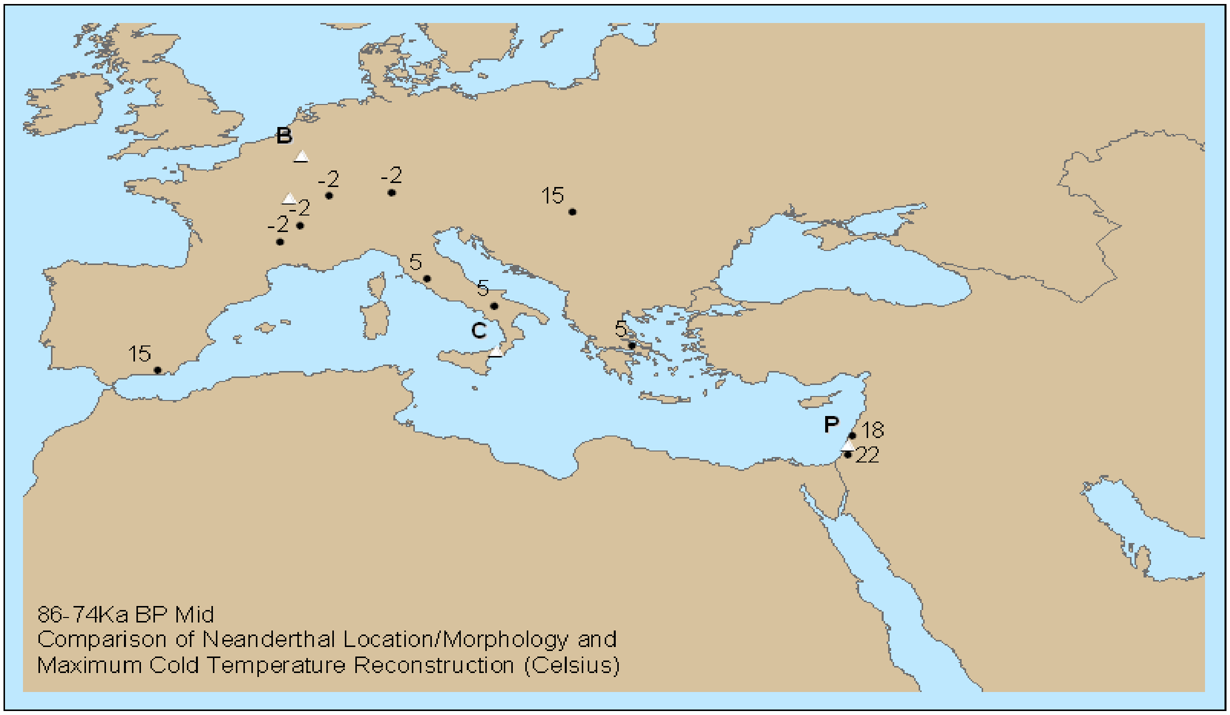


Figure 3.19: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS5a time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



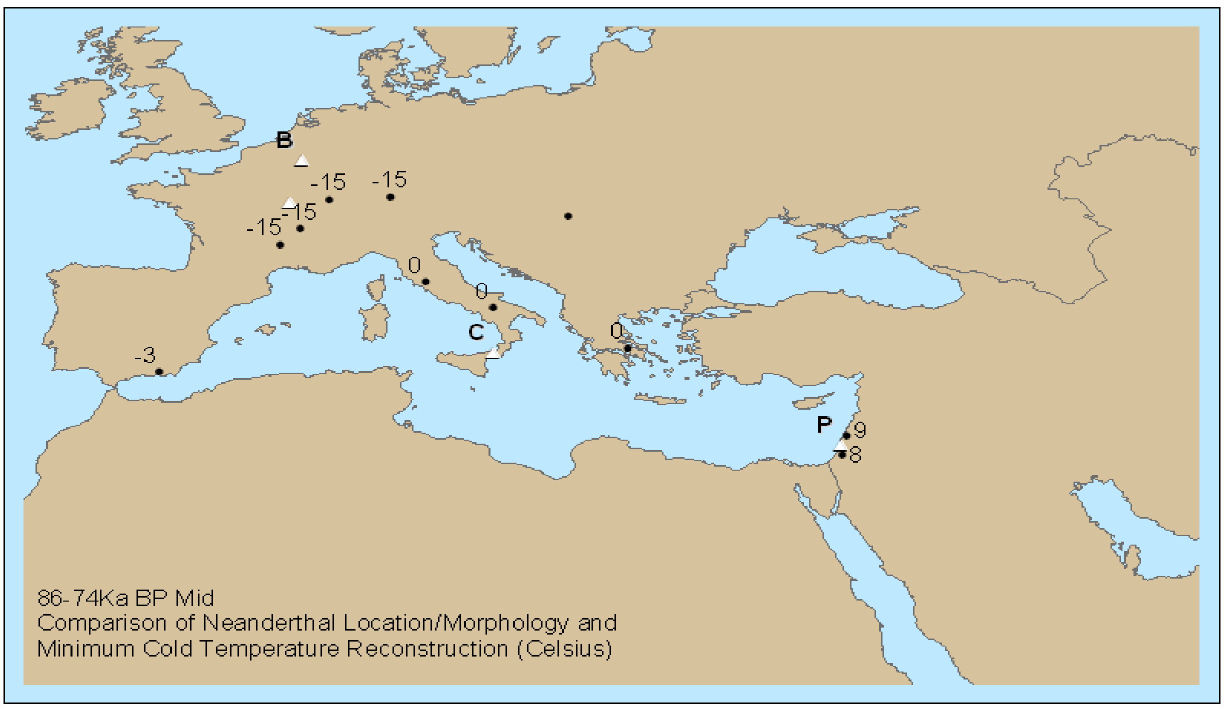
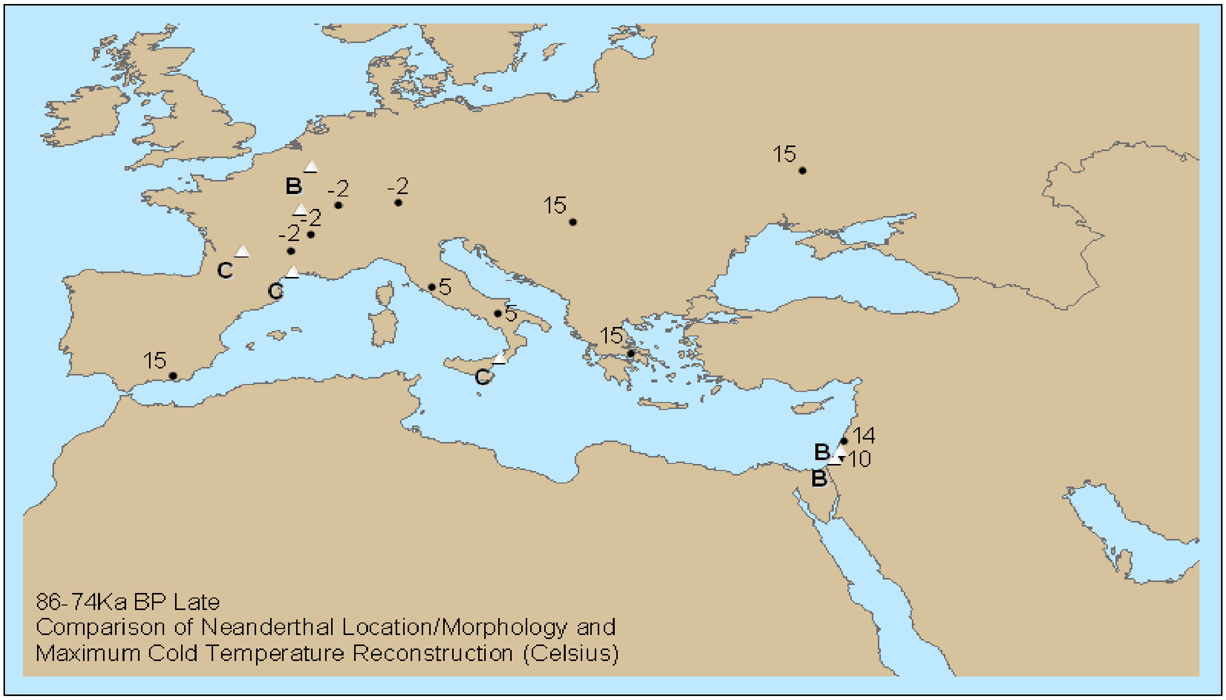


Figure 3.20: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid MIS5a time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



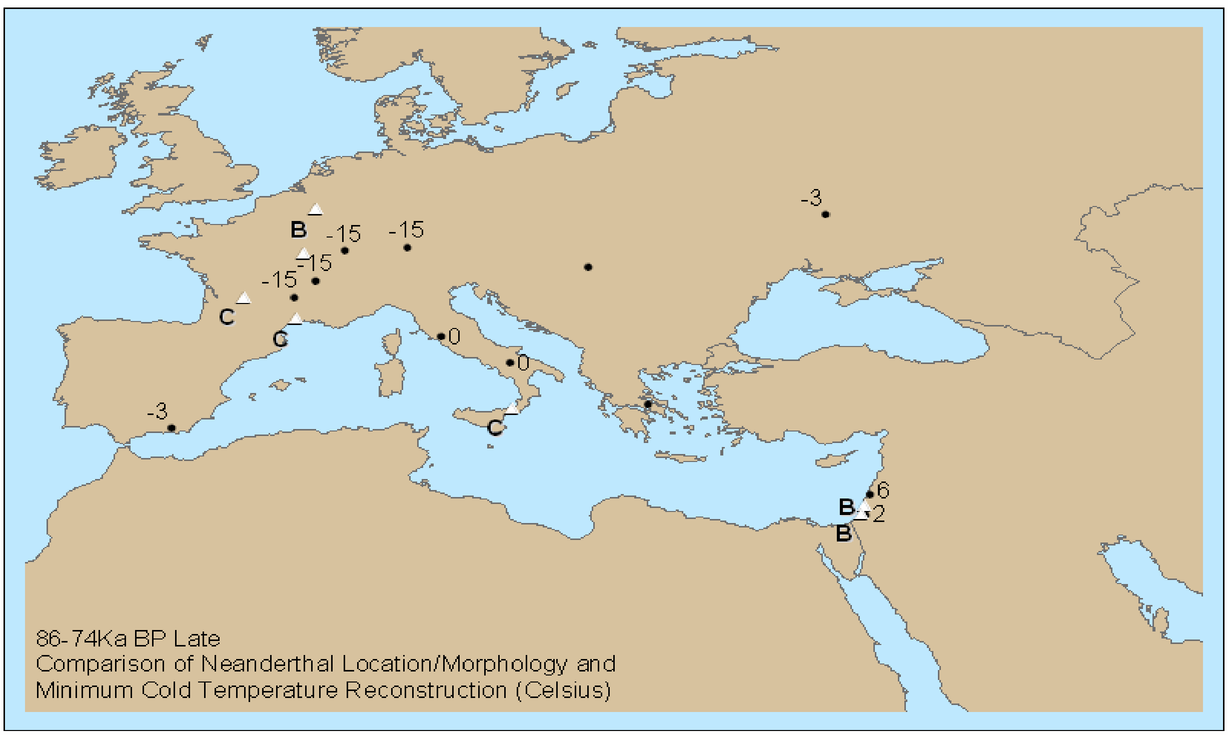


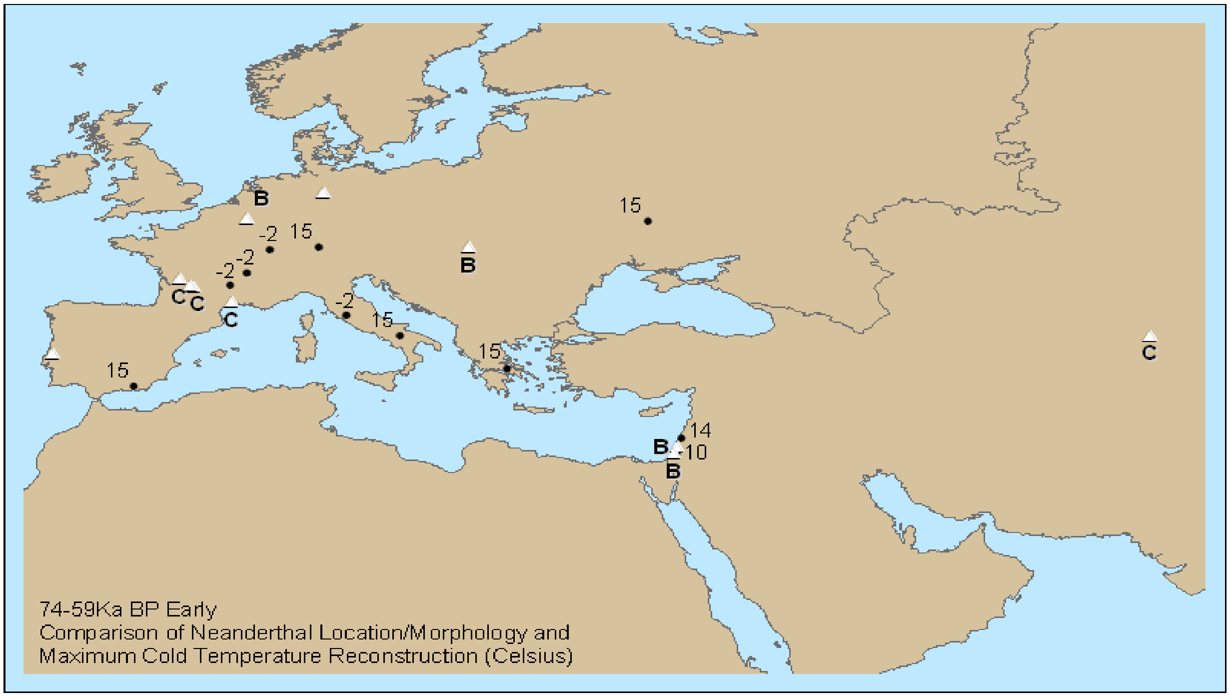
Figure 3.21: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS5a time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others

86-74Ka time-slice (Figure 3.21). Five are located in western and southern Europe (three Classic, one both Classic and Progressive and one undefined) and two sites associated with both Classic and Progressive morphological traits are found in the Eastern Mediterranean.

Eleven sites with Neanderthal skeletal remains belong in the early 74-59Ka time-slice (Figure 3.22; Table 3.6). Eight sites occur in the European area- four with Classic traits identified, two with both Classic and Progressive traits identified and two sites with morphologically undefined remains. Two sites occur in the East Mediterranean area, both with specimens exhibiting Classic and Progressive Neanderthal traits. This time-slice contains the farthest east Neanderthal specimen identified to date. This specimen occurs in Uzbekistan and exhibits Classic morphological traits.

Twelve Neanderthal sites occur within the mid 74-59Ka time-slice (Figure 3.23). Nine are found in the European area- four with morphologically Classic Neanderthal specimens, two with both Classic and Progressive morphological specimens and three with uncategorized morphological traits. Two are found in the Eastern Mediterranean area- one with Progressive traits and one with both Classic and Progressive traits. The Classic morphological specimen identified in the far eastern region of Uzbekistan also falls into this time-slice.

Twelve sites occur within the late 74-59Ka time-slice (Figure 3.24). Nine of these sites are in Europe and two are in the Eastern Mediterranean area. Of all twelve sites, the skeletal remains at four sites have Classic morphological traits, four sites have both Classic and Progressive Morphological traits and four sites were undefined.



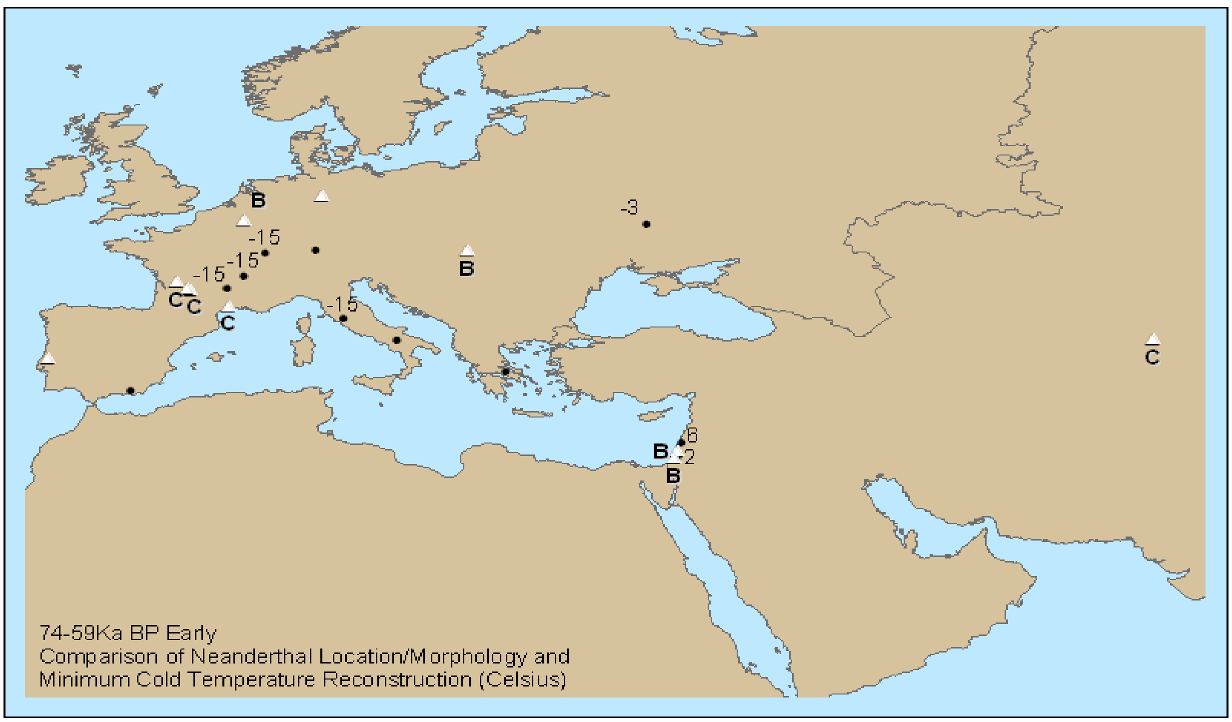
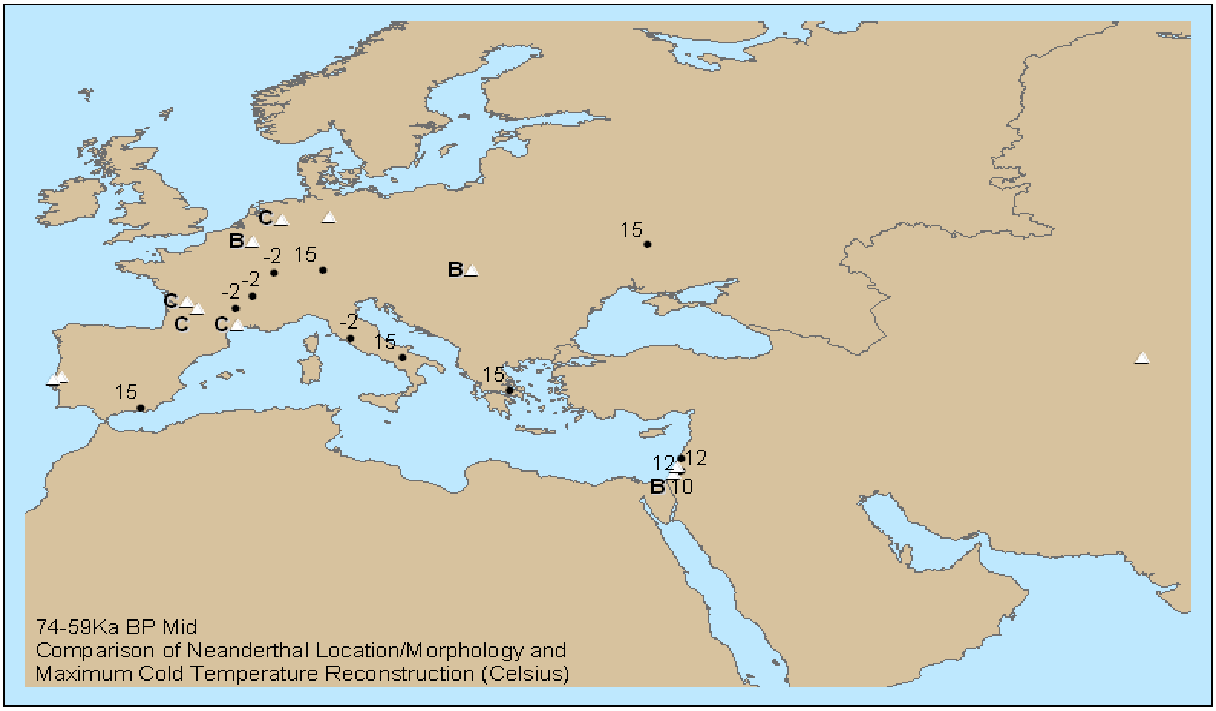


Figure 3.22: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS4 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others



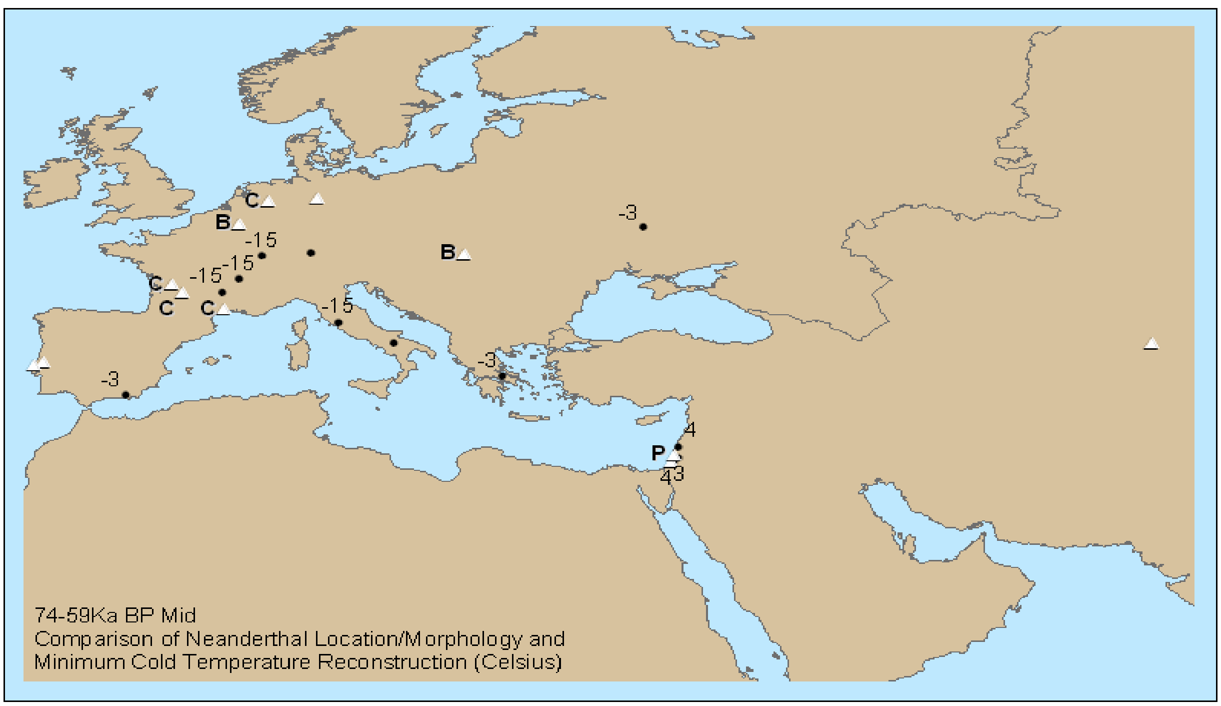


Figure 3.23: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid MIS4 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others

Figure 3.24: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS4 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others

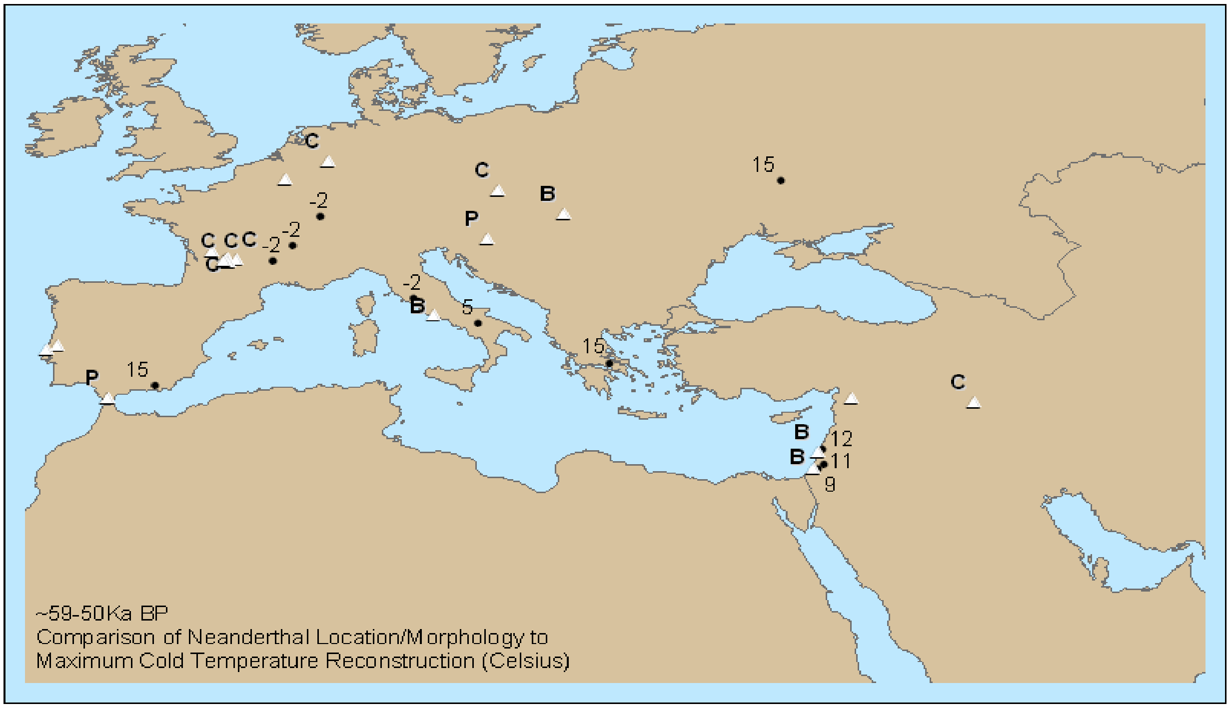
3.2.4. MIS 3 Early (59-50Ka) and Middle (50-40Ka) Time-slices

Eighteen sites with Neanderthal skeletal remains occur within the 59-50Ka time-slice (Figure 3.25; Table 3.7). Fourteen of those sites span across Europe and four sites span across the Eastern Mediterranean area. Of the European sites, seven of those have skeletal remains defined as having Classic morphological traits, two have skeletal remains defined as having Progressive morphological traits, two have skeletal remains with both Progressive and Classic traits and three could not be classified as either. Of the Eastern Mediterranean sites, one site has skeletal remains defined by Classic morphological traits, two sites have remains of both Classic and Progressive traits and one is undefined.

Twenty-one sites in the 50-40Ka time-slice are recognized to have Neanderthal skeletal remains (Figure 3.26; Table 3.7). Eighteen of those sites are located across Europe- seven Classic, two Progressive, two Classic and Progressive and seven not unequivocally defined as either. The other three sites are in the Eastern Mediterranean- one Classic, one Classic and Progressive and one undefined.

3.2.5. MIS 3 Mid to Late (40-34Ka, 34-29Ka and 29-25Ka) Time-slices

In the 40-34Ka time-slice, the eighteen sites with Neanderthal skeletal remains used in this study are only in Europe (Figure 3.27; Table 3.7). Of these sites, the remains at six sites have Classic morphological features, remains at two sites have Progressive features, remains at three sites have both Classic and Progressive features and seven are not defined as either Classic or Progressive.



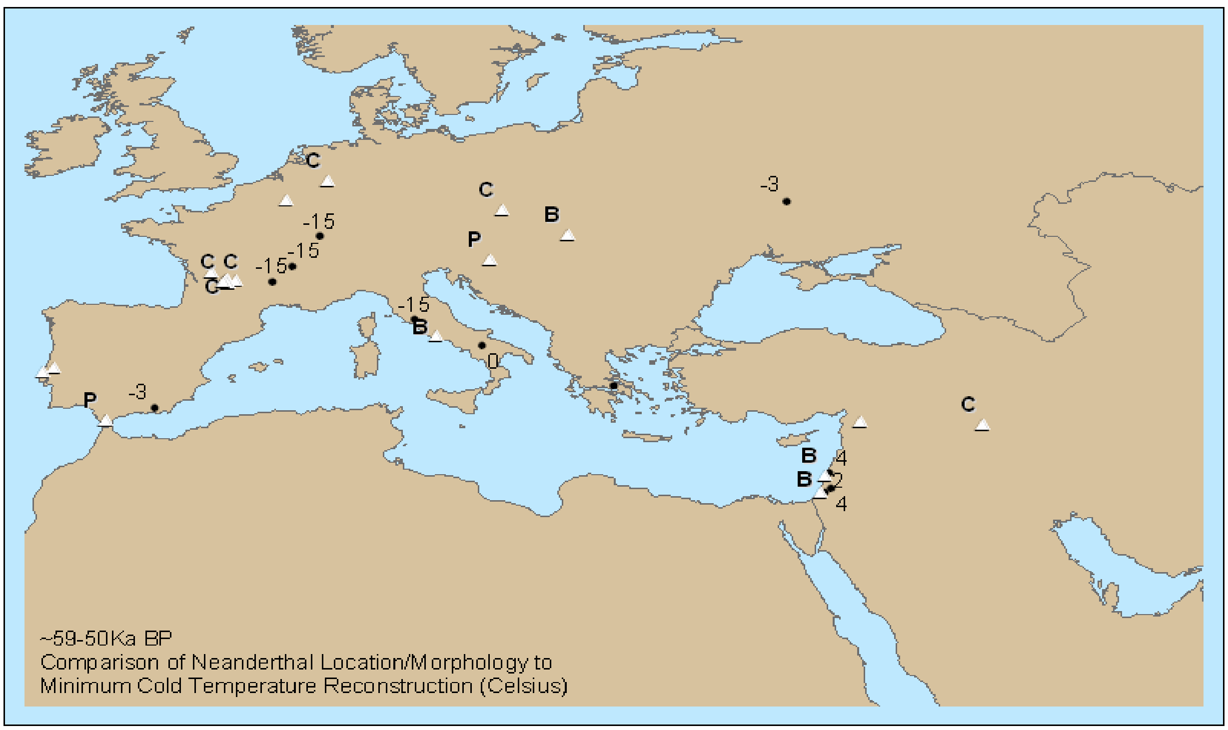


Figure 3.25: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in early MIS3 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others

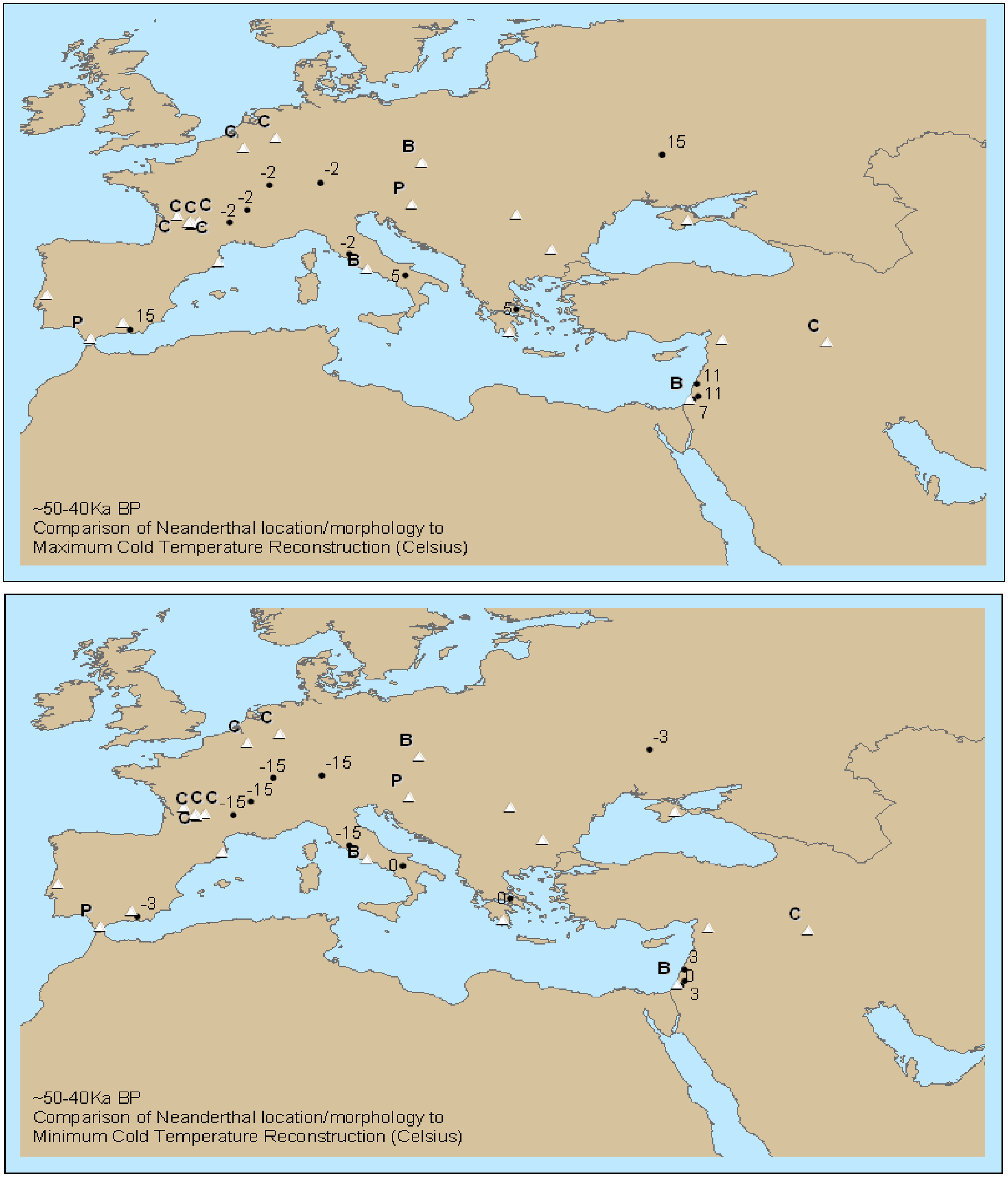


Figure 3.26: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid MIS3 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others

Figure 3.27: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid to late MIS3 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others.

In the 34-29Ka time-slice, sixteen sites with Neanderthal skeletal remains are identified, once again confined to the European area (Figure 3.28; Table 3.8). Of these sites, the remains at four sites have Classic morphological features, remains at one site have Progressive features, remains at one site have both Classic and Progressive features and ten are not defined as Classic or Progressive.

Eight sites with identified Neanderthal remains are dated to the 29-25Ka time-slice (Figure 3.27; Table 3.8). These remains are restricted to Western Europe, including a site along the eastern coast of Spain. Three sites are defined as having Classic-type Neanderthal specimens and the remaining five are undefined.

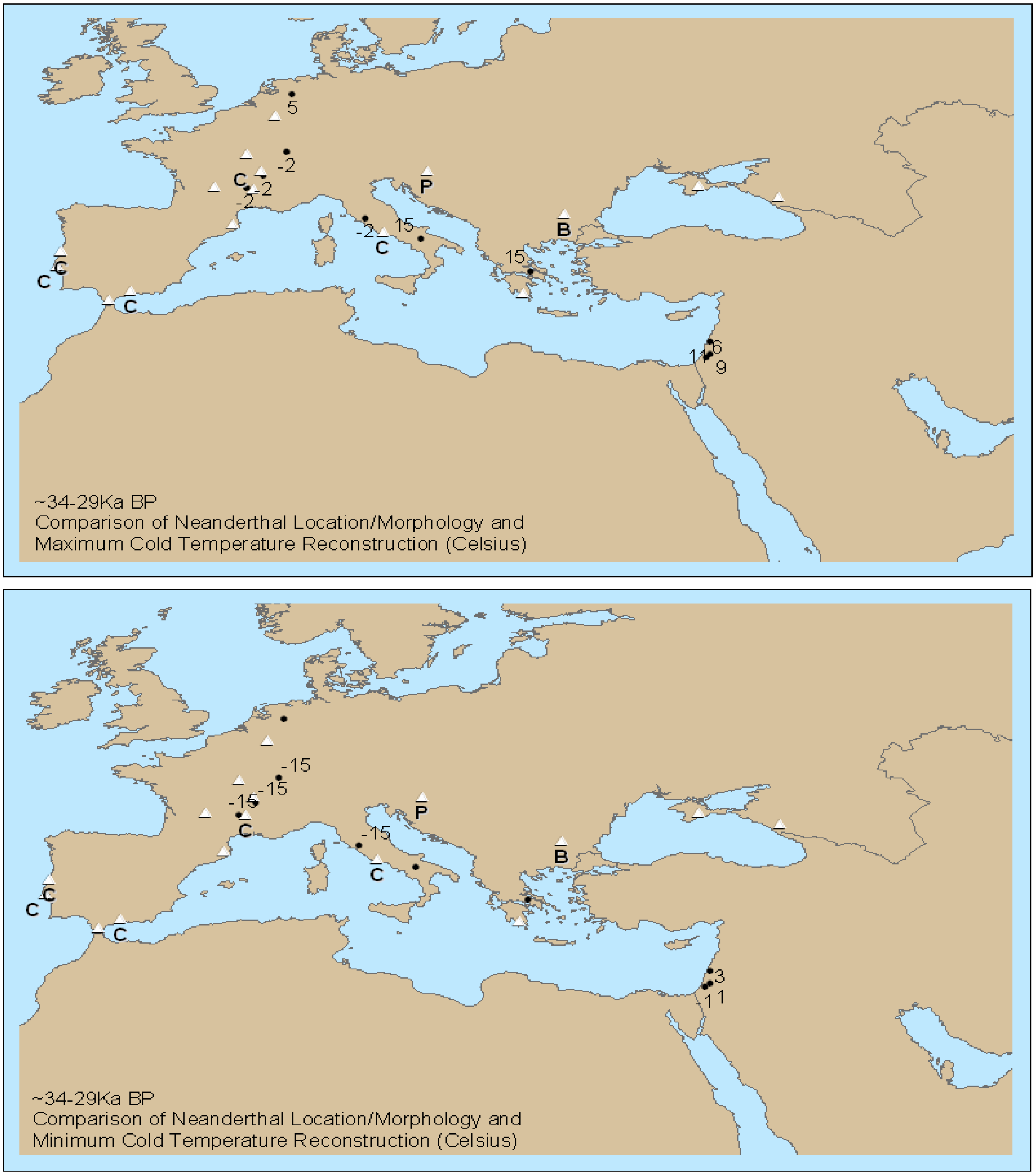


Figure 3.28: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in mid to late MIS3 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found). Due to scale and proximity, some points may obscure others.

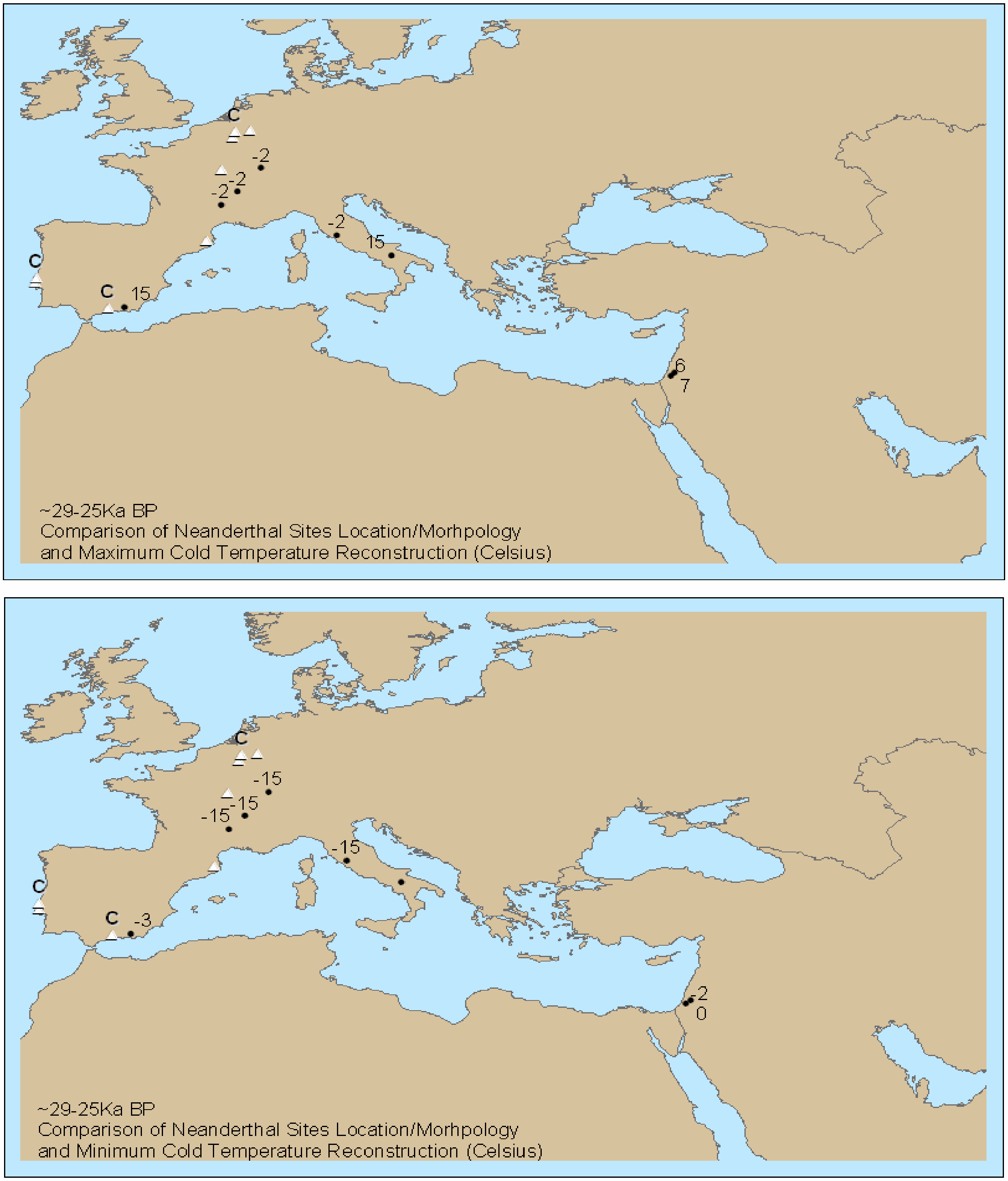


Figure 3.29: Comparison of Neanderthal site locations and morphological traits found at that site to maximum and minimum temperature reconstructions in late MIS3 time-slice. Black dots represent paleoclimatic data points, numbers are in degrees Celsius. White triangles represent sites where Neanderthal skeletal remains were found, with letter indicating dominant morphology found (C = Classic, P = Progressive and B = Both found) . Due to scale and proximity, some points may obscure others

CHAPTER 4: DISCUSSION:

4.1 Paleotemperature Reconstruction

The temperature values expressed in the GIS time-slice maps represent the temperature range (^{o}C) that could possibly have occurred during the coldest (winter) months as defined by the biomes reconstructed. Due to lack of detail available in some pollen diagrams used and lack of time control in others, the biomes reconstructed were generalized for the entire time-slice and do not reflect the degree of detail originally desired.

The original idea was to create isotherm maps from the reconstructed winter temperature ranges to better express the temperature variations which could have occurred during the coldest months over the time-slices. However, not enough data existed for the author to confidently draw such isothermal lines. To aid in isotherm map creation, computer-generated models were considered, as such models had been used in studies similar to this one to supplement data inferred (Alfano et al., 2003; Huntley et al., 2003; Prentice et al., 1996). However, the GSU geology department does not have ready access to such a program, nor could one be attained in the timetable required for this study. Even without isotherm maps, the area-restricted winter temperature ranges provide useful information for the Neanderthal morphology-to-climate comparison.

4.1.1. Variation in Europe

Superficial examination of the paleotemperature variation through all time-slices implies little fluctuation in most of Western and Eastern Europe and continuous

fluctuation along Europe bordering the Mediterranean Sea (Spain, Italy and Greece)Closer examination reveals local fluctuations in several time-slices. During the early 128-115Ka time-slice (Figure 3.1), the Ioannina site in Greece lags behind in the warming trend, expressing a lower cold temperature range (-15 to -2 ^{o}C) than the surrounding data points (0 to 5 ^{o}C). It is uncertain whether this anomaly is reflective of a regional variation from the average or if this is a result of biome reconstruction error. By the mid and late stages of this interglacial period, Ioannina has the same 0 to 5^{o}C cold month temperature range as all other European sites.

In the late 115-110Ka time-slice, two French data points (Lac du Bouchet and Les Echets) and the two Greek sites (Kopais and Ioannina) express a possible localized warming as compared to the other temperature ranges estimated for the European area. In the mid 110-93Ka time-slice, the Les Echets data point in France reconstructed to a warmer winter temperature range (0 to 5 ^{o}C) then the data for the surrounding region, possibly reflective of a localized warming or may be reflective of the general warming associated with this interstadial stage not as evident from nearby sites as analyzed in this study (Klotz et al., 2004; van Andel and Tzedakis, 1996).

In the late 93-86Ka time-slice, the biome reconstructed at the German data point of Furamoos has a winter temperature range of -25 to 10 ^{o}C (Figure 3.4). However, this does not mean temperatures definitely climbed higher than the -2 ^{o}C maximum limit of the surrounding area nor did it definitely reach minimum temperatures far below the -15 ^{o}C limit imposed on the surrounding area.

Near the beginning of MIS 4, which corresponds to time-slices 74-59Ka, reconstructed ranges allowed for warmer winter temperatures in the German data point

of Furamoos and at the East European data point of Vyazivok (Figures 3.6). Both data points could have gotten as high as 15 ^{o}C, matching the ranges seen in the southern European area bordering the Mediterranean Sea. This is significantly higher than the maximum winter temperature of -2 ^{o}C imposed on most of Western Europe. Again, the temperatures reconstructed in this time-slice do not mean that the temperatures during the winter months reached that high, but imply that temperatures could have reached that high. For these two data points, no lower limit is assigned to the Furamoos data point, but a minimum limit of -3 ^{o}C is imposed upon the Vyazivok data point. This implies that conditions in Eastern Europe were somewhat milder than conditions in Western Europe.

By the 59-50Ka time-slice, the Furamoos data point reconstruction correlated well with the French data point reconstructions (Figure 3.7). However, the Vyazivok data point continued to vary and imply milder climatic conditions in Eastern Europe. The -3 to 15 ^{o}C winter temperature month range continued to be associated with the data point up through the 50-40Ka time-slice. This is interesting as continental Europe is generally viewed as cooler than peninsular Europe since it lacks the effect of the warm Gulf Stream in the Atlantic Ocean (Lydolph, 1985). Unfortunately, enough data points with readily available pollen diagrams could not be found to accurately address this Eastern European issue. Further research with more data points and greater pollen diagram detail are needed to resolve this issue.

Data points for the Eastern European area after 40Ka could not be located for use in this study (Figure 3.7-3.8). This leaves a large gap in the temperature range reconstructions. This lack of data was not a set back to the purposes of this research,

as a majority of Neanderthal sites after this time occur in Western Europe. Additionally, the few Neanderthal sites which do occur in the East are closer to the Mediterranean coastline where the Italian data point and the Greek data point of Kopais can be used to infer basic climatic conditions. This correlation is discussed in a later section.

4.1.1.1 Problems from the use of previously established data

The French core data points (La Grande Pile, Les Echets, Lac du Bouchet, Praclaux) contain some of the most detailed and documented records for study (Reille et al., 1998; Reille and Beaulieu, 1995; Beaulieu and Reille 1992; Beaulieu and Reille, 1989; Woillard, 1978). Numerous studies have already been performed with thee data points, including reconstructing mean summer and winter month temperatures and precipitation amounts (Klotz et al., 2004; Caspers and Freud, 2001; Cheddadi et al., 1998). Such studies were useful for comparison to the results of this data to check accuracy.

Unfortunately, for this study the data found in these cores had to be averaged in order to fit into the time-slices necessary for the less detailed cores of Eastern Europe (Vyazivok, Timar, Kiskumfelegyhaza). These less detailed cores could not be completely disregarded without losing climatic data in less documented areas like Eastern Europe.

Another issue in the use of data from previously conducted studies stemmed from a lack of pollen diagrams during the 128-115Ka and 115-110Ka time-slices. No diagrams spanning into these time-frames could be found in the eastern European area, in the Iberian Peninsula or in Italy. Without more

data, the temperature range reconstructions for these time-slices are not as complete as desired.

4.1.1.2 Discrepancies in the Biomes Reconstructed

Factors which may have influenced the biomes reconstructed need to be addressed. First, the percentage of pollen taxa used to establish the biome of a time-slice is actually the mean percentage of the fluctuation within the defined time-slice. Only a few of the previously established pollen diagrams have the level of detail necessary to complete the study on a smaller timescale. Averaging the percentages of the more detailed pollen records was necessary to fit into the designated time-slices for comparison to the more generalized pollen records. Therefore, the biome inferred for each time-slice from the pollen data is generalized for the entire time-slice and can not reflect smaller scale changes. One study by Allen et al. (2000) documented a detailed change in biome over time for the Lago di Monticchio site and was useful for comparison to the biomes reconstructed for the same data point in this study for accuracy purposes.

Second, very few of the diagrams were associated with up to date absolute ages. Many of the studies provided radiocarbon dates up to 40Ka, and then relied on stratigraphic correlation to assign a relative date. In most of the previously conducted studies, the pollen data was grouped into pollen assemblages, which were then associated with a particular marine isotope stage.

Finally, the outside effect on reconstructed temperatures by wind action, surface ocean temperature and alpine glaciers was not considered in this study. All of these could have altered the temperature above or below the predicted temperature ranges of this study (Garrison, 2005; Ruddiman,2001)

4.1.2 Variations in the Eastern Mediterranean

The $\delta^{18}O$ records from the Israeli speleothems had the most potential in tracking temperature fluctuations on a smaller scale due to their detail. However, the study is limited by the assigned time-slices necessary to include the broadly dated Eastern European data points. Therefore, the paleotemperatures reconstructed via the speleothem records had to be averaged to produce a possible maximum temperature during the winter months and possible minimum temperature during the winter months. This process was explained in detail in the Methods section of this study.

Overall, a slow stable decrease in temperatures is reconstructed from the speleothem data in the Eastern Mediterranean (Israel). The highest predicted temperatures occur during the early 128-115Ka time-slice, the beginning of the last interglacial period (Figure 3.1). In the mid 128-115Ka time-slice, temperatures drop slightly, but remain much warmer than those assumed in the European area. Starting in the late 128-115Ka time-slice, the reconstructed temperatures stabilize, only fluctuating by a degree or two between 4 to 16 ^{o}C. This range dominated up through the late 115-110Ka time-slice (Figure 3.2).

Temperatures appeared to have risen a few degrees during the early and mid 110-93Ka time-slices (Figures 3.3). This is reasonable, as these time-slices roughly

correlate to MIS5c, a short interstadial period. In the late 110-93Ka time-slice, temperatures return to the same range before the warming: 4 to 16 ^{o}C. Again, this range fluctuated from time-slice to time-slice by one or two degrees, but otherwise remained fairly stable.

A brief warming in seen in the mid 86-74Ka time slice (Figure 3.5). This time-slice coincides with the middle of another established interstadial (Anderson et al., 2004). The temperature range here was between 8 to 22 ^{o}C. However, this warming was short lived, as temperatures dropped again in the late 86-74 Ka time-slice and remained near this level up through the 59-50Ka time-slice (Figure 3.7). Starting in the 50-40Ka time-slice, the predicted temperature ranges start to continuously, slowly drop. The range during the 50-40Ka time-slice is 0 to 11 ^{o}C, the range for the 40-34Ka time-slice is -1 to 10 ^{o}C, the range for the 34-29Ka time-slice is -1 to 11 ^{o}C and the range for the 29-25Ka time-slice is the coldest of the study, -2 to 7 ^{o}C. While these temperature ranges are rather mild in comparison to the European temperature ranges of the same time, they still emulate the climatic deterioration of the time leading up to the last glacial stage.

4.2 Neanderthal Morphological Differences

The cold month temperature ranges of a time-slice were directly compared to the occurrence of Neanderthals and the dominant morphology-type of a recovered Neanderthal specimen during a time-slice. This comparison did not reveal any climatically driven morphological changes but does dispute climatic conditions as the main driving factor in Neanderthal morphology. Overall, more Classic Neanderthal traits do occur in cooler climates while more Progressive Neanderthal traits do occur in warmer climates,

supporting the traditional views. However, a great deal of intermingling occurred and no temperature line could be draw between where Classic traits stopped and Progressive traits began. This lack of restriction of Classic traits only to cold climate and Progressive traits only to warm climate works toward disproving the traditional idea of robust Neanderthal traits being a direct result of a cold climate adaptation.

One hindrance in drawing a clear conclusion lies in the availability of morphological definition of the Neanderthal skeletal remains. In order to define the Neanderthal remains as either Classic or Progressive, previously conducted studies were used. Not all of the skeletal remains referenced had both detailed morphological description and accurate associated dates available for use. Table 4.1 chronicles the occurrence of the different morphological-types of Neanderthal relative to the reconstructed cold month temperature ranges within each time-slice. Areas of interest are highlighted and discussed in the following sections.

4.2.1 The Early Years

Although Neanderthal-like traits can be dated as far back as 230Ka, the traditional view places the appearance of a fully-developed Neanderthal (exhibiting all basic Neanderthal characteristics) to approximately 130Ka (Stringer et al., 2003; Poirier and McKee, 1999; Jordan, 1999). Neanderthal skeletal remains correlated to these early years (128-73Ka) are sparse, hindering a detailed analysis of morphology as related to climatic conditions. Still, a few observations are notable.

Both Classic and Progressive Neanderthal traits are observed in the well-established interglacial climate of MIS5e (~128-115Ka) in Western and Central Europe (Figures 3.9-3.11). In the late 128-115Ka time-slice, Neanderthal remains

Table 4.1. Summary Table of Neanderthal morphology type occurrence within specified cold month temperature range in each time-slice. Data points of particular interest as discussed in text are highlighted. Site in Uzbekistan is not included as no temperature reconstruction ranges extend that far east.

Time-slice (Ka BP)	General Cold Temperature Range (^{o}C)	Classic-type (# sites)	Progressive-type (# sites)	Both-types (# sites)	Not Defined (#sites)
128-115 Early	-15 to -2	1	0	1	1
	0 to 5	3	0	1	0
	15 to 30	0	0	0	0
128-115 Mid	0 to 5	3	0	4	2
	7 to 22	0	0	0	0
128-115 Late	0 to 5	2	1	3	1
	2 to 15	0	0	0	0
115-110 Early	-15 to -2	0	0	1	0
	0 to 5	1	0	0	0
	4 to 16	0	0	0	0
115-110 Late	-15 to -2	0	1	3	0
	0 to 5	2	0	0	0
	4 to 16	0	0	0	0
110-93 Early	-15 to -2	0	0	1	0
	0 to 5	1	0	0	0
	8 to 18	0	0	0	0
110-93 Mid	-15 to -2	0	0	1	0
	0 to 5	1	0	0	0
	9 to 18	0	0	0	0
110-93 Late	-15 to -2	0	0	1	0
	0 to 5	1	0	0	1
	4 to 15	0	0	0	0
93-86 Early	-15 to -2	0	0	1	0
	0 to 15	1	0	0	1
	4 to 13	0	0	0	0
93-86 Late	-15 to -2	0	0	1	0
	0 to 15	1	0	0	1
	4 to 13	0	1	0	0
86-74 Early	-15 to -2	0	0	1	0
	0 to 5	1	0	0	0
	4 to 17	0	1	0	0
86-74 Mid	-15 to -2	0	0	1	1
	0 to 5	1	0	0	0
	8 to 22	0	1	0	0
86-74 Late	-15 to -2	2	0	1	1
	0 to 15	1	0	0	0
	2 to 14	0	0	2	0

Table 4.1 continued…

Time-slice (Ka BP)	General Cold Temperature Range (^oC)	Classic-type (# sites)	Progressive-type (# sites)	Both-types (# sites)	Not Defined (#sites)
74-59 Early	-15 to -2	3	0	1	1
	-2 to 15	1	0	0	1
	2 to 14	0	0	2	0
74-59 Mid	-15 to -2	4	0	1	1
	-3 to 15	0	0	1	2
	3 to 12	0	1	1	0
74-59 Late	-15 to -2	3	0	1	1
	-3 to 15	0	0	2	3
	1 to 12	1	0	1	1
59-50	-15 to -2	6	0	0	1
	-3 to 15	1	2	2	2
	2 to 12	1	0	2	1
50-40	-15 to -2	7	0	0	0
	-3 to 15	0	2	2	7
	3 to 11	1	0	1	1
40-34	-15 to -2	4	0	1	4
	-3 to 15	2	2	2	4
	-1 to 10	0	0	0	0
34-29	-15 to -2	1	0	0	4
	-3 to 15	4	1	1	5
	-1 to 11	0	0	0	0
29-25	-15 to -2	3	0	0	3
	-3 to 15	0	0	0	2
	-2 to 7	0	0	0	0

exhibiting Progressive-type morphology are seen further north than the Neanderthal remains exhibiting Classic-type morphology (Figure 3.11). This is not extremely significant as the climate in the area at the time was rather mild. During this time, temperatures as reconstructed in this study did not dip below 0-5^oC during the cold winter months (Table 4.1 highlighted in green).

Two unsubstantiated theories are proposed for relatively simultaneous appearance of Classic and Progressive traits. Foremost, the Neanderthal specimens are restricted to the European area at this point. One traditional views place the

evolution of the fully developed Neanderthal as occurring in Europe during the cold glacial of MIS6, then migrating south and east as climate cooled prior to the last interglacial of MIS5e (Klein, 2004; Jordan, 1999). Therefore, this intermingling of Classic-type and Progressive-types early in the Neanderthal appearance could be due to a lack of early migration. This theory, however, raises the question of how two distinct types of morphological traits could have evolved under the same environmental conditions if these different traits are presumed to be adaptations to different climatic conditions (this study does not attempt to answer this question). Secondly, this interglacial has been documented in numerous studies as being quite mild (Klotz et al., 2004; Cheddadi et al., 1998; Aalbersberg and Litt, 1998; Kukla et al., 1996). Without cooler temperatures, there is no evidence of a climatic push on the Progressive-type Neanderthal to migrate for survival to warmer climates, leaving the supposed cold-inclined Classic-type Neanderthal to dominate.

The few Neanderthal specimens dated to the 115-93Ka time-slices continued to be restricted to Europe. In this study, it was not until the late 93-86Ka time-slice that a Progressive-type Neanderthal is identified in the Eastern Mediterranean area with a cold temperature range of 4 to 13^{o}C (Table 4.1, highlighted in blue). However, Neanderthal remains dated to this time are too sparse to draw any conclusions.

4.2.2 Neanderthal Expansion

The most complete record of Neanderthal skeletal remains can be dated back to approximately 70Ka and continuing up to approximately 30Ka (Poirier and McKee, 1999). In this study, the beginnings of this “Neanderthal expansion” can be

viewed in the early 74-59Ka time-slice (Figure 3.22). However, no division of Classic-type or Progressive-type Neanderthal can be seen by temperature occurrence. While strictly Classic traits are found only in the cooler European area and strictly Progressive features are found only in the warmer Eastern Mediterranean in this time-slice, remains of both Progressive-type and Classic-type morphology are found at sites in both predicted warm and cool regions.

Tangible evidence of opposition to the strictly cold-climate adaptation theory occurs in the late 74-59Ka time-slice. At this time, the Kebara cave site in the Eastern Mediterranean was identified as containing only a Classic-type Neanderthal specimen (Stringer and Gamble, 1993). Temperature in the area during this time slice did not drop below 1^{o}C- not necessarily warm, but not implying extreme cold condition either (Table 4.1, highlighted in pink). These temperatures supported Progressive-type Neanderthals alongside the Classic-type Neanderthals. While this fact alone does not discredit the cold-climate adaptation theory, it does illustrate the intermingling of the two morphological types of Neanderthal rather than a interspecies division dependant on climatic condition.

In both the 59-50Ka and 50-40Ka time-slices, Progressive-type Neanderthal remains are identified at the inferred cooler site of Vindija Cave, Croatia (Figure 3.25-3.26). Temperatures in this area could have gotten as cold as -3^{o}C and did not get warmer than 15^{o}C during the winter months (Table 4.1, highlighted in yellow). If strictly following the traditional view, the Progressive-type Neanderthal would not be as well equipped to handle the colder temperatures as the Classic-type Neanderthal. Yet they survived in this area through several time-slices. Classic-type Neanderthal

remains identified at the inferred warmer site of Shanidar Cave, Iraq through the 59-50Ka and 50-40Ka time-slices (Figures 3.25-3.26; Table 4.1, highlighted in green).

During the 40-34Ka time-slice, a definitely Classic-type Neanderthal and a definitely Progressive-type Neanderthal occur at two separate nearby sites in southern Spain (Figure 3.27). Cold month temperatures in this region could have varied widely between -3 ^{o}C to 15 ^{o}C (Table 4.1 highlighted in grey). The occurrence of a Classic-type Neanderthal in a presumed warmer climate does not completely dispute the cold-climate adaptation theory. It does, however, reinforce the higher level of intermingling the two morphological types engaged in, which in this study does not appear to be related to temperature variations. Further research into precise temperature occurrences as well as other climatic factors such as precipitation could reveal a pattern for this intermingling.

By the 40-34Ka time-slice, no skeletal remains have been identified in the Eastern Mediterranean. It is uncertain whether this is related to a drop in temperature as reconstructed from the speleothem data, whether such remains still remain to be found or whether Neanderthals were forced out of the area due to competition from anatomically modern human which also occupied the area (Poirier and McKee, 1999; Jordan, 1999; Stringer and Gamble, 1993). It is unlikely that temperature alone pushed the Neanderthal out of this region, as cold winter month ranges did not fluctuated much from previous time-slices.

4.2.2 The Final Years

The gracile traits of the Progressive Neanderthal continued to occur at the Vindja Cave site in Central Europe during mid to late MIS3 (~34-29Ka) when

temperatures were as cold as -15^{o}C (Figure 3.28). Neanderthal remains dated to these time-slices are sparse and often resigned to partial remains such as teeth and cranial fragments, making a morphological comparison to climate difficult (Davies et al., 2003; Schwartz and Tattersall, 2002). Regardless, by the 29-25Ka time-slice, Neanderthal remain recovery is restricted to the cold Western European region. Only the Classic-type morphological traits have been identified within this date range (Figure 3.29; Table 4.1, highlighted in red).

The disappearance of the Neanderthal from the archaeological record remains a subject of dispute. Some researchers believe the Neanderthal died out due to an inability to adapt to the continuously degrading climatic condition at the onset of the last glacial period (van Andel, 2003a; Stringer et al., 2003). The high frequency climatic change expressed as Dansgaard-Oeschger events beginning in MIS4 and continuing through MIS3 could have been too rapid for the Neanderthal to adapt. Others believe the Neanderthal were out-competed by early modern humans who migrated into the area (Mellars, 1999; Gat, 1999; Stringer and Gamble, 1993). Still others maintain that the Neanderthal did not die out at all, but interbred with *Homo sapiens* (Zilhao and Trinkaus, 2003; Smith 1994). This study does not attempt to address this issue and can neither support nor refute any of the theories based on the any evidence presented from this study.

4.2.3 Explanation for the Morphological Variation

One question that must be addressed is whether the morphological differences between the Classic Neanderthal and the Progressive Neanderthal are the result of speciation or natural variation within a species. Speciation occurs when

one species divides into two or more genetically distinct ones due to isolation by geographic or cultural barriers allowing separate evolutionary processes to take place (Finlayson, 2004; Poirier and McKee, 1999). The results of this study favor the two morphological types being the result of natural variation, as no climatic barrier could be identified. It was earlier noted that both Classic and Progressive-type Neanderthal are seen side-by-side early in the accepted time frame of the Neanderthal species. However, the split into two species could have occurred prior to the end of glacial MIS6 and outside the scope of this study. It is also possible that these are variants within one species, and not separate subspecies. Variation within a species population is often underestimated (Kurten, 1968). For instance, the size of limb bones of the Pleistocene cave lion varied widely in terms of ratio values (Kurten, 1968). Further research is necessary to adequately address the concept of speciation versus natural variation as an explanation for Neanderthal morphological differences.

One way to approach this problem would be to compare the variations seen in Neanderthal morphological traits in different geographic locations to variations seen in other Pleistocene mammals of the same locations. Morphological variation within Pleistocene mammalian species has already been confirmed (Kurten, 1968). Finding robust specimens of other mammalian species near the Classic-type Neanderthal and gracile specimens of the same species alongside Progressive-type Neanderthals could imply physical barriers as an explanation for varying morphological traits.

Cultural barriers could be revealed in studying variation in tool types or tool manufacturing techniques in relation to Classic and Progressive-morphological type Neanderthals. Francois Bordes identified five distinct Mousterian tool type varieties (Kuhn, 1995). He proposed that these different tool types implied cultural variability within the Neanderthal species (Kuhn, 1995). Lewis and Mary Binford disagreed and proposed that the tool type variations represent different toolkits used for different purposes within the same culture (Feder, 1997). Directly relating the location of different tool varieties to Neanderthal morphological-type occurrences in a method similar to this study could help resolve this disagreement.

4.3 Neanderthal Migration Patterns

Based on the data in this study, no definitive conclusions concerning the migration patterns of the Neanderthal as related to temperature change could be made due to a scarcity of Neanderthal sites used for mapping. Only sites with preserved Neanderthal skeletal remains were used in this study due to the emphasis on morphological changes. With such a small pool to study, any pattern of migration associated with climate change would be distorted.

The biggest problem in identifying Neanderthal migration patterns is the exclusion of Mousterian artifacts, the tool making technique uniquely associated with Neanderthals. As the emphasis on this study was on how climatic fluctuations affected Neanderthal morphology, tool-only sites were not seen as crucial. Future studies relating Mousterian tool occurrences as well as Neanderthal skeletal remains to climatic fluctuations could prove useful for establishing a migration pattern. Van Andel et al.

(2003b) drew a parallelism between Neanderthal movements and climatic change during Stage 3. They observed a rapid spread of Neanderthal sites across the Mediterranean and throughout Europe beginning around 59Ka with the MIS3 warm phase. Likewise, a withdrawal of sorts both westward and southeastward is noted, possibly as a response to an established cool phase beginning approximately 37Ka (van Andel et al, 2003b).

4.3.1 Basic Observations

Although no definite conclusions could be drawn, basic observations can be made. First, the Western European area appeared to have been continuously occupied at various sites throughout the entire temporal span despite temperature fluctuations. Second, Neanderthal occupation remained sparse outside of Western Europe up until the beginning of MIS4 (~74Ka). This migration south can not be related to climatic change based on the temperatures reconstructed in this study. Although this is an established cool stadial stage, the temperature ranges reconstructed are no lower than some of those in earlier time-slices.

Numerous Neanderthal skeletal remains had been dated to the 74-59Ka time-slices- spanning from Western Europe, into Central and Southern Europe and into the Mediterranean areas of Israel, Syria, Iran and Iraq. However, this observation could be skewed by lack of preservation or proper identification of Neanderthal skeletal remains for earlier time-slices. A majority of Neanderthal remains recovered from western and southern Europe and from the Eastern Mediterranean area are from cave sites (Davies et al., 2003, Schwartz and Tattersall, 2002; Poirier and McGee, 1999). Eastern Europe lacks such well-preserved sites, with Neanderthal occupation via toolkit correlations established at most open-air

sites. These open air sites lack the superior preservation status of the cave sites (Rapp and Hill, 1998). Just because more skeletal remains do not exist or have not yet been recovered in the Eastern European area does not necessarily mean they did not at one time exist.

The range of Neanderthal occupation shrank toward the end of MIS 3 when no Neanderthal skeletal remains are identified in the Eastern Mediterranean by 40Ka. By 29Ka, Neanderthal skeletal remain recovery is further restricted to Western Europe. All evidence of the Neanderthal disappeared by 25Ka (Poirier and McKee, 1999). Possible explanations for this Neanderthal extinction were discussed earlier in this section. Based on the data from this study, climatic conditions can not be attributed to this disappearance.

CHAPTER 5: CONCLUSIONS:

This study inferred paleotemperature from biome reconstruction and analysis of stable isotopes of speleothems in order to represent the range of cold month temperatures, which may have occurred during the Neanderthal time. Producing both GIS-generated maps and data tables allowed for direct correlation between the paleotemperature reconstructed at each paleoclimatic site and the occurrence of specific Neanderthal morphological traits. Several conclusions can be drawn from observations of the data compiled for this study.

1. The morphological traits of the Neanderthal did not appear to be solely climatically forced based on the data of this study. Classic-type morphological traits were consistently seen in northwestern Europe at times of cooler temperatures. However, generous intermingling of Classic-type and Progressive-type amongst both cool and warm reconstructed paleoclimate limits the idea of mutual exclusivity. Both Classic-type and Progressive-type morphological traits appear almost simultaneously in the same region amongst similar temperature occurrences (Figure 5.1). Progressive-type traits are notably absent at the beginning of the 29-25Ka time-slice, but this study does not reveal a major correlative decrease in temperatures as predicted by study.
2. No definite conclusions can be drawn concerning Neanderthal migration patterns from the data in this study. The main problem in drawing migratory conclusions was that the Neanderthal sites shown on these maps exclude Neanderthal sites where skeletal remains were not found. Future studies including sites where Neanderthal existence is evident by other evidence, such as lithic tools, may reveal a migration pattern.

Paleotemperature variation alone is unlikely to be the main driving force in Neanderthal migration patterns. The distribution of Neanderthal sites as viewed on the GIS-generated maps does not correlate with concurrent temperature fluctuations. Early in the Neanderthal existence, Neanderthal sites were restricted to the European area and do not appear in the warmer (and wetter during the early interglacial) Eastern Mediterranean area until the late 93-86Ka time-slice (Figure 5.1). No significant change in temperatures is seen in this study before or during this time-slice in the European area which could have forced migration. Likewise, Neanderthal sites continued to be more prevalent in the European area at this time.

No Neanderthal skeletal evidence was observed in the East Mediterranean area by the 40-34Ka time-slice, relative to a possible 5^{o}C drop in temperatures. This was the only point in this study where temperature changes appear to correlate to Neanderthal activity. Still it is more likely that other climatic variables (precipitation levels) or outside pressures such as change in food source and an expanding modern human population had more to do with the lack of Neanderthals in the East Mediterranean. Regardless of the reasons, by approximately 40Ka BP, Neanderthals were restricted to a cooler European area (Figure 5.1). Future studies of more detailed, smaller scale paleotemperature reconstructions may reveal refuge regions of warmer temperatures in the areas of Neanderthal sites.

3. Pollen diagrams from lacustrine terrestrial cores can be used to establish cold month temperature ranges across Europe. The Eastern European area was the limiting factor here, in that little pollen data from the cores has been published or made available for use. The core data which is available is limited chronologically and lacking significant detail

to track smaller scale fluctuations. As more detailed data becomes available for use, future studies may be able to rectify this problem.

Another option for improvement is to use computer generated models to test the temperature reconstructions. Different environmental factors such as the influence of coastal climate processes or the influence of alpine glaciers could be programmed into the computer model and better accounted for. Future research using such models can compliment (or in some cases contradict) the pollen-based biome and temperature reconstructions in this study.

4. $\delta^{18}O$ data recorded in speleothems holds the greatest potential for tracking small scale temperature fluctuations in great detail. Future studies would be necessary to establish the precise value of the meteoric waters throughout the speleothem's history could produce more accurate paleotemperature occurrences.

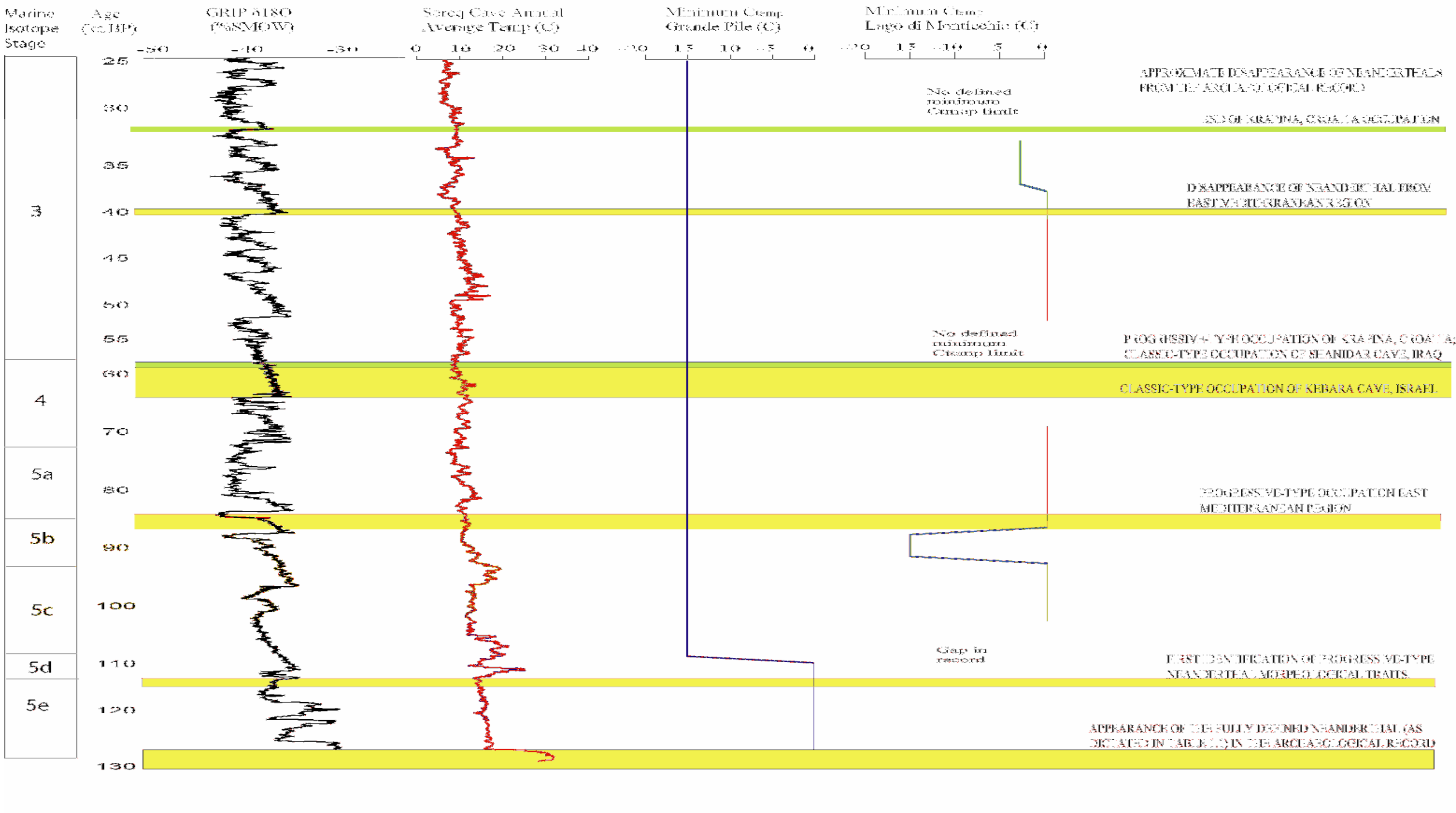


Figure 5.1: Occurrence of specific Neanderthal events (right), approximate time of events (left), comparison to GRIP δ^{18}O record (black), annual average reconstructed temperatures from the Soreq Cave, Israel (red), minimum cold month temperatures reconstructed at La Grande Pile, France (dark blue) and Lago di Monticchio, Italy (light blue)

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APPENDIX A: Pollen Percentage Conversion to Affinity Score

$A_{ik} = \Sigma_j\delta_{ij} (\{\max[0, (p_{jk}-\theta_j)]\})^{1/2}$
TOTAL = Total affinity score for biome

La Grande Pile, France

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Bet	Fra	Lar	Bu	Ulm	Tax	Hed	Ilex	Tilia	Chen	Cy	Acer	**Total**
128-115 Early																							
DTMF	0	0	5.41	0	3.75	0	0	0	2.12	0	6.24	0	0	0	0	0	0	0	0	0	0	0	17.52
ETMF	0	0	5.41	2.12	3.75	0	0	0	2.12	0	6.24	0	0	0	0	0	0	0	0	0	0	0	19.64
CMF1	0	0	5.41	0	3.75	0	2.12	4.26	2.12	2.12	6.24	2.6	0	0	3.75	3.75	0	0	1.22	0	0	0	37.34
TCF	0	0	5.41	2.12	3.75	0	2.12	4.26	2.12	2.12	6.24	0	0	0	3.75	0	0	0	1.22	0	0	0	33.11
TDF	0	0	5.41	0	3.75	2.6	2.12	4.26	2.12	2.12	6.24	2.6	0		3.75	3.75	0.707		1.22	0	0	1.22	41.867
CMF2	0	0	5.41	2.12	3.75	2.6	2.12	4.26	2.12	2.12	6.24	2.6	0	0	3.75	0	0	0	1.22	0	0	1.22	39.53
WMF	0	0	5.41	0	3.75	2.6	2.12	4.26	0	2.12	0	2.6	0		3.75	0	0.707		1.22	0	0	1.22	29.757
TSWS	0	0	5.41	0	3.75	0	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	11.28
TG	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	9.62
STWS	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	9.62
DSS		3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.87
HD		3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.87
SDST	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	3.45	0	13.07
128-115 Mid																							
DTMF	0	0	2.6	0	2.12	0	0	0	5.35	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.67
ETMF	0	0	2.6	3.45	2.12	0	0	0	5.35	0	2.6	0	0	0	0	0	0	0	0	0	0	0	16.12
CMF1	0	0	2.6	0	2.12	0	5.19	6.24	5.35	5.35	2.6	2.6	0	0	1.58	1.58	0	0	0	0	0	0	35.21
TCF	0	0	2.6	3.45	2.12	0	5.19	6.24	5.35	5.35	2.6	0	0	0	1.58	0	0	0	0	0	0	0	34.48
TDF	0	0	2.6	0	2.12	5.81	5.19	6.24	5.35	5.35	2.6	2.6	0	1.58	1.58	1.58	0	2.12	0	0	0	0.707	45.427
CMF2	0	0	2.6	3.45	2.12	5.81	5.19	6.24	5.35	5.35	2.6	2.6	0	0	1.58	0	0	0	0	0	0	0.707	43.597
WMF	0	0	2.6	0	2.12	5.81	5.19	6.24	0	5.35	2.6	2.6	0	1.58	1.58	0	0	2.12	0	0	0	0.707	38.497
TSWS	0	0	2.6	0	2.12	5.81	0	0	0	5.35	0	0	0	0	0	0	0	0	0	0	0	0	15.88
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	6.36
128-115 Late																							
DTMF	0	0	7	0	2.12	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	14.32
ETMF	0	0	7	5.86	2.12	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	20.18
CMF1	0	0	7	0	2.12	0	2.12	2.6	2.6	2.12	2.6	2.12	0	0	0.707	0	0	0	0	0	0	0	23.987
TCF	0	0	7	5.86	2.12	0	2.12	2.6	2.6	2.12	2.6	0	0	0	0.707	0	0	0	0	0	0	0	27.727
TDF	0	0	7	0	2.12	2.6	2.12	2.6	2.6	2.12	2.6	2.12	0	1.22	0.707	0	0	2.12	0	0	0	0.707	30.634

CMF2	0	0	7	5.86	2.12	2.6	2.12	2.6	2.6	2.12	2.6	2.12	0	0	0.707	0	0	0	0	0	0	0.707	33.154
WMF	0	0	7	0	2.12	2.6	2.12	2.6	0	2.12	2.6	2.12	0	1.22	0.707	0	0	2.12	0	0	0	0.707	28.034
TSWS	0	0	7	0	2.12	2.6	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	13.84
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
115-110 Early																							
DTMF	0	0	3.08	0	3.08	0	0	0	3.08	0	4.42	0	0	0	0	0	0	0	0	0	0	0	13.66
ETMF	0	0	3.08	3.81	3.08	0	0	0	3.08	0	4.42	0	0	0	0	0	0	0	0	0	0	0	17.47
CMF1	0	0	3.08	0	3.08	0	2.12	2.12	3.08	3.08	4.42	0	0	0	0	0	0	0	0	0	0	0	20.98
TCF	0	0	3.08	3.81	3.08	0	2.12	2.12	3.08	3.08	4.42	0	0	0	0	0	0	0	0	0	0	0	24.79
TDF	0	0	3.08	0	3.08	2.12	2.12	2.12	3.08	3.08	4.42	0	0	0	0	0	0	0	0	0	0	0	23.1
CMF2	0	0	3.08	3.81	3.08	2.12	2.12	2.12	3.08	3.08	4.42	0	0	0	0	0	0	0	0	0	0	0	26.91
WMF	0	0	3.08	0	3.08	2.12	2.12	2.12	0	3.08	4.42	0	0	0	0	0	0	0	0	0	0	0	20.02
TSWS	0	0	3.08	0	3.08	2.12	0	0	0	3.08	0	0	0	0	0	0	0	0	0	0	0	0	11.36
TG	7.04	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	12.24
STWS	7.04	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	12.24
DSS	0	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.2
HD	0	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.2
SDST	7.04	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	3.08	0	15.32
115-110 Late																							
DTMF	0	0	2.6	0	2.6	0	0	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	11.55
ETMF	0	0	2.6	2.97	2.6	0	0	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	14.52
CMF1	0	0	2.6	0	2.6	0	2.12	0	2.6	2.6	3.75	0	0	0	0	0	0	0	0	0	0	0	16.27
TCF	0	0	2.6	2.97	2.6	0	2.12	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	16.64
TDF	0	0	2.6	0	2.6	2.12	2.12	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	15.79
CMF2	0	0	2.6	2.97	2.6	2.12	2.12	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	18.76
WMF	0	0	2.6	0	2.6	2.12	2.12	0	0	0	3.75	0	0	0	0	0	0	0	0	0	0	0	13.19
TSWS	0	0	2.6	0	2.6	2.12	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	7.32
TG	5.73	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.45
STWS	5.73	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.45
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
SDST	5.73	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12		0	10.45
110-93 Early																							
DTMF	0	0	6.17	0	2.12	0	0	0	2.12	0	5.35	0	0	0	0	0	0	0	0	0	0	0	15.76
ETMF	0	0	6.17	2.6	2.12	0	0	0	2.12	0	5.35	0	0	0	0	0	0	0	0	0	0	0	18.36

CMF1	0	0	6.17	0	2.12	0	2.12	2.12	2.12	2.12	5.35	1.58	0	0	0	0	0	0	0	0	0	0	23.7
TCF	0	0	6.17	2.6	2.12	0	2.12	2.12	2.12	2.12	5.35	0	0	0	0	0	0	0	0	0	0	0	24.72
TDF	0	0	6.17	0	2.12	4.93	2.12	2.12	2.12	2.12	5.35	1.58	0	0	0	0	0	0	0	0	0	0.707	29.337
CMF2	0	0	6.17	2.6	2.12	4.93	2.12	2.12	2.12	2.12	5.35	1.58	0	0	0	0	0	0	0	0	0	0.707	31.937
WMF	0	0	6.17	0	2.12	4.93	2.12	2.12	0	2.12	5.35	1.58	0	0	0	0	0	0	0	0	0	0.707	27.217
TSWS	0	0	6.17	0	2.12	4.93	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	15.34
TG	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
STWS	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	7.69
110-93 Mid																							
DTMF	0	0	3.45	0	2.12	0	0	0	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	12.41
ETMF	0	0	3.45	4.93	2.12	0	0	0	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	17.34
CMF1	0	0	3.45	0	2.12	0	5.86	2.6	2.12	2.12	2.6	0	2.12	0	2.12	0	0	0	0	0	0	0	25.11
TCF	0	0	3.45	4.93	2.12	0	5.86	2.6	2.12	2.12	2.6	0	2.12	0	2.12	0	0	0	0	0	0	0	30.04
TDF	0	0	3.45	0	2.12	2.12	5.86	2.6	2.12	2.12	2.6	0	2.12	2.12	2.12	0	0	0	0	0	0	0	29.35
CMF2	0	0	3.45	4.93	2.12	2.12	5.86	2.6	2.12	2.12	2.6	0	2.12	0	2.12	0	0	0	0	0	0	0	32.16
WMF	0	0	3.45	0	2.12	2.12	5.86	2.6	0	2.12	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	25.11
TSWS	0	0	3.45	0	2.12	2.12	0	0	0	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	11.93
TG	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
STWS	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	7.69
110-93 Late																							
DTMF	0	0	7	0	2.12	0	0	0	2.12	0	4.93	0	0.707	0	0	0	0	0	0	0	0	0	16.877
ETMF	0	0	7	4.93	2.12	0	0	0	2.12	0	4.93	0	0.707	0	0	0	0	0	0	0	0	0	21.807
CMF1	0	0	7	0	2.12	0	5.86	2.6	2.12	2.12	4.93	0	0.707	0	0.707	0	0	0	0.707	0	0	0	28.871
TCF	0	0	7	4.93	2.12	0	5.86	2.6	2.12	2.12	4.93	0	0.707	0	0.707	0	0	0	0.707	0	0	0	33.801
TDF	0	0	7	0	2.12	2.12	5.86	2.6	2.12	2.12	4.93	0	0.707	0	0.707	0	0	0	0.707	0	0	0	30.991
CMF2	0	0	7	4.93	2.12	2.12	5.86	2.6	2.12	2.12	4.93	0	0.707	0	0.707	0	0	0	0.707	0	0	0	35.921
WMF	0	0	7	0	2.12	2.12	5.86	2.6	0	2.12	4.93	0	0	0	0.707	0	0	0	0.707	0	0	0	28.164
TSWS	0	0	7	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	13.36
TG	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	7.69
STWS	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	7.69
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.24
SDST	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.12	0	9.81
93-86 Early																							

DTMF	0	0	3.24	0	2.12	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	0	0	0	12.41
ETMF	0	0	3.24	2.6	2.12	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	0	0	0	15.01
CMF1	0	0	3.24	0	2.12	0	2.12	2.6	2.12	2.12	4.93	0	0	0	0.707	0	0	0	0	0	0	0	19.957
TCF	0	0	3.24	2.6	2.12	0	2.12	2.6	2.12	2.12	4.93	0	0	0	0.707	0	0	0	0	0	0	0	22.557
TDF	0	0	3.24	0	2.12	2.12	2.12	2.6	2.12	2.12	4.93	0	0	0	0.707	0	1.58	0	0	0	0	0	23.657
CMF2	0	0	3.24	2.6	2.12	2.12	2.12	2.6	2.12	2.12	4.93	0	0	0	0.707	0	0	0	0	0	0	0	24.677
WMF	0	0	3.24	0	2.12	2.12	2.12	2.6	0	2.12	4.93	0	0	0	0.707	0	1.58	0	0	0	0	0	21.537
TSWS	0	0	3.24	0	2.12	2.12	0	0	0	2.12	0	0	0		0	0	0	0	0	0	0	0	9.6
TG	5.15	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.69
STWS	5.15	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.69
DSS	0	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	6.54
HD	0	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	6.54
SDST	5.15	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12		0	11.69
93-86 Late																							
DTMF	0	0	3.24	0	2.6	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	0	0	0	12.89
ETMF	0	0	3.24	2.6	2.6	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	0	0	0	15.49
CMF1	0	0	3.24	0	2.6	0	2.12	2.6	2.12	2.12	4.93	0	0	0	0	0	0	0	0	0	0	0	19.73
TCF	0	0	3.24	2.6	2.6	0	2.12	2.6	2.12	2.12	4.93	0	0	0	0	0	0	0	0	0	0	0	22.33
TDF	0	0	3.24	0	2.6	2.12	2.12	2.6	2.12	2.12	4.93	0	0	0	0	0	0	0	0	0	0	0	21.85
CMF2	0	0	3.24	2.6	2.6	2.12	2.12	2.6	2.12	2.12	4.93	0	0	0	0	0	0	0	0	0	0	0	24.45
WMF	0	0	3.24	0	2.6	2.12	2.12	2.6	0	2.12	4.93	0	0	0	0	0	0	0	0	0	0	0	19.73
TSWS	0	0	3.24	0	2.6	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	10.08
TG	5.15	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.69
STWS	5.15	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.69
DSS	0	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	6.54
HD	0	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	6.54
SDST	5.15	4.42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.6	0	14.29
86-74 Early																							
DTMF	0	0	2.12	0	2.12	0	0	0	2.12	0	6.24	0	0	0	0	0	0	0	0	0	0	0	12.6
ETMF	0	0	2.12	2.12	2.12	0	0	0	2.12	0	6.24	0	0	0	0	0	0	0	0	0	0	0	14.72
CMF1	0	0	2.12	0	2.12	0	2.12	5.41	2.12	2.12	6.24	0	0	0	1.58	0	0	0	0	0	0	0	23.83
TCF	0	0	2.12	2.12	2.12	0	2.12	5.41	2.12	2.12	6.24	0	0	0	1.58	0	0	0	0	0	0	0	25.95
TDF	0	0	2.12	0	2.12	6.66	2.12	5.41	2.12	2.12	6.24	0	0	0	1.58	0	0	0	0	0	0	0	30.49
CMF2	0	0	2.12	2.12	2.12	6.66	2.12	5.41	2.12	2.12	6.24	0	0	0	1.58	0	0	0	0	0	0	0	32.61
WMF	0	0	2.12	0	2.12	6.66	2.12	5.41	0	2.12	6.24	0	0	0	1.58	0	0	0	0	0	0	0	28.37
TSWS	0	0	2.12	0	2.12	6.66	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	13.02
TG	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
STWS	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	7.99

86-74 Mid																						
DTMF	0	0	5.86	0	2.12	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	0	0	0	13.85
ETMF	0	0	5.86	3.75	2.12	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	0	0	0	17.6
CMF1	0	0	5.86	0	2.12	0	4.11	2.12	2.12	2.12	3.75	0.707	0	0	1.58	0	0	0	0	0	0	0	24.487
TCF	0	0	5.86	3.75	2.12	0	4.11	2.12	2.12	2.12	3.75	0	0	0	1.58	0	0	0	0	0	0	0	27.53
TDF	0	0	5.86	0	2.12	2.12	4.11	2.12	2.12	2.12	3.75	0.707	0	0	1.58	0	0	0	0	0	0	0.707	27.314
CMF2	0	0	5.86	3.75	2.12	2.12	4.11	2.12	2.12	2.12	3.75	0.707	0	0	1.58	0	0	0	0	0	0	0.707	31.064
WMF	0	0	5.86	0	2.12	2.12	4.11	2.12	0	2.12	3.75	0.707	0	0	1.58	0	0	0	0	0	0	0.707	25.194
TSWS	0	0	5.86	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	12.22
TG	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
STWS	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	7.99
86-74 Late																						
DTMF	0	0	5.86	0	2.12	0	0	0	2.12	0	5.86	0	0	0	0	0	0	0	0	0	0	0	15.96
ETMF	0	0	5.86	3.75	2.12	0	0	0	2.12	0	5.86	0	0	0	0	0	0	0	0	0	0	0	19.71
CMF1	0	0	5.86	0	2.12	0	4.11	2.12	2.12	2.12	5.86	0	0	0	0.707	0	0	0	0	0	0	0	25.017
TCF	0	0	5.86	3.75	2.12	0	4.11	2.12	2.12	2.12	5.86	0	0	0	0.707	0	0	0	0	0	0	0	28.767
TDF	0	0	5.86	0	2.12	2.12	4.11	2.12	2.12	2.12	5.86	0	0	0	0.707	0	0	0	0	0	0	0.707	27.844
CMF2	0	0	5.86	3.75	2.12	2.12	4.11	2.12	2.12	2.12	5.86	0	0	0	0.707	0	0	0	0	0	0	0.707	31.594
WMF	0	0	5.86	0	2.12	2.12	4.11	2.12	0	2.12	5.86	0	0	0	0.707	0	0	0	0	0	0	0.707	25.724
TSWS	0	0	5.86	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	12.22
TG	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
STWS	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	8.47
74-59 Early																						
DTMF	0	0	4.12	0	2.12	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	0	0	0	12.11
ETMF	0	0	4.12	2.12	2.12	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	0	0	0	14.23
CMF1	0	0	4.12	0	2.12	0	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	18.47
TCF	0	0	4.12	2.12	2.12	0	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	20.59
TDF	0	0	4.12	0	2.12	2.12	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	20.59
CMF2	0	0	4.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	22.71
WMF	0	0	4.12	0	2.12	2.12	2.12	2.12	0	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	18.47
TSWS	0	0	4.12	0	2.12	2.12	0	0	0	2.12	0	0	0		0	0	0	0	0	0	0	0	10.48
TG	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.43
STWS	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.43
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.57

HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.57
SDST	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	3.75	0	15.18
74-59 Mid																							
DTMF	0	0	4.12	0	2.12	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.96
ETMF	0	0	4.12	2.12	2.12	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	0	0	0	13.08
CMF1	0	0	4.12	0	2.12	0	2.12	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	17.32
TCF	0	0	4.12	2.12	2.12	0	2.12	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	19.44
TDF	0	0	4.12	0	2.12	2.12	2.12	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	19.44
CMF2	0	0	4.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	21.56
WMF	0	0	4.12	0	2.12	2.12	2.12	2.12	0	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	17.32
TSWS	0	0	4.12	0	2.12	2.12	0	0	0	2.12	0	0	0		0	0	0	0	0	0	0	0	10.48
TG	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.43
STWS	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.43
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.57
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.57
SDST	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	3.75	0	15.18
74-59 late																							
DTMF	0	0	4.12	0	2.12	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	0	0	0	12.11
ETMF	0	0	4.12	2.12	2.12	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	0	0	0	14.23
CMF1	0	0	4.12	0	2.12	0	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	18.47
TCF	0	0	4.12	2.12	2.12	0	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	20.59
TDF	0	0	4.12	0	2.12	2.12	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	20.59
CMF2	0	0	4.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	22.71
WMF	0	0	4.12	0	2.12	2.12	2.12	2.12	0	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	18.47
TSWS	0	0	4.12	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	10.48
TG	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.43
STWS	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.43
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.57
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.57
SDST	5.86	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.6	0	14.03
59-50																							
DTMF	0	0	3.75	0	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	0	0	0	10.8
ETMF	0	0	3.75	2.12	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	0	0	0	12.92
CMF1	0	0	3.75	0	2.12	0	0	2.12	0	0	4.93	0	0	0	0.707	0	0	0	0	0	0	0	13.627
TCF	0	0	3.75	2.12	2.12	0	0	2.12	0	0	4.93	0	0	0	0.707	0	0	0	0	0	0	0	15.747
TDF	0	0	3.75	0	2.12	2.12	0	2.12	0	0	4.93	0	0	0	0.707	0	0	0	0	0	0	0	15.747
CMF2	0	0	3.75	2.12	2.12	2.12	0	2.12	0	0	4.93	0	0	0	0.707	0	0	0	0	0	0	0	17.867
WMF	0	0	3.75	0	2.12	2.12	0	2.12	0	0	4.93	0	0	0	0.707	0	0	0	0	0	0	0	15.747
TSWS	0	0	3.75	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
TG	6.46	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.18
STWS	6.46	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.18

DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
SDST	6.46	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.12	0	13.3
50-40																							
DTMF	0	0	2.97	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	7.69
ETMF	0	0	2.97	2.12	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	9.81
CMF1	0	0	2.97	0	2.12	0	0	2.6	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	12.89
TCF	0	0	2.97	2.12	2.12	0	0	2.6	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.41
TDF	0	0	2.97	0	2.12	2.12	0	2.6	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	15.01
CMF2	0	0	2.97	2.12	2.12	2.12	0	2.6	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	17.13
WMF	0	0	2.97	0	2.12	2.12	0	2.6	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	15.01
TSWS	0	0	2.97	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.21
TG	6.66	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.46
STWS	6.66	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.46
DSS	0	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8
HD	0	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8
SDST	6.66	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.46
40-34																							
DTMF	0	0	3.75	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	2.12	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	0	2.12	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.59
TCF	0	0	3.75	2.12	2.12	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.71
TDF	0	0	3.75	0	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.71
CMF2	0	0	3.75	2.12	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	14.83
WMF	0	0	3.75	0	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.71
TSWS	0	0	3.75	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
TG	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.38
STWS	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.38
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
SDST	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.12	0	13.5
34-29																							
DTMF	0	0	3.75	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	2.12	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	0	2.12	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.59
TCF	0	0	3.75	2.12	2.12	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.71
TDF	0	0	3.75	0	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.71
CMF2	0	0	3.75	2.12	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	14.83
WMF	0	0	3.75	0	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.71
TSWS	0	0	3.75	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
TG	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.38

STWS	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.38
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
SDST	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.6	0	13.98
29-25																						
DTMF	0	0	4.26	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	8.98
ETMF	0	0	4.26	2.12	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	11.1
CMF1	0	0	4.26	0	2.12	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	11.1
TCF	0	0	4.26	2.12	2.12	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	13.22
TDF	0	0	4.26	0	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	13.22
CMF2	0	0	4.26	2.12	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	15.34
WMF	0	0	4.26	0	2.12	2.12	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	13.22
TSWS	0	0	4.26	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.5
TG	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.38
STWS	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.38
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
SDST	6.66	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.6	0	13.98

Les Echets, France

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Bet	Fra	Bux	Hed	Ilex	Chen	Cy	Acer	**TOTAL**
128-115 Early																			
DTMF	0	0	7	0	0	0	0	0	0.707	0	0	0	0	0	0	0	0	0	7.707
ETMF	0	0	7	0	0	0	0	0	0.707	0	0	0	0	0	0	0	0	0	7.707
CMF1	0	0	7	0	0	0	2.12	2.12	0.707	0.707	0	0	0	0	0	0	0	0	12.654
TCF	0	0	7	0	0	0	2.12	2.12	0.707	0.707	0	0	0	0	0	0	0		12.654
TDF	0	0	7	0	0	2.6	2.12	2.12	0.707	0.707	0	0	0	0		0	0	0	15.254
CMF2	0	0	7	0	0	2.6	2.12	2.12	0.707	0.707	0	0	0	0	0	0	0	0	15.254
WMF	0	0	7	0	0	2.6	2.12	2.12	0	0.707	0	0	0	0		0	0	0	14.547
TSWS	0	0	7	0	0	0	0	0	0	0.707	0	0	0	0	0	0	0	0	7.707
TG	4.93	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.53
STWS	4.93	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.53
DSS		2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD		2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	4.93	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.53
128-115 Mid																			
DTMF	0	0	2.6	0	0	0	0	0	6.66	0	0	0	0	0	0	0	0	0	9.26
ETMF	0	0	2.6	0	0	0	0	0	6.66	0	0	0	0	0	0	0	0	0	9.26

CMF1	0	0	2.6	0	0	0	6.66	5.35	6.66	6.66	0	0	0	0	0	0	0	0	27.93
TCF	0	0	2.6	0	0	0	6.66	5.35	6.66	6.66	0	0	0	0	0	0	0	0	27.93
TDF	0	0	2.6	0	0	5.86	6.66	5.35	6.66	6.66	0	0	2.6	0	0	0	0	0	36.39
CMF2	0	0	2.6	0	0	5.86	6.66	5.35	6.66	6.66	0	0	0	0	0	0	0	0	33.79
WMF	0	0	2.6	0	0	5.86	6.66	5.35	0	6.66	0	0	2.6	0	0	0	0	0	29.73
TSWS	0	0	2.6	0	0	5.86	0	0	0	6.66	0	0	0	0	0	0	0	0	15.12
TG	2.6	6.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.26
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
128-115 Late																			
DTMF	0	0	7	0	0	0	0	0	6.24	0	0	0	0	0	0	0	0	0	13.24
ETMF	0	0	7	5.86	0	0	0	0	6.24	0	0	0	0	0	0	0	0	0	19.1
CMF1	0	0	7	0	0	0	2.6	2.12	6.24	1.22	0	0	0	0	0	0	0	0	19.18
TCF	0	0	7	5.86	0	0	2.6	2.12	6.24	1.22	0	0	0	0	0	0	0	0	25.04
TDF	0	0	7	0	0	2.6	2.6	2.12	6.24	1.22	0	0	0	0	0	0	0	0	21.78
CMF2	0	0	7	5.86	0	2.6	2.6	2.12	6.24	1.22	0	0	0	0	0	0	0	0	27.64
WMF	0	0	7	0	0	2.6	2.6	2.12	0	1.22	0	0	0	0	0	0	0	0	15.54
TSWS	0	0	7	0	0	2.6	0	0	0	1.22	0	0	0	0	0	0	0	0	10.82
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
115-110 Early																			
DTMF	0	0	4.62	0	1.22	0	0	0	4.93	0	2.6	0	0	0	0	0	0	0	13.37
ETMF	0	0	4.62	2.6	1.22	0	0	0	4.93	0	2.6	0	0	0	0	0	0	0	15.97
CMF1	0	0	4.62	0	1.22	0	4.93	2.6	4.93	0.707	2.6	0.5	0	0	0	0	0	0	22.107
TCF	0	0	4.62	2.6	1.22	0	4.93	2.6	4.93	0.707	2.6	0	0	0	0	0	0	0	24.207
TDF	0	0	4.62	0	1.22	2.12	4.93	2.6	4.93	0.707	2.6	0.5	0	0	0	0	0	0	24.227
CMF2	0	0	4.62	2.6	1.22	2.12	4.93	2.6	4.93	0.707	2.6	0.5	0	0	0	0	0	0	26.827
WMF	0	0	4.62	0	1.22	2.12	4.93	2.6	0	0.707	2.6	0.5	0	0	0	0	0	0	19.297
TSWS	0	0	4.62	0	1.22	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	8.667
TG	3.45	3.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	7.397
STWS	3.45	3.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	7.397
DSS	0	3.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	3.947
HD	0	3.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	3.947
SDST	3.45	3.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707		0	7.397

115-110 Late																			
DTMF	0	0	3.75	0	1.22	0	0	0	4.93	0	4.02	0	0	0	0	0	0	0	13.92
ETMF	0	0	3.75	2.6	1.22	0	0	0	4.93	0	4.02	0	0	0	0	0	0	0	16.52
CMF1	0	0	3.75	0	1.22	0	4.93	2.6	4.93	0.707	4.02	0.5	0	0	0	0	0	0	22.657
TCF	0	0	3.75	2.6	1.22	0	4.93	2.6	4.93	0.707	4.02	0	0	0	0	0	0	0	24.757
TDF	0	0	3.75	0	1.22	2.12	4.93	2.6	4.93	0.707	4.02	0.5	1.45	0.707	0.707	0	0	0	27.641
CMF2	0	0	3.75	2.6	1.22	2.12	4.93	2.6	4.93	0.707	4.02	0.5	0	0	0	0	0	0	27.377
WMF	0	0	3.75	0	1.22	2.12	4.93	2.6	0	0.707	4.02	0.5	1.45	0.707	0.707	0	0	0	22.711
TSWS	0	0	3.75	0	1.22	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	7.797
TG	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	6.757
STWS	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	6.757
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	3.307
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	3.307
SDST	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	2.12	0	8.877
110-93 Early																			
DTMF	0	0	4.62	0	1.22	0	0	0	1.22	0	4.48	0	0	0	0	0	0	0	11.54
ETMF	0	0	4.62	2.12	1.22	0	0	0	1.22	0	4.48	0	0	0	0	0	0	0	13.66
CMF1	0	0	4.62	0	1.22	0	2.6	2.12	1.22	0.707	4.48	3.75	0	0	0	0	0	0	20.717
TCF	0	0	4.62	2.12	1.22	0	2.6	2.12	1.22	0.707	4.48	0	0	0	0	0	0	0	19.087
TDF	0	0	4.62	0	1.22	6.24	2.6	2.12	1.22	0.707	4.48	3.75	0	0	0	0	0	0.707	27.664
CMF2	0	0	4.62	2.12	1.22	6.24	2.6	2.12	1.22	0.707	4.48	3.75	0	0	0	0	0	0.707	29.784
WMF	0	0	4.62	0	1.22	6.24	2.6	2.12	0	0.707	4.48	3.75	0	0	0	0	0	0.707	26.444
TSWS	0	0	4.62	0	1.22	6.24	0	0	0	0.707	0	0	0	0	0	0	0	0	12.787
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	5.427
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	5.427
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	2.827
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	2.827
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	2.12	0	7.547
110-93 Mid																			
DTMF	0	0	7.87	0	0	0	0	0	2.12	0	2.12	0	0	0	0	0	0	0	12.11
ETMF	0	0	7.87	1.22	0	0	0	0	2.12	0	2.12	0	0	0	0	0	0	0	13.33
CMF1	0	0	7.87	0	0	0	7.38	5.86	2.12	4.93	2.12	0	0	0	0	0	0	0	30.28
TCF	0	0	7.87	1.22	0	0	7.38	5.86	2.12	4.93	2.12	0	0	0	0	0	0	0	31.5
TDF	0	0	7.87	0	0	2.12	7.38	5.86	2.12	4.93	2.12	0	0	0	0.707	0	0	0	33.107
CMF2	0	0	7.87	1.22	0	2.12	7.38	5.86	2.12	4.93	2.12	0	0	0	0	0	0	0	33.62
WMF	0	0	7.87	0	0	2.12	7.38	5.86	0	4.93	2.12	0	0	0	0.707	0	0	0	30.987
TSWS	0	0	7.87	0	0	2.12	0	0	0	4.93	0	0	0	0	0	0	0	0	14.92
TG	5.86	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.61
STWS	5.86	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.61
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75

SDST	5.86	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.61
110-93 Late																			
DTMF	0	0	5.35	0	0.707	0	0	0	1.22	0	6.27	0	0	0	0	0	0	0	13.547
ETMF	0	0	5.35	5.15	0.707	0	0	0	1.22	0	6.27	0	0	0	0	0	0	0	18.697
CMF1	0	0	5.35	0	0.707	0	2.6	2.6	1.22	2.12	6.27	0.707	0	0	0	0	0	0	21.574
TCF	0	0	5.35	5.15	0.707	0	2.6	2.6	1.22	2.12	6.27	0	0	0	0	0	0	0	26.017
TDF	0	0	5.35	0	0.707	4.69	2.6	2.6	1.22	2.12	6.27	0.707	0	0	0	0	0	0	26.264
CMF2	0	0	5.35	5.15	0.707	4.69	2.6	2.6	1.22	2.12	6.27	0.707	0	0	0	0	0	0	31.414
WMF	0	0	5.35	0	0.707	4.69	2.6	2.6	0	2.12	6.27	0.707	0	0	0	0	0	0	25.044
TSWS	0	0	5.35	0	0.707	4.69	0	0	0	2.12	0	0	0	0	0	0	0	0	12.867
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	5.94
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	5.94
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	3.34
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	3.34
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0.707	0	6.647
93-86 Early																			
DTMF	0	0	4.02	0	0.707	0	0	0	1.22	0	4.02	0	0	0	0	0	0	0	9.967
ETMF	0	0	4.02	3.75	0.707	0	0	0	1.22	0	4.02	0	0	0	0	0	0	0	13.717
CMF1	0	0	4.02	0	0.707	0	3.45	3.75	1.22	0	4.02	3.75	0	0	0	0	0	0	20.917
TCF	0	0	4.02	3.75	0.707	0	3.45	3.75	1.22	0	4.02	0	0	0	0	0	0	0	20.917
TDF	0	0	4.02	0	0.707	3.08	3.45	3.75	1.22	0	4.02	3.75	0	0	0	0	0	0	23.997
CMF2	0	0	4.02	3.75	0.707	3.08	3.45	3.75	1.22	0	4.02	3.75	0	0	0	0	0	0	27.747
WMF	0	0	4.02	0	0.707	3.08	3.45	3.75	0	0	4.02	3.75	0	0	0	0	0	0	22.777
TSWS	0	0	4.02	0	0.707	3.08	0	0	0	0	0	0	0	0	0	0	0	0	7.807
TG	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	9.62
STWS	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	9.62
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.87
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.87
SDST	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	1.22	0	10.84
93-86 Late																			
DTMF	0	0	4.02	0	2.6	0	0	0	1.22	0	2.6	0	0	0	0	0	0	0	10.44
ETMF	0	0	4.02	2.6	2.6	0	0	0	1.22	0	2.6	0	0	0	0	0	0	0	13.04
CMF1	0	0	4.02	0	2.6	0	2.6	2.6	1.22	1.22	2.6	1.22	0	0	0	0	0	0	18.08
TCF	0	0	4.02	2.6	2.6	0	2.6	2.6	1.22	1.22	2.6	0	0	0	0	0	0	0	19.46
TDF	0	0	4.02	0	2.6	3.08	2.6	2.6	1.22	1.22	2.6	1.22	0	0	0	0	0	0	21.16
CMF2	0	0	4.02	2.6	2.6	3.08	2.6	2.6	1.22	1.22	2.6	1.22	0	0	0	0	0	0	23.76
WMF	0	0	4.02	0	2.6	3.08	2.6	2.6	0	1.22	2.6	1.22	0	0	0	0	0	0	19.94
TSWS	0	0	4.02	0	2.6	3.08	0	0	0	1.22	0	0		0	0	0	0	0	10.92
TG	2.6	5.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	9.167
STWS	2.6	5.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	9.167
DSS	0	5.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	6.567

HD	0	5.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	6.567
SDST	2.6	5.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	2.12	0	11.287
86-74 Early																			
DTMF	0	0	5.35	0	0	0	0	0	1.22	0	0.707	0	0	0	0	0	0	0	7.277
ETMF	0	0	5.35	2.12	0	0	0	0	1.22	0	0.707	0	0	0	0	0	0	0	9.397
CMF1	0	0	5.35	0	0	0	2.6	2.6	1.22	1.22	0.707	2.12	0	0	0	0	0	0	15.817
TCF	0	0	5.35	2.12	0	0	2.6	2.6	1.22	1.22	0.707	0	0	0	0	0	0	0	15.817
TDF	0	0	5.35	0	0	5.35	2.6	2.6	1.22	1.22	0.707	2.12	0.707	0	0	0	0	0	21.874
CMF2	0	0	5.35	2.12	0	5.35	2.6	2.6	1.22	1.22	0.707	2.12	0	0	0	0	0	0	23.287
WMF	0	0	5.35	0	0	5.35	2.6	2.6	0	1.22	0.707	2.12	0.707	0	0	0	0	0	20.654
TSWS	0	0	5.35	0	0	5.35	0	0	0	1.22	0	0	0.707	0	0	0	0	0	12.627
TG	2.6	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35
STWS	2.6	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	2.6	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35
86-74 Mid																			
DTMF	0	0	3.75	0	0	0	0	0	1.22	0	2.12	0	0	0	0	0	0	0	7.09
ETMF	0	0	3.75	2.6	0	0	0	0	1.22	0	2.12	0	0	0	0	0	0	0	9.69
CMF1	0	0	3.75	0	0	0	6.66	7	1.22	0	2.12	0.707	0	0	0	0	0	0	21.457
TCF	0	0	3.75	2.6	0	0	6.66	7	1.22	0	2.12	0	0	0	0	0	0	0	23.35
TDF	0	0	3.75	0	0	3.75	6.66	7	1.22	0	2.12	0.707	0	0	0	0	0	0	25.207
CMF2	0	0	3.75	2.6	0	3.75	6.66	7	1.22	0	2.12	0.707	0	0	0	0	0	0	27.807
WMF	0	0	3.75	0	0	3.75	6.66	7	0	0	2.12	0.707	0	0	0	0	0	0	23.987
TSWS	0	0	3.75	0	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	7.5
TG	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
86-74 Late																			
DTMF	0	0	5.86	0	0.707	0	0	0	0	0	0	0	0	0	0	0	0	0	6.567
ETMF	0	0	5.86	2.6	0.707	0	0	0	0	0	0	0	0	0	0	0	0	0	9.167
CMF1	0	0	5.86	0	0.707	0	4.93	2.6	0	1.22	0	0	0	0	0	0	0	0	15.317
TCF	0	0	5.86	2.6	0.707	0	4.93	2.6	0	1.22	0	0	0	0	0	0	0	0	17.917
TDF	0	0	5.86	0	0.707	3.75	4.93	2.6	0	1.22	0	0	0	0	0	0	0	0	19.067
CMF2	0	0	5.86	2.6	0.707	3.75	4.93	2.6	0	1.22	0	0	0	0	0	0	0	0	21.667
WMF	0	0	5.86	0	0.707	3.75	4.93	2.6	0	1.22	0	0	0	0	0	0	0	0	19.067
TSWS	0	0	5.86	0	0.707	3.75	0	0	0	1.22	0	0	0	0	0	0	0	0	11.537
TG	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
STWS	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2

DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	5.907
									0										
74-69 Early									0										
DTMF	0	0	2.6	0	0	0	0	0	0	0	1.22	0	0	0	0	0	0	0	3.82
ETMF	0	0	2.6	2.12	0	0	0	0	0	0	1.22	0	0	0	0	0	0	0	5.94
CMF1	0	0	2.6	0	0	0	0	2.12	0	0	1.22	0	0	0	0	0	0	0	5.94
TCF	0	0	2.6	2.12	0	0	0	2.12	0	0	1.22	0	0	0	0	0	0	0	8.06
TDF	0	0	2.6	0	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	0	8.06
CMF2	0	0	2.6	2.12	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	0	10.18
WMF	0	0	2.6	0	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	0	8.06
TSWS	0	0	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
TG	4.26	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.86
STWS	4.26	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.86
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	4.26	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	7.567
74-59 Mid																			
DTMF	0	0	5.86	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	0	7.98
ETMF	0	0	5.86	2.6	0	0	0	0	0	0	2.12	0	0	0	0	0	0	0	10.58
CMF1	0	0	5.86	0	0	0	0	0	0	0	2.12		0	0	0	0	0	0	7.98
TCF	0	0	5.86	2.6	0	0	0	0	0	0	2.12	0	0	0	0	0	0	0	10.58
TDF	0	0	5.86	0	0	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	10.1
CMF2	0	0	5.86	2.6	0	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	12.7
WMF	0	0	5.86	0	0	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	10.1
TSWS	0	0	5.86	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	7.98
TG	4.26	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.71
STWS	4.26	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.71
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
SDST	4.26	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	11.46
										0									
74-59 late										0									
DTMF	0	0	5.86	0	0	0	0	0	0	0	3.45	0	0	0	0	0	0	0	9.31
ETMF	0	0	5.86	2.6	0	0	0	0	0	0	3.45	0	0	0	0	0	0	0	11.91
CMF1	0	0	5.86	0	0	0	0	0	0	0	3.45		0	0	0	0	0	0	9.31
TCF	0	0	5.86	2.6	0	0	0	0	0	0	3.45	0	0	0	0	0	0	0	11.91
TDF	0	0	5.86	0	0	2.12	0	0	0	0	3.45	0	0	0	0	0	0	0	11.43
CMF2	0	0	5.86	2.6	0	2.12	0	0	0	0	3.45	0	0	0	0	0	0	0	14.03
WMF	0	0	5.86	0	0	2.12	0	0	0	0	3.45	0	0	0	0	0	0	0	11.43
TSWS	0	0	5.86	0	0	2.12	0	0	0	0	0	0		0	0	0	0	0	7.98
TG	4.26	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.71

STWS	4.26	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.71
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
SDST	4.26	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	10.31
59-50																			
DTMF	0	0	5.35	0	2.12	0	0	0	0.707	0	2.12	0	0	0	0	0	0	0	10.297
ETMF	0	0	5.35	2.12	2.12	0	0	0	0.707	0	2.12	0	0	0	0	0	0	0	12.417
CMF1	0	0	5.35	0	2.12	0	0	0	0.707		2.12	0	0	0	0	0	0	0	10.297
TCF	0	0	5.35	2.12	2.12	0	0	0	0.707		2.12	0	0	0	0	0	0	0	12.417
TDF	0	0	5.35	0	2.12	2.12	0	0	0.707		2.12	0	0	0	0	0	0	0	12.417
CMF2	0	0	5.35	2.12	2.12	2.12	0	0	0.707		2.12	0	0	0	0	0	0	0	14.537
WMF	0	0	5.35	0	2.12	2.12	0	0	0		2.12	0	0	0	0	0	0	0	11.71
TSWS	0	0	5.35	0	2.12	2.12	0	0	0		0	0	0	0	0	0	0	0	9.59
TG	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.01
STWS	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.01
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.02	0	12.03
50-40																			
DTMF	0	0	5.35	0	2.12	0	0	0	0.707	0	4.02	0	0	0	0	0	0	0	12.197
ETMF	0	0	5.35	2.12	2.12	0	0	0	0.707	0	4.02	0	0	0	0	0	0	0	14.317
CMF1	0	0	5.35	0	2.12	0	2.12	2.12	0.707		4.02	0	0	0	0	0	0	0	16.437
TCF	0	0	5.35	2.12	2.12	0	2.12	2.12	0.707		4.02	0	0	0	0	0	0	0	18.557
TDF	0	0	5.35	0	2.12	2.12	2.12	2.12	0.707		4.02	0	0	0	0	0	0	0	18.557
CMF2	0	0	5.35	2.12	2.12	2.12	2.12	2.12	0.707		4.02	0	0	0	0	0	0	0	20.677
WMF	0	0	5.35	0	2.12	2.12	2.12	2.12	0		4.02	0	0	0	0	0	0	0	17.85
TSWS	0	0	5.35	0	2.12	2.12	0	0	0		0	0		0	0	0	0	0	9.59
TG	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.01
STWS	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.01
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	10.13
40-34																			
DTMF	0	0	2.97	0	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	10.02
ETMF	0	0	2.97	2.6	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	12.62
CMF1	0	0	2.97	0	2.12	0	2.12	0	0	0	4.93		0	0	0	0	0	0	12.14
TCF	0	0	2.97	2.6	2.12	0	2.12	0	0	0	4.93	0	0	0	0	0	0	0	14.74
TDF	0	0	2.97	0	2.12	2.12	2.12	0	0	0	4.93	0	0	0	0	0	0	0	14.26
CMF2	0	0	2.97	2.6	2.12	2.12	2.12	0	0	0	4.93	0	0	0	0	0	0	0	16.86
WMF	0	0	2.97	0	2.12	2.12	2.12	0	0	0	4.93	0	0	0	0	0	0	0	14.26
TSWS	0	0	2.97	0	2.12	2.12	0	0	0	0	0	0		0	0	0	0	0	7.21

TG	5.35	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.95
STWS	5.35	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.95
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	5.35	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45	0	11.4
34-29																			
DTMF	0	0	2.97	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	7.69
ETMF	0	0	2.97	2.6	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	10.29
CMF1	0	0	2.97	0	2.12	0	2.12	2.12	0	0.707	2.6	0	0	0	0	0	0	0	12.637
TCF	0	0	2.97	2.6	2.12	0	2.12	2.12	0	0.707	2.6	0	0	0	0	0	0	0	15.237
TDF	0	0	2.97	0	2.12	2.12	2.12	2.12	0	0.707	2.6	0	0	0	0	0	0	0	14.757
CMF2	0	0	2.97	2.6	2.12	2.12	2.12	2.12	0	0.707	2.6	0	0	0	0	0	0	0	17.357
WMF	0	0	2.97	0	2.12	2.12	2.12	2.12	0	0.707	2.6	0	0	0	0	0	0	0	14.757
TSWS	0	0	2.97	0	2.12	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	7.917
TG	5.35	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.95
STWS	5.35	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.95
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	5.35	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.25	0	11.2
29-25																			
DTMF	0	0	5.86	0	2.12	0	0	0	0.707	0	2.6	0	0	0	0	0	0	0	11.287
ETMF	0	0	5.86	2.12	2.12	0	0	0	0.707	0	2.6	0	0	0	0	0	0	0	13.407
CMF1	0	0	5.86	0	2.12	0	2.12	0	0.707	0.707	2.6	0	0	0	0	0	0	0	14.114
TCF	0	0	5.86	2.12	2.12	0	2.12	0	0.707	0.707	2.6	0	0	0	0	0	0	0	16.234
TDF	0	0	5.86	0	2.12	2.12	2.12	0	0.707	0.707	2.6	0	0	0	0	0	0	0	16.234
CMF2	0	0	5.86	2.12	2.12	2.12	2.12	0	0.707	0.707	2.6	0	0	0	0	0	0	0	18.354
WMF	0	0	5.86	0	2.12	2.12	2.12	0	0	0.707	2.6	0	0	0	0	0	0	0	15.527
TSWS	0	0	5.86	0	2.12	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	10.807
TG	5.86	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.61
STWS	5.86	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.61
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	5.86	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.25	0	12.86

Lac du Bouchet, France

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Bet	Lar	Bu	Ulm	Hed	Ilex	Chen	Cy	Acer	**TOTAL**
128-115 Early																				
DTMF	0	0	4.26	0	0	0	0	0	4.62	0	0	0	0	0	0	0	0	0	0	8.88
ETMF	0	0	4.26	5.86	0	0	0	0	4.62	0	0	0	0	0	0	0	0	0	0	14.74
CMF1	0	0	4.26	0	0	0	2.12	2.12	4.62	0	0	0	0	0	0	0	0	0	0	13.12

TCF	0	0	4.26	5.86	0	0	2.12	2.12	4.62	0	0	0	0	0	0	0	0	0		18.98
TDF	0	0	4.26	0	0	3.75	2.12	2.12	4.62	0	0	0	0.707	0	0.707	0.707	0	0	0	18.991
CMF2	0	0	4.26	5.86	0	3.75	2.12	2.12	4.62	0	0	0	0	0	0	0	0	0	0	22.73
WMF	0	0	4.26	0	0	3.75	2.12	2.12	0	0	0	0	0.707	0	0.707	0.707	0	0	0	14.371
TSWS	0	0	4.26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.26
TG	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
STWS	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	5.907
128-115 Mid																				
DTMF	0	0	7.87	0	0	0	0	0	2.6	0	2.6		0	0	0	0	0	0	0	13.07
ETMF	0	0	7.87	2.12	0	0	0	0	2.6	0	2.6		0	0	0	0	0	0	0	15.19
CMF1	0	0	7.87	0	0	0	2.12	2.12	2.6	0	2.6		0	0	0	0	0	0	0	17.31
TCF	0	0	7.87	2.12	0	0	2.12	2.12	2.6	0	2.6		0	0	0	0	0	0	0	19.43
TDF	0	0	7.87	0	0	3.75	2.12	2.12	2.6	0	2.6		1.22	0	1.22	1.22	0	0	0.707	25.427
CMF2	0	0	7.87	2.12	0	3.75	2.12	2.12	2.6	0	2.6		0	0	0	0	0	0	0.707	23.887
WMF	0	0	7.87	0	0	3.75	2.12	2.12	0	0	2.6	0	1.22	0	1.22	1.22	0	0	0.707	22.827
TSWS	0	0	7.87	0	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	11.62
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	4.947
128-115 Late																				
DTMF	0	0	7.87	0	0	0	0	0	2.6	0	2.6		0	0	0	0	0	0	0	13.07
ETMF	0	0	7.87	2.12	0	0	0	0	2.6	0	2.6		0	0	0	0	0	0	0	15.19
CMF1	0	0	7.87	0	0	0	2.12	2.12	2.6	0	2.6		0	0	0	0	0	0	0	17.31
TCF	0	0	7.87	2.12	0	0	2.12	2.12	2.6	0	2.6		0	0	0	0	0	0	0	19.43
TDF	0	0	7.87	0	0	3.75	2.12	2.12	2.6	0	2.6		1.22	0	1.22	1.22	0	0	0.707	25.427
CMF2	0	0	7.87	2.12	0	3.75	2.12	2.12	2.6	0	2.6		0	0	0	0	0	0	0.707	23.887
WMF	0	0	7.87	0	0	3.75	2.12	2.12	0	0	2.6	0	1.22	0	1.22	1.22	0	0	0.707	22.827
TSWS	0	0	7.87	0	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	11.62
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	4.947
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	4.947
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	2.827
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	2.827
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0.707	0	5.654
115-110 Early																				
DTMF	0	0	4.62	0	1.22	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	10.56

ETMF	0	0	4.62	2.12	1.22	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	12.68
CMF1	0	0	4.62	0	1.22	0	0	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	14.8
TCF	0	0	4.62	2.12	1.22	0	0	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	16.92
TDF	0	0	4.62	0	1.22	2.12	0	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	16.92
CMF2	0	0	4.62	2.12	1.22	2.12	0	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	19.04
WMF	0	0	4.62	0	1.22	2.12	0	2.12	0	2.12	2.6	0	0	0	0	0	0	0	0	14.8
TSWS	0	0	4.62	0	1.22	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	10.08
TG	6.24	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.33
STWS	6.24	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	11.33
DSS	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.09
HD	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.09
SDST	6.24	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.12	0	13.45

115-110 Late																			
DTMF	0	0	2.6	0	2.6	0	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	9.92
ETMF	0	0	2.6	2.97	2.6	0	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	12.89
CMF1	0	0	2.6	0	2.6	0	2.12	0	2.6	2.6	2.12	0	0	0	0	0	0	0	0	14.64
TCF	0	0	2.6	2.97	2.6	0	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	0	15.01
TDF	0	0	2.6	0	2.6	2.12	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	0	14.16
CMF2	0	0	2.6	2.97	2.6	2.12	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	0	17.13
WMF	0	0	2.6	0	2.6	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	11.56
TSWS	0	0	2.6	0	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.32
TG	5.73	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.45
STWS	5.73	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.45
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	2.12	0	6.84
SDST	5.73	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.45
110-93 Early																			
DTMF	0	0	6.24	0	1.22	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	13.33
ETMF	0	0	6.24	3.75	1.22	0	0	0	2.12	0	3.75	0	0	0	0	0	0	0	0	17.08
CMF1	0	0	6.24	0	1.22	0	3.75	2.6	2.12	2.12	3.75	0	0	0	0	0	0	0	0	21.8
TCF	0	0	6.24	3.75	1.22	0	3.75	2.6	2.12	2.12	3.75	0	0	0	0	0	0	0	0	25.55
TDF	0	0	6.24	0	1.22	4.38	3.75	2.6	2.12	2.12	3.75	0	0.707	0	0.707	0.707	0	0	0	28.301
CMF2	0	0	6.24	3.75	1.22	4.38	3.75	2.6	2.12	2.12	3.75	0	0	0	0	0	0	0	0	29.93
WMF	0	0	6.24	0	1.22	4.38	3.75	2.6	0	2.12	3.75	0	0.707	0	0.707	0.707	0	0	0	26.181
TSWS	0	0	6.24	0	1.22	4.38	0	0	0	2.12	0	0	0.707	0	0	0	0	0	0	14.667
TG	4.02	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	9.7
STWS	4.02	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	9.7
DSS	0	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	5.68
HD	0	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	5.68
SDST	4.02	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0.707	0	10.407

110-93 Mid																				
DTMF	0	0	6.24	0	2.12	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	13.08
ETMF	0	0	6.24	5.15	2.12	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	18.23
CMF1	0	0	6.24	0	2.12	0	2.6	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	19.92
TCF	0	0	6.24	5.15	2.12	0	2.6	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	25.07
TDF	0	0	6.24	0	2.12	3.75	2.6	2.12	2.12	2.12	2.6	0	0.707	0	0.707	0.707	0	0	0	25.791
CMF2	0	0	6.24	5.15	2.12	3.75	2.6	2.12	2.12	2.12	2.6	0	0	0	0	0	0	0	0	28.82
WMF	0	0	6.24	0	2.12	3.75	2.6	2.12	0	2.12	2.6	0	0.707	0	0.707	0.707	0	0	0	23.671
TSWS	0	0	6.24	0	2.12	3.75	0	0	0	2.12	0	0	0.707	0	0	0	0	0	0	14.937
TG	4.02	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	9.22
STWS	4.02	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	9.22
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	5.2
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	5.2
SDST	4.02	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0.707	0	9.927
110-93 Late																				
DTMF	0	0	2.6	0	2.12	0	0	0	2.12	0	2.12	0	0	0	0	0	0	0	0	8.96
ETMF	0	0	2.6	5.15	2.12	0	0	0	2.12	0	2.12	0	0	0	0	0	0	0	0	14.11
CMF1	0	0	2.6	0	2.12	0	2.6	2.12	2.12	2.12	2.12	0	0	0	0	0	0	0	0	15.8
TCF	0	0	2.6	5.15	2.12	0	2.6	2.12	2.12	2.12	2.12	0	0	0	0	0	0	0	0	20.95
TDF	0	0	2.6	0	2.12	3.75	2.6	2.12	2.12	2.12	2.12	0	0	0	0	0	0	0	0	19.55
CMF2	0	0	2.6	5.15	2.12	3.75	2.6	2.12	2.12	2.12	2.12	0	0	0	0	0	0	0	0	24.7
WMF	0	0	2.6	0	2.12	3.75	2.6	2.12	0	2.12	2.12	0	0	0	0	0	0	0	0	17.43
TSWS	0	0	2.6	0	2.12	3.75	0	0	0	2.12	0	0	0	0	0	0	0	0	0	10.59
TG	4.02	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	8.74
STWS	4.02	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	8.74
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.72
SDST	4.02	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0.707	0	9.447
93-86 Early																				
DTMF	0	0	5.05	0	0	0	0	0	2.12	0	1.22	0	0	0	0	0	0	0	0	8.39
ETMF	0	0	5.05	2.6	0	0	0	0	2.12	0	1.22	0	0	0	0	0	0	0	0	10.99
CMF1	0	0	5.05	0	0	0	2.12	2.12	2.12	2.12	1.22	0	0	0	0	0	0	0	0	14.75
TCF	0	0	5.05	2.6	0	0	2.12	2.12	2.12	2.12	1.22	0	0	0	0	0	0	0	0	17.35
TDF	0	0	5.05	0	0	2.6	2.12	2.12	2.12	2.12	1.22	0	0	0	0	0	0	0	0	17.35
CMF2	0	0	5.05	2.6	0	2.6	2.12	2.12	2.12	2.12	1.22	0	0	0	0	0	0	0	0	19.95
WMF	0	0	5.05	0	0	2.6	2.12	2.12	0	2.12	1.22	0	0	0	0	0	0	0	0	15.23
TSWS	0	0	5.05	0	0	2.6	0	0	0	2.12	0	0		0	0	0	0	0	0	9.77
TG	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	5.94
STWS	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	5.94
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	3.82
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	3.82
SDST	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0.707	0	6.647

93-86 Late																				
DTMF	0	0	3.75	0	0	0	0	0	2.12	0	1.58	0	0	0	0	0	0	0	0	7.45
ETMF	0	0	3.75	2.12	0	0	0	0	2.12	0	1.58	0	0	0	0	0	0	0	0	9.57
CMF1	0	0	3.75	0	0	0	2.12	2.12	2.12	2.12	1.58	0	0	0	0	0	0	0	0	13.81
TCF	0	0	3.75	2.12	0	0	2.12	2.12	2.12	2.12	1.58	0	0	0	0	0	0	0	0	15.93
TDF	0	0	3.75	0	0	2.12	2.12	2.12	2.12	2.12	1.58	0	0	0	0	0	0	0	0	15.93
CMF2	0	0	3.75	2.12	0	2.12	2.12	2.12	2.12	2.12	1.58	0	0	0	0	0	0	0	0	18.05
WMF	0	0	3.75	0	0	2.12	2.12	2.12	0	2.12	1.58	0	0	0	0	0	0	0	0	13.81
TSWS	0	0	3.75	0	0	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	7.99
TG	5.35	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	12.57
STWS	5.35	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	12.57
DSS	0	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	7.22
HD	0	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	7.22
SDST	5.35	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	2.12	0	14.69
86-74 Early																				
DTMF	0	0	7	0	2.12	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	16.17
ETMF	0	0	7	2.12	2.12	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	18.29
CMF1	0	0	7	0	2.12	0	2.12	2.12	2.12	2.12	4.93	0	0	1.58	0	0	0	0	0	24.11
TCF	0	0	7	2.12	2.12	0	2.12	2.12	2.12	2.12	4.93	0	0	1.58	0	0	0	0	0	26.23
TDF	0	0	7	0	2.12	2.12	2.12	2.12	2.12	2.12	4.93	0	0	1.58	0	0	0	0	0	26.23
CMF2	0	0	7	2.12	2.12	2.12	2.12	2.12	2.12	2.12	4.93	0	0	1.58	0	0	0	0	0	28.35
WMF	0	0	7	0	2.12	2.12	2.12	2.12	0	2.12	4.93	0	0	1.58	0	0	0	0	0	24.11
TSWS	0	0	7	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	13.36
TG	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.68
STWS	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.68
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	10.8
86-74 Mid																				
DTMF	0	0	3.75	0	0	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	5.35	0	0	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	13.82
CMF1	0	0	3.75	0	0	0	4.02	2.6	2.12	2.12	2.6	0	0	0	0	0	0	0	0	17.21
TCF	0	0	3.75	5.35	0	0	4.02	2.6	2.12	2.12	2.6	0	0	0	0	0	0	0	0	22.56
TDF	0	0	3.75	0	0	2.12	4.02	2.6	2.12	2.12	2.6	0	0	0	0	0	0	0	0	19.33
CMF2	0	0	3.75	5.35	0	2.12	4.02	2.6	2.12	2.12	2.6	0	0	0	0	0	0	0	0	24.68
WMF	0	0	3.75	0	0	2.12	4.02	2.6	0	2.12	2.6	0	0	0	0	0	0	0	0	17.21
TSWS	0	0	3.75	0	0	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	7.99
TG	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	5.907
STWS	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	5.907
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	2.827
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	2.827

SDST	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0.707	0	6.614
86-74 Late																				
DTMF	0	0	7.87	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	10.47
ETMF	0	0	7.87	2.12	0	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	12.59
CMF1	0	0	7.87	0	0	0	2.12	2.12	0	0	2.6	0	0	0	0	0	0	0	0	14.71
TCF	0	0	7.87	2.12	0	0	2.12	2.12	0	0	2.6	0	0	0	0	0	0	0	0	16.83
TDF	0	0	7.87	0	0	2.12	2.12	2.12	0	0	2.6	0	0	0	0	0	0	0	0	16.83
CMF2	0	0	7.87	2.12	0	2.12	2.12	2.12	0	0	2.6	0	0	0	0	0	0	0	0	18.95
WMF	0	0	7.87	0	0	2.12	2.12	2.12	0	0	2.6	0	0	0	0	0	0	0	0	16.83
TSWS	0	0	7.87	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	9.99
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	5.427
74-59 Early																				
DTMF	0	0	4.26	0	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	7.6
ETMF	0	0	4.26	2.6	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	10.2
CMF1	0	0	4.26	0	2.12	0	2.12	2.12	0	2.12	1.22	0	0	0	0	0	0	0	0	13.96
TCF	0	0	4.26	2.6	2.12	0	2.12	2.12	0	2.12	1.22	0	0	0	0	0	0	0	0	16.56
TDF	0	0	4.26	0	2.12	2.12	2.12	2.12	0	2.12	1.22	0	0	0	0	0	0	0	0	16.08
CMF2	0	0	4.26	2.6	2.12	2.12	2.12	2.12	0	2.12	1.22	0	0	0	0	0	0	0	0	18.68
WMF	0	0	4.26	0	2.12	2.12	2.12	2.12	0	2.12	1.22	0	0	0	0	0	0	0	0	16.08
TSWS	0	0	4.26	0	2.12	2.12	0	0	0	2.12	0	0		0	0	0	0	0	0	10.62
TG	5.62	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.07
STWS	5.62	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.07
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
SDST	5.62	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	9.777
74-59 Mid																				
DTMF	0	0	7.87	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	12.11
ETMF	0	0	7.87	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	14.23
CMF1	0	0	7.87	0	2.12	0	2.12	2.12	0	0	2.12	0	0	0	0	0	0	0	0	16.35
TCF	0	0	7.87	2.12	2.12	0	2.12	2.12	0	0	2.12	0	0	0	0	0	0	0	0	18.47
TDF	0	0	7.87	0	2.12	2.12	2.12	2.12	0	0	2.12	0	0	0	0	0	0	0	0	18.47
CMF2	0	0	7.87	2.12	2.12	2.12	2.12	2.12	0	0	2.12	0	0	0	0	0	0	0	0	20.59
WMF	0	0	7.87	0	2.12	2.12	2.12	2.12	0	0	2.12	0	0	0	0	0	0	0	0	18.47
TSWS	0	0	7.87	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	12.11
TG	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	9.23
STWS	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	9.23
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	4.97
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	0	4.97

SDST	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	2.12	0	11.35
74-59 late																				
DTMF	0	0	7.87	0	2.12	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	13.74
ETMF	0	0	7.87	2.12	2.12	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	15.86
CMF1	0	0	7.87	0	2.12	0	2.12	2.12	0	0	3.75	0	0	0	0	0	0	0	0	17.98
TCF	0	0	7.87	2.12	2.12	0	2.12	2.12	0	0	3.75	0	0	0	0	0	0	0	0	20.1
TDF	0	0	7.87	0	2.12	2.12	2.12	2.12	0	0	3.75	0	0	0	0	0	0	0	0	20.1
CMF2	0	0	7.87	2.12	2.12	2.12	2.12	2.12	0	0	3.75	0	0	0	0	0	0	0	0	22.22
WMF	0	0	7.87	0	2.12	2.12	2.12	2.12	0	0	3.75	0	0	0	0	0	0	0	0	20.1
TSWS	0	0	7.87	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	12.11
TG	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.13
STWS	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	10.13
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.87
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	5.87
SDST	4.26	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	10.13
59-50																				
DTMF	0	0	4.62	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	8.86
ETMF	0	0	4.62	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	10.98
CMF1	0	0	4.62	0	2.12	0	0	2.12	0	0	2.12	0	0	0	0	0	0	0	0	10.98
TCF	0	0	4.62	2.12	2.12	0	0	2.12	0	0	2.12	0	0	0	0	0	0	0	0	13.1
TDF	0	0	4.62	0	2.12	2.12	0	2.12	0	0	2.12	0	0	0	0	0	0	0	0	13.1
CMF2	0	0	4.62	2.12	2.12	2.12	0	2.12	0	0	2.12	0	0	0	0	0	0	0	0	15.22
WMF	0	0	4.62	0	2.12	2.12	0	2.12	0	0	2.12	0	0	0	0	0	0	0	0	13.1
TSWS	0	0	4.62	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	8.86
TG	4.26	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.24	0	0	13.5
STWS	4.26	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.24	0	0	13.5
DSS	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.24	0	0	9.24
HD	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.24	0	0	9.24
SDST	4.26	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	12.38
50-40																				
DTMF	0	0	3.75	0	2.12	0	0	0		0	2.6	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	2.12	2.12	0	0	0		0	2.6	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	8.47
TCF	0	0	3.75	2.12	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	10.59
TDF	0	0	3.75	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	8.47
CMF2	0	0	3.75	2.12	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	10.59
WMF	0	0	3.75	0	2.12	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	8.47
TSWS	0	0	3.75	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
TG	5.35	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	13.95
STWS	5.35	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	13.95
DSS	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	8.6
HD	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	8.6

SDST	5.35	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	13.95
40-34																				
DTMF	0	0	7.31	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	11.55
ETMF	0	0	7.31	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
CMF1	0	0	7.31	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	11.55
TCF	0	0	7.31	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
TDF	0	0	7.31	0	2.12	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
CMF2	0	0	7.31	2.12	2.12	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	0	15.79
WMF	0	0	7.31	0	2.12	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
TSWS	0	0	7.31	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	11.55
TG	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.68
STWS	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.68
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.68
34-29																				
DTMF	0	0	7.31	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	11.55
ETMF	0	0	7.31	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
CMF1	0	0	7.31	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	11.55
TCF	0	0	7.31	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
TDF	0	0	7.31	0	2.12	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
CMF2	0	0	7.31	2.12	2.12	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	0	15.79
WMF	0	0	7.31	0	2.12	2.12	0	0	0	0	2.12	0	0	0	0	0	0	0	0	13.67
TSWS	0	0	7.31	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	11.55
TG	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	10.26
STWS	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	10.26
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	5.33
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	5.33
SDST	4.93	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	10.8
29-25																				
DTMF	0	0	3.75	0	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	7.09
ETMF	0	0	3.75	2.12	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	9.21
CMF1	0	0	3.75	0	2.12	0	2.12	2.12	0	0	1.22	0	0	0	0	0	0	0	0	11.33
TCF	0	0	3.75	2.12	2.12	0	2.12	2.12	0	0	1.22	0	0	0	0	0	0	0	0	13.45
TDF	0	0	3.75	0	2.12	2.12	2.12	2.12	0	0	1.22	0	0	0	0	0	0	0	0	13.45
CMF2	0	0	3.75	2.12	2.12	2.12	2.12	2.12	0	0	1.22	0	0	0	0	0	0	0	0	15.57
WMF	0	0	3.75	0	2.12	2.12	2.12	2.12	0	0	1.22	0	0	0	0	0	0	0	0	13.45
TSWS	0	0	3.75	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
TG	6.46	5.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	13.63
STWS	6.46	5.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	13.63
DSS	0	5.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	7.17
HD	0	5.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	7.17

SDST	6.46	5.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22	0	12.73

Furamoos, Germany

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Bet	Fra	Lar	Bux	Ulm	Tax	Hed	Ilex	Til	**TOTAL**
128-115 Early					0															
DTMF	0	0	2.12	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	5.87
ETMF	0	0	2.12	3.45	0	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	9.32
CMF1	0	0	2.12	0	0	0	0	8.08	0	0	3.75	2.6	0	0	2.6	3.75	0	0	1.22	24.12
TCF	0	0	2.12	3.45	0	0	0	8.08	0	0	3.75	0	0	0	2.6	0	0	0	1.22	21.22
TDF	0	0	2.12	0	0	3.75	0	8.08	0	0	3.75	2.6	0	0	2.6	3.75	0.707	0	1.22	28.577
CMF2	0	0	2.12	3.45	0	3.75	0	8.08	0	0	3.75	2.6	0	0	2.6	0	0	0	1.22	27.57
WMF	0	0	2.12	0	0	3.75	0	8.08	0	0	0	2.6	0	0	2.6	0	0.707	0	1.22	21.077
TSWS	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
TG	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
STWS	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SDST	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
128-115 Mid																				
DTMF	0	0	3.75	0	0	0	0	0	5.86	0	0.707	0	0	0	0	0	0	0	0	10.317
ETMF	0	0	3.75	2.6	0	0	0	0	5.86	0	0.707	0	0	0	0	0	0	0	0	12.917
CMF1	0	0	3.75	0	0	0	4.93	2.6	5.86	0	0.707	1.22	0	0	2.12	1.58	0	0	0	22.767
TCF	0	0	3.75	2.6	0	0	4.93	2.6	5.86	0	0.707	0	0	0	2.12	0	0	0	0	22.567
TDF	0	0	3.75	0	0	2.12	4.93	2.6	5.86	0	0.707	1.22	0	0.707	2.12	1.58	0	2.12	0	27.714
CMF2	0	0	3.75	2.6	0	2.12	4.93	2.6	5.86	0	0.707	1.22	0	0	2.12	0	0	0	0	25.907
WMF	0	0	3.75	0	0	2.12	4.93	2.6	0	0	0.707	1.22	0	0.707	2.12	0	0	2.12	0	20.274
TSWS	0	0	3.75	0	0	2.12	0	0	0	0	0	0	0		0	0	0	0	0	5.87
TG	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
STWS	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SDST	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
128-115 Late																				
DTMF	0	0	7.03	0	0	0	0	0	2.12	0	3.45	0	0	0	0	0	0	0	0	12.6
ETMF	0	0	7.03	4.93	0	0	0	0	2.12	0	3.45	0	0	0	0	0	0	0	0	17.53
CMF1	0	0	7.03	0	0	0	2.12	2.12	2.12	0.707	3.45	0	0	0	1.22		0	0	0	18.767
TCF	0	0	7.03	4.93	0	0	2.12	2.12	2.12	0.707	3.45	0	0	0	1.22	0	0	0	0	23.697
TDF	0	0	7.03	0	0	2.12	2.12	2.12	2.12	0.707	3.45	0	0	1.58	1.22	0	0	2.12	0	24.587

CMF2	0	0	7.03	4.93	0	2.12	2.12	2.12	2.12	0.707	3.45	0	0	0	1.22	0	0	0	0	25.817
WMF	0	0	7.03	0	0	2.12	2.12	2.12	0	0.707	3.45	0	0	1.58	1.22	0	0	2.12	0	22.467
TSWS	0	0	7.03	0	0	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	0	9.857
TG	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
STWS	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SDST	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
115-110 Early																				
DTMF	0	0	5.35	0	0	0	0	0	0.707	0	2.6	0	0	0	0	0	0	0	0	8.657
ETMF	0	0	5.35	4.02	0	0	0	0	0.707	0	2.6	0	0	0	0	0	0	0	0	12.677
CMF1	0	0	5.35	0	0	0	2.12	0	0.707	0	2.6	0	0	0	0	0	0	0	0	10.777
TCF	0	0	5.35	4.02	0	0	2.12	0	0.707	0	2.6	0	0	0	0	0	0	0	0	14.797
TDF	0	0	5.35	0	0	2.12	2.12	0	0.707	0	2.6	0	0	0	0	0	0	0	0	12.897
CMF2	0	0	5.35	4.02	0	2.12	2.12	0	0.707	0	2.6	0	0	0	0	0	0	0	0	16.917
WMF	0	0	5.35	0	0	2.12	2.12	0	0	0	2.6	0	0	0	0	0	0	0	0	12.19
TSWS	0	0	5.35	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.47
TG	4.17	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.29
STWS	4.17	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.29
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	4.17	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.29
115-110 Late																				
DTMF	0	0	5.35	0	0	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	12.4
ETMF	0	0	5.35	4.02	0	0	0	0	2.12	0	4.93	0	0	0	0	0	0	0	0	16.42
CMF1	0	0	5.35	0	0	0	2.12	0	2.12	0	4.93	0	0	0	0	0	0	0	0	14.52
TCF	0	0	5.35	4.02	0	0	2.12	0	2.12	0	4.93	0	0	0	0	0	0	0	0	18.54
TDF	0	0	5.35	0	0	2.12	2.12	0	2.12	0	4.93	0	0	0	0	0	0	0	0	16.64
CMF2	0	0	5.35	4.02	0	2.12	2.12	0	2.12	0	4.93	0	0	0	0	0	0	0	0	20.66
WMF	0	0	5.35	0	0	2.12	2.12	0	0	0	4.93	0	0	0	0	0	0	0	0	14.52
TSWS	0	0	5.35	0	0	2.12	0	0	0	0	0	0	0		0	0	0	0	0	7.47
TG	4.17	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.29
STWS	4.17	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.29
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	4.17	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.29
110-93 Early																				
DTMF	0	0	8.04	0	2.6	0	0	0	0	0	4.93	0	2.12	0	0	0	0	0	0	17.69
ETMF	0	0	8.04	4.02	2.6	0	0	0	0	0	4.93	0	2.12	0	0	0	0	0	0	21.71
CMF1	0	0	8.04	0	2.6	0	2.12	2.12	0	0	4.93	0	2.12	0	0	0	0	0	0	21.93

TCF	0	0	8.04	4.02	2.6	0	2.12	2.12	0	0	4.93	0	2.12	0	0	0	0	0	0	25.95
TDF	0	0	8.04	0	2.6	0	2.12	2.12	0	0	4.93	0	2.12	0	0	0	0	0	0	21.93
CMF2	0	0	8.04	4.02	2.6	0	2.12	2.12	0	0	4.93	0	2.12	0	0	0	0	0	0	25.95
WMF	0	0	8.04	0	2.6	0	2.12	2.12	0	0	4.93	0	0	0	0	0	0	0	0	19.81
TSWS	0	0	8.04	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.64
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
110-93 Mid																				
DTMF	0	0	4.42	0	0	0	0	0	2.12	0	3.75	0	2.12	0	0	0	0	0	0	12.41
ETMF	0	0	4.42	6.66	0	0	0	0	2.12	0	3.75	0	2.12	0	0	0	0	0	0	19.07
CMF1	0	0	4.42	0	0	0	2.12	0	2.12	0.707	3.75	0	2.12	0	0	0	0	0	0	15.237
TCF	0	0	4.42	6.66	0	0	2.12	0	2.12	0.707	3.75	0	2.12	0	0	0	0	0	0	21.897
TDF	0	0	4.42	0	0	2.12	2.12	0	2.12	0.707	3.75	0	2.12	0	0	0	0	0	0	17.357
CMF2	0	0	4.42	6.66	0	2.12	2.12	0	2.12	0.707	3.75	0	2.12	0	0	0	0	0	0	24.017
WMF	0	0	4.42	0	0	2.12	2.12	0	0	0.707	3.75	0	0	0	0	0	0	0	0	13.117
TSWS	0	0	4.42	0	0	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	0	7.247
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
110-93 Late																				
DTMF	0	0	7.55	0	0	0	0	0	0	0	2.6	0	2.12	0	0	0	0	0	0	12.27
ETMF	0	0	7.55	4.93	0	0	0	0	0	0	2.6	0	2.12	0	0	0	0	0	0	17.2
CMF1	0	0	7.55	0	0	0	2.12	0	0	0	2.6	0	2.12	0	0	0	0	0	0.707	15.097
TCF	0	0	7.55	4.93	0	0	2.12	0	0	0	2.6	0	2.12	0	0	0	0	0	0.707	20.027
TDF	0	0	7.55	0	0	0	2.12	0	0	0	2.6	0	2.12	0	0	0	0	0	0.707	15.097
CMF2	0	0	7.55	4.93	0	0	2.12	0	0	0	2.6	0	2.12	0	0	0	0	0	0.707	20.027
WMF	0	0	7.55	0	0	0	2.12	0	0	0	2.6	0	0	0	0	0	0	0	0.707	12.977
TSWS	0	0	7.55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.55
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
93-86 Early																				
DTMF	0	0	4.12	0	2.12	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	9.99
ETMF	0	0	4.12	2.6	2.12	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	12.59

CMF1	0	0	4.12	0	2.12	0	0	0	0	0	3.75	0	0	0	0.707	0	0	0	0	10.697
TCF	0	0	4.12	2.6	2.12	0	0	0	0	0	3.75	0	0	0	0.707	0	0	0	0	13.297
TDF	0	0	4.12	0	2.12	0	0	0	0	0	3.75	0	0	0	0.707	0	1.58	0	0	12.277
CMF2	0	0	4.12	2.6	2.12	0	0	0	0	0	3.75	0	0	0	0.707	0	0	0	0	13.297
WMF	0	0	4.12	0	2.12	0	0	0	0	0	3.75	0	0	0	0.707	0	1.58	0	0	12.277
TSWS	0	0	4.12	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.24
TG	5.91	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.51
STWS	5.19	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.79
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	5.91	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.51
93-86 Late																				
DTMF	0	0	4.12	0	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	11.17
ETMF	0	0	4.12	2.6	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	13.77
CMF1	0	0	4.12	0	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	11.17
TCF	0	0	4.12	2.6	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	13.77
TDF	0	0	4.12	0	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	11.17
CMF2	0	0	4.12	2.6	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	13.77
WMF	0	0	4.12	0	2.12	0	0	0	0	0	4.93	0	0	0	0	0	0	0	0	11.17
TSWS	0	0	4.12	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.24
TG	5.91	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.51
STWS	5.91	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.51
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	5.91	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.51
86-74 Early																				
DTMF	0	0	5.65	0	0	0	0	0	2.12	0	2.6	0	2.12	0	0	0	0	0	0	12.49
ETMF	0	0	5.65	4.93	0	0	0	0	2.12	0	2.6	0	2.12	0	0	0	0	0	0	17.42
CMF1	0	0	5.65	0	0	0	2.12	2.12	2.12	0	2.6	0	2.12	0	0	0	0	0	0	16.73
TCF	0	0	5.65	4.93	0	0	2.12	2.12	2.12	0	2.6	0	2.12	0	0	0	0	0	0	21.66
TDF	0	0	5.65	0	0	2.6	2.12	2.12	2.12	0	2.6	0	2.12	0	0	0	0	0	0	19.33
CMF2	0	0	5.65	4.93	0	2.6	2.12	2.12	2.12	0	2.6	0	2.12	0	0	0	0	0	0	24.26
WMF	0	0	5.65	0	0	2.6	2.12	2.12	0	0	2.6	0	0	0	0	0	0	0	0	15.09
TSWS	0	0	5.65	0	0	2.6	0	0	0	0	0	0	0		0	0	0	0	0	8.25
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
86-74 Mid																				
DTMF	0	0	4.69	0	0	0	0	0	0	0	2.6	0	2.12	0	0	0	0	0	0	9.41

ETMF	0	0	4.69	4.12	0	0	0	0	0	0	2.6	0	2.12	0	0	0	0	0	0	13.53
CMF1	0	0	4.69	0	0	0	0	2.12	0	0	2.6	0	2.12	0	0	0	0	0	0	11.53
TCF	0	0	4.69	4.12	0	0	0	2.12	0	0	2.6	0	2.12	0	0	0	0	0	0	15.65
TDF	0	0	4.69	0	0	2.6	0	2.12	0	0	2.6	0	2.12	0	0	0	0	0	0	14.13
CMF2	0	0	4.69	4.12	0	2.6	0	2.12	0	0	2.6	0	2.12	0	0	0	0	0	0	18.25
WMF	0	0	4.69	0	0	2.6	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	12.01
TSWS	0	0	4.69	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	7.29
TG	4.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.72
STWS	4.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.72
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	4.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.72
86-74 Late																				
DTMF	0	0	4.69	0	0	0	0	0	0	0	3.75	0	2.12	0	0	0	0	0	0	10.56
ETMF	0	0	4.69	4.69	0	0	0	0	0	0	3.75	0	2.12	0	0	0	0	0	0	15.25
CMF1	0	0	4.69	0	0	0	0	2.12	0	0	3.75		2.12	0	0	0	0	0	0	12.68
TCF	0	0	4.69	4.69	0	0	0	2.12	0	0	3.75	0	2.12	0	0	0	0	0	0	17.37
TDF	0	0	4.69	0	0	2.12	0	2.12	0	0	3.75	0	2.12	0	0	0	0	0	0	14.8
CMF2	0	0	4.69	4.69	0	2.12	0	2.12	0	0	3.75	0	2.12	0	0	0	0	0	0	19.49
WMF	0	0	4.69	0	0	2.12	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	12.68
TSWS	0	0	4.69	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	6.81
TG	4.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.72
STWS	4.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.72
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	4.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.72
74-59 Early																				
DTMF	0	0	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	5.2
ETMF	0	0	2.6	2.12	0	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	0	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	7.32
TCF	0	0	2.6	2.12	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	9.44
TDF	0	0	2.6	0	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	7.32
CMF2	0	0	2.6	2.12	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	9.44
WMF	0	0	2.6	0	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	7.32
TSWS	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
TG	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
STWS	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
SDST	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
74-59 Mid																				

DTMF	0	0	2.6	0	0	0	0	0	0	0	2.12	0		0	0	0	0	0	0	4.72
ETMF	0	0	2.6	2.12	0	0	0	0	0	0	2.12	0	0	0	0	0	0	0	0	6.84
CMF1	0	0	2.6	0	0	0	0	2.12	0	0	2.12	0	0	0	0.707	0	0	0	0	7.547
TCF	0	0	2.6	2.12	0	0	0	2.12	0	0	2.12	0	0	0	0.707	0	0	0	0	9.667
TDF	0	0	2.6	0	0	0	0	2.12	0	0	2.12	0	0	0	0.707	0	0	0	0	7.547
CMF2	0	0	2.6	2.12	0	0	0	2.12	0	0	2.12	0	0	0	0.707	0	0	0	0	9.667
WMF	0	0	2.6	0	0	0	0	2.12	0	0	2.12	0	0	0	0.707	0	0	0	0	7.547
TSWS	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
TG	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
STWS	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
SDST	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
74-59 late																			
DTMF	0	0	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	5.2
ETMF	0	0	2.6	2.12	0	0	0	0	0	0	2.6	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	0	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	7.32
TCF	0	0	2.6	2.12	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	9.44
TDF	0	0	2.6	0	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	7.32
CMF2	0	0	2.6	2.12	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	9.44
WMF	0	0	2.6	0	0	0	0	2.12	0	0	2.6	0	0	0	0	0	0	0	0	7.32
TSWS	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
TG	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
STWS	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.45
SDST	7.21	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.66
59-50																			
DTMF	0	0	2.6	0	1.22	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	7.57
ETMF	0	0	2.6	2.6	1.22	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	10.17
CMF1	0	0	2.6	0	1.22	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	9.69
TCF	0	0	2.6	2.6	1.22	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	12.29
TDF	0	0	2.6	0	1.22	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	9.69
CMF2	0	0	2.6	2.6	1.22	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	12.29
WMF	0	0	2.6	0	1.22	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	9.69
TSWS	0	0	2.6	0	1.22	0	0	0	0	0	0	0	0		0	0	0	0	0	3.82
TG	7.37	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.97
STWS	7.37	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.97
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	7.37	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.97

50-40																				
DTMF	0	0	2.6	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	6.35
ETMF	0	0	2.6	3.75	0	0	0	0	0	0	3.75	0	0	0	0	0	0	0	0	10.1
CMF1	0	0	2.6	0	0	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	8.47
TCF	0	0	2.6	3.75	0	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	12.22
TDF	0	0	2.6	0	0	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	8.47
CMF2	0	0	2.6	3.75	0	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	12.22
WMF	0	0	2.6	0	0	0	0	2.12	0	0	3.75	0	0	0	0	0	0	0	0	8.47
TSWS	0	0	2.6	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	2.6
TG	7.37	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.49
STWS	7.37	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.49
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	7.37	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.49

Dweizle, Poland

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Bet	Fra	Lar	Bu	Ulm	Hed	Chen	Acer	Olea	Pi	Vi	Ost	**TOTAL**
128-115 Early																							
DTMF	0	0	6.2	0	2.6	0	0	0	0	0	7	0	2.6	0	0	0	0	0	0	0	0	0	18.44
ETMF	0	0	6.2	1.2	2.6	0	0	0	0	0	7	0	2.6	0	0	0	0	0	0	0	0	0	19.66
CMF1	0	0	6.2	0	2.6	0	0	2.1	0	0	7	0	2.6	0	1.22	0	0	0	0	0	0	0	21.78
TCF	0	0	6.2	1.2	2.6	0	0	2.1	0	0	7	0	2.6	0	1.22	0	0	0	0	0	0	0	23
TDF	0	0	6.2	0	2.6	2.1	0	2.1	0	0	7	0	2.6	0	1.22	0.71	0	0.71	0	0	0	0	25.314
CMF2	0	0	6.2	1.2	2.6	2.1	0	2.1	0	0	7	0	2.6	0	1.22	0	0	0.71	0	0	0	0	25.827
WMF	0	0	6.2	0	2.6	2.1	0	2.1	0	0	0	0	0	0	1.22	0.71	0	0.71	0	0	0		15.714
TSWS	0	0	6.2	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.84
TG	2.6	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.84
STWS	2.6	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.84
DSS	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
HD	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
SDST	2.6	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.84
128-115 Mid																							
DTMF	0	0	2.6	0	2.1	0	0	0	0	0	3.8	0	2.1	0	0	0	0	0	0	0	0	0	10.59
ETMF	0	0	2.6	1.2	2.1	0	0	0	0	0	3.8	0	2.1	0	0	0	0	0	0	0	0	0	11.81
CMF1	0	0	2.6	0	2.1	0	5.9	6.7	0	0	3.8	1.6	2.1	0	1.22	0	0	0	0	0	0	0	25.91
TCF	0	0	2.6	1.2	2.1	0	5.9	6.7	0	0	3.8	0	2.1	0	1.22	0	0	0	0	0	0	0	25.55
TDF	0	0	2.6	0	2.1	6.2	5.9	6.7	0	0	3.8	1.6	2.1	1.6	1.22	0	0	0.71	0	0	1.2		35.657
CMF2	0	0	2.6	1.2	2.1	6.2	5.9	6.7	0	0	3.8	1.6	2.1	0	1.22	0	0	0.71	0	0	1.2	0	35.297
WMF	0	0	2.6	0	2.1	6.2	5.9	6.7	0	0	3.8	0	0	1.6	1.22	0	0	0.71	0	0	1.2	0	31.957
TSWS	0	0	2.6	0	2.1	6.2	0	0	0	0	0	0	0		0	0	0	0	0	1	0	0	11.66

TG	2.1	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.1	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.1	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
128-115 Late																							
DTMF	0	0	7.4	0	0	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.58
ETMF	0	0	7.4	5.9	0	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	18.44
CMF1	0	0	7.4	0	0	0	2.1	2.6	2.6	2.6	2.6	0	0	0	0.71	0	0	0	0	0	0	0	20.607
TCF	0	0	7.4	5.9	0	0	2.1	2.6	2.6	2.6	2.6	0	0	0	0.71	0	0	0	0	0	0	0	26.467
TDF	0	0	7.4	0	0	2.1	2.1	2.6	2.6	2.6	2.6	0	0	0	0.71		0	0	0	0	0	0	22.727
CMF2	0	0	7.4	5.9	0	2.1	2.1	2.6	2.6	2.6	2.6	0	0	0	0.71	0	0	0	0	0	0	0	28.587
WMF	0	0	7.4	0	0	2.1	2.1	2.6	0	2.6	2.6	0	0	0	0.71		0	0	0	0	0	0	20.127
TSWS	0	0	7.4	0	0	2.1	0	0	0	2.6	0	0	0	0	0	0	0	0	0.71	0	0	0	12.807
TG	2.1	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.36
STWS	2.1	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.36
DSS	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
HD	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
SDST	2.1	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.36
115-110 Early																							
DTMF	0	0	3.8	0	2.1	0	0	0	2.1	0	4.7	0	0	0	0	0	0	0	0	0	0	0	12.68
ETMF	0	0	3.8	2.6	2.1	0	0	0	2.1	0	4.7	0	0	0	0	0	0	0	0	0	0	0	15.28
CMF1	0	0	3.8	0	2.1	0	2.1	2.1	2.1	2.1	4.7	0	0	0	1.22	0	0	0	0	0	0	0	20.26
TCF	0	0	3.8	2.6	2.1	0	2.1	2.1	2.1	2.1	4.7	0	0	0	1.22	0	0	0	0	0	0	0	22.86
TDF	0	0	3.8	0	2.1	0	2.1	2.1	2.1	2.1	4.7	0	0	0	1.22	0	0	0	0	0	0	0	20.26
CMF2	0	0	3.8	2.6	2.1	0	2.1	2.1	2.1	2.1	4.7	0	0	0	1.22	0	0	0	0	0	0	0	22.86
WMF	0	0	3.8	0	2.1	0	2.1	2.1	0	2.1	4.7	0	0	0	1.22	0	0	0	0	0	0		18.14
TSWS	0	0	3.8	0	2.1	0	0	0	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	7.99
TG	3.8	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	9.62
STWS	3.8	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	9.62
DSS	0	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	5.87
HD	0	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	5.87
SDST	3.8	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	9.62
115-110 Late																							
DTMF	0	0	6.7	0	2.1	0	0	0	2.1	0	2.6	0	2.1	0	0	0	0	0	0	0	0	0	15.62
ETMF	0	0	6.7	2.6	2.1	0	0	0	2.1	0	2.6	0	2.1	0	0	0	0	0	0	0	0	0	18.22
CMF1	0	0	6.7	0	2.1	0	2.1	2.1	2.1	2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	21.98
TCF	0	0	6.7	2.6	2.1	0	2.1	2.1	2.1	2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	24.58
TDF	0	0	6.7	0	2.1	0	2.1	2.1	2.1	2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	21.98
CMF2	0	0	6.7	2.6	2.1	0	2.1	2.1	2.1	2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	24.58

WMF	0	0	6.7	0	2.1	0	2.1	2.1	0	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	17.74
TSWS	0	0	6.7	0	2.1	0	0	0	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	10.9
TG	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.32
STWS	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.32
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.72
SDST	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.32
110-93 Early																						
DTMF	0	0	4.9	0	2.1	0	0	0	2.1	0	2.6	0	0	0	0	0	0	0	0	0	0	0	11.77
ETMF	0	0	4.9	2.1	2.1	0	0	0	2.1	0	2.6	0	0	0	0	0	0	0	0	0	0	0	13.89
CMF1	0	0	4.9	0	2.1	0	2.1	2.1	2.1	2.1	2.6		0	0	0	0	0	0	0	0	0	0	18.13
TCF	0	0	4.9	2.1	2.1	0	2.1	2.1	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	20.25
TDF	0	0	4.9	0	2.1	0	2.1	2.1	2.1	2.1	2.6		0	0	0	0	0	0	0	0	0	0	18.13
CMF2	0	0	4.9	2.1	2.1	0	2.1	2.1	2.1	2.1	2.6		0	0	0	0	0	0	0	0	0	0	20.25
WMF	0	0	4.9	0	2.1	0	2.1	2.1	0	2.1	2.6		0	0	0	0	0	0	0	0	0	0	16.01
TSWS	0	0	4.9	0	2.1	0	0	0	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	9.17
TG	2.6	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
110-93 Mid																						
DTMF	0	0	6.7	0	2.6	0	0	0	0	0	2.6	0	2.1	0	0	0	0	0	0	0	0	0	13.98
ETMF	0	0	6.7	2.6	2.6	0	0	0	0	0	2.6	0	2.1	0	0	0	0	0	0	0	0	0	16.58
CMF1	0	0	6.7	0	2.6	0	2.1	2.1	0	2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	20.34
TCF	0	0	6.7	2.6	2.6	0	2.1	2.1	0	2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	22.94
TDF	0	0	6.7	0	2.6	2.1	2.1	2.1	0	2.1	2.6	0	2.1	2.1	0	0	0	0	0	0	0	0	24.58
CMF2	0	0	6.7	2.6	2.6	2.1	2.1	2.1		2.1	2.6	0	2.1	0	0	0	0	0	0	0	0	0	25.06
WMF	0	0	6.7	0	2.6	2.1	2.1	2.1	0	2.1	2.6	0	0	2.1	0	0	0	0	0	0	0	0	22.46
TSWS	0	0	6.7	0	2.6	2.1	0	0	0	2.1	0	0	0	2.1	0	0	0	0	0	0	0	0	15.62
TG	4.9	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	9.65
STWS	4.9	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	9.65
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.72
SDST	4.9	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	9.65
110-93 Late																						
DTMF	0	0	4.9	0	0	0	0	0	2.1	0	2.6	0	0	0	0	0	0	0	0	0	0	0	9.65
ETMF	0	0	4.9	2.6	0	0	0	0	2.1	0	2.6	0	0	0	0	0	0	0	0	0	0	0	12.25
CMF1	0	0	4.9	0	0	0	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	11.77

TCF	0	0	4.9	2.6	0	0	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	14.37
TDF	0	0	4.9	0	0	2.1	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	13.89
CMF2	0	0	4.9	2.6	0	2.1	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	16.49
WMF	0	0	4.9	0	0	2.1	0	0	0	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	11.77
TSWS	0	0	4.9	0	0	2.1	0	0	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	9.17
TG	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.32
STWS	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.32
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.72
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.72
SDST	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.32
93-86 Early																							
DTMF	0	0	4.3	0	0	0	0	0	2.1	0	2.6	0	0	0	0	0	0	0	0	0	0	0	9.02
ETMF	0	0	4.3	2.1	0	0	0	0	2.1	0	2.6	0	0	0	0	0	0	0	0	0	0	0	11.14
CMF1	0	0	4.3	0	0	0	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	11.14
TCF	0	0	4.3	2.1	0	0	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	13.26
TDF	0	0	4.3	0	0	0	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	11.14
CMF2	0	0	4.3	2.1	0	0	0	0	2.1	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	13.26
WMF	0	0	4.3	0	0	0	0	0	0	2.1	2.6	0	0	0	0	0	0	0	0	0	0	0	9.02
TSWS	0	0	4.3	0	0	0	0	0	0	2.1	0	0	0	0	0	0	0	0	0	0	0	0	6.42
TG	4.9	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	10.8
STWS	4.9	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	10.8
DSS	0	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	5.87
HD	0	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	5.87
SDST	4.9	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	10.8
93-86 Late																							
DTMF	0	0	6.7	0	2.1	0	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	12.23
ETMF	0	0	6.7	2.1	2.1	0	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	14.35
CMF1	0	0	6.7	0	2.1	0	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	12.23
TCF	0	0	6.7	2.1	2.1	0	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	14.35
TDF	0	0	6.7	0	2.1	1.2	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	13.45
CMF2	0	0	6.7	2.1	2.1	1.2	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	15.57
WMF	0	0	6.7	0	2.1	1.2	0	0	0	0	3.5	0	0	0	0	0	0	0	0	0	0	0	13.45
TSWS	0	0	6.7	0	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
TG	3.8	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	10.1
STWS	3.8	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	10.1
DSS	0	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	6.35
HD	0	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	6.35
SDST	3.8	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	10.1

Henglo, Netherlands

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Bet	Fra	Lar	Bux	Ulm	Chen	Cy	Aln	Heli	Ro	**TOTAL**
40-34																					
DTMF	0	0	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	1.22	0	0	5.94
ETMF	0	0	2.12	0.707	0	0	0	0	0	0	2.6	0	0	0	0	0	0	1.22	0	0	6.647
CMF1	0	0	2.12	0	0	0	0	1.22	0	0	2.6	0	0	0	0	0	0	1.22	0	0	7.16
TCF	0	0	2.12	0.707	0	0	0	1.22	0	0	2.6	0	0	0	0	0	0	1.22	0	0	7.867
TDF	0	0	2.12	0	0	0	0	1.22	0	0	2.6	0	0	0	0	0	0	1.22	0	0	7.16
CMF2	0	0	2.12	0.707	0	0	0	1.22	0	0	2.6	0	0	0	0	0	0	1.22	0	0	7.867
WMF	0	0	2.12	0	0	0	0	1.22	0	0	0	0	0	0	0	0	0	1.22	0	0	4.56
TSWS	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
TG	4.62	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	1.22	0.707	9.374
STWS	4.62	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	1.22	0.707	9.374
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	0	0	2.827
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	0	0	2.827
SDST	4.62	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	6.24	0	0	0	13.687
34-29																					
DTMF	0	0	2.6	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	2.12	0	0	9.65
ETMF	0	0	2.6	1.58	0	0	0	0	0	0	4.93	0	0	0	0	0	0	2.12	0	0	11.23
CMF1	0	0	2.6	0	0	0	0	2.6	0	0	4.93	0	0	0	0	0	0	2.12	0	0	12.25
TCF	0	0	2.6	1.58	0	0	0	2.6	0	0	4.93	0	0	0	0	0	0	2.12	0	0	13.83
TDF	0	0	2.6	0	0	0	0	2.6	0	0	4.93	0	0	0	0	0	0	2.12	0	0	12.25
CMF2	0	0	2.6	1.58	0	0	0	2.6	0	0	4.93	0	0	0	0	0	0	2.12	0	0	13.83
WMF	0	0	2.6	0	0	0	0	2.6	0	0	4.93	0	0	0	0	0	0	2.12	0	0	12.25
TSWS	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
TG	6.24	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	1.58	2.12	15.27
STWS	6.24	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	1.58	2.12	15.27
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	5.33
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	5.33
SDST	6.24	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	4.26	0	0	0	15.83

Ioannina, Greece

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Bet	Fra	Bux	Ulm	Tax	Hed	Ilex	Chen	Cy	Acer	Qu-i	Pi	Ost	**TOTAL**
128-115 Early																							
DTMF	0	0	3.75	0	2.6	0	0	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	10.59
ETMF	0	0	3.75	2.12	2.6	0	0	0	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	12.71
CMF1	0	0	3.75	0	2.6	0	2.12	2.12	2.12	2.12	0.707	0	0	0	0	0	0	0	0	0	0	0	15.537
TCF	0	0	3.75	2.12	2.6	0	2.12	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	16.95
TDF	0	0	3.75	0	2.6	4.26	2.12	2.12	2.12	2.12	0.707	0	0	0	0	0	0	0	0	0	0		19.797
CMF2	0	0	3.75	2.12	2.6	4.26	2.12	2.12	2.12	2.12	0.707	0	0	0	0	0	0	0	0	0	0	0	21.917
WMF	0	0	3.75	0	2.6	4.26	2.12	2.12	0	0	0.707	0	0	0	0	0	0	0	0	2.12	0	0	17.677

TSWS	0	0	3.75	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	8.47
TG	3.45	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.42
STWS	3.45	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.42
DSS	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.97
HD	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.97
SDST	3.45	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.42
128-115 Mid																						
DTMF	0	0	2.6	0	2.12	0	0	0	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	9.44
ETMF	0	0	2.6		2.12	0	0	0	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	9.44
CMF1	0	0	2.6	0	2.12	0	5.14	2.12	2.6	2.12	0.707	0	1.58	1.58	0	0	0	0	0	0	0	0	20.567
TCF	0	0	2.6		2.12	0	5.14	2.12	2.6	2.12	0	0	1.58	0	0	0	0	0	0	0	0	0	18.28
TDF	0	0	2.6	0	2.12	5.86	5.14	2.12	2.6	2.12	0.707	0.707	1.58	1.58	0.71		0	0	0.707	0	0	2.6	31.148
CMF2	0	0	2.6		2.12	5.86	5.14	2.12	2.6	2.12	0.707	0	1.58	0	0	0	0	0	0.707	0	0	0	25.554
WMF	0	0	2.6	0	2.12	5.86	5.14	2.12	0	2.12	0.707	0.707	1.58	0	0.71		0	0	0.707	1.22	0	2.6	28.188
TSWS	0	0	2.6	0	2.12	5.86	0	0	0	0	0		0	0	0	0	0	0	0	1.22	0.707	0	12.507
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	4.72
128-115 Late																						
DTMF	0	0	2.6	0	2.12	0	0	0	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	9.44
ETMF	0	0	2.6		2.12	0	0	0	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	9.44
CMF1	0	0	2.6	0	2.12	0	3.75	2.12	2.6	2.12	0.707	0	0.707		0	0	0	0	0	0	0	0	16.724
TCF	0	0	2.6		2.12	0	3.75	2.12	2.6	2.12	0	0	0.707	0	0	0	0	0	0	0	0	0	16.017
TDF	0	0	2.6	0	2.12	5.86	3.75	2.12	2.6	2.12	0.707	1.22	0.707		0.71	2.12	0	0	0.707	0	0	0	27.338
CMF2	0	0	2.6		2.12	5.86	3.75	2.12	2.6	2.12	0.707	0	0.707	0	0	0	0	0	0.707	0	0	0	23.291
WMF	0	0	2.6	0	2.12	5.86	3.75	2.12	0	2.12	0.707	1.22	0.707	0	0.71	2.12	0	0	0.707	0	0	0	24.738
TSWS	0	0	2.6	0	2.12	5.86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.58
TG	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.05
STWS	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.05
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.05
115-110 Early																						
DTMF	0	0	3.75	0	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
ETMF	0	0	3.75		2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
CMF1	0	0	3.75	0	2.12	0	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	12.23
TCF	0	0	3.75		2.12	0	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	12.23
TDF	0	0	3.75	0	2.12	6.24	2.12	2.12	2.12	0	0	1.22	0	0	0	0	0	0	0.71	0	0	1.58	21.977
CMF2	0	0	3.75		2.12	6.24	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0.71	0	0	0	19.177

WMF	0	0	3.75	0	2.12	6.24	2.12	2.12	0	0	0	1.22	0	0	0	0	0	0	0.71	0	0	1.58	19.857
TSWS	0	0	3.75	0	2.12	6.24	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	0	0	13.33
TG	3.75	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	8.3
STWS	3.75	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	8.3
DSS	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	4.55
HD	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	4.55
SDST	3.75	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	3.08	0	0	0	0	11.38
115-110 Late																							
DTMF	0	0	3.75	0	2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
ETMF	0	0	3.75		2.12	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	7.99
CMF1	0	0	3.75	0	2.12	0	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	12.23
TCF	0	0	3.75		2.12	0	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	12.23
TDF	0	0	3.75	0	2.12	6.24	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0.707	0	0	0.707	19.884
CMF2	0	0	3.75		2.12	6.24	2.12	2.12	2.12	0	0	0	0	0	0	0	0	0	0.707	0	0	0	19.177
WMF	0	0	3.75	0	2.12	6.24	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0.707	0.707	0	0.707	18.471
TSWS	0	0	3.75	0	2.12	6.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	12.817
TG	3.75	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	8.3
STWS	3.75	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	8.3
DSS	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	4.55
HD	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58	0	0	0	0	0	4.55
SDST	3.75	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.58		0	0	0	0	8.3

Lago di Monticchio, Italy

	Po	Ar	Pin	Jun	Qu	Car	Ab	Fa	Bet	Fra	Ulm	Hed	Tha	Til	Chen	Com	Acer	Pi	Cary	Ost	**TOTAL**
110-93 Mid																					
DTMF	0	0	2.6	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	7.8
ETMF	0	0	2.6	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	7.8
CMF1	0	0	2.6	0	0	0	2.6	0	2.6	0	2.12	0	0	0.707	0	0	0	0	0	0	10.627
TCF	0	0	2.6	0	0	0	2.6	0	2.6	0	2.12	0	0	0.707	0	0	0	0	0	0	10.627
TDF	0	0	2.6	0	7	0	2.6	0	2.6	0	2.12	0	0	0.707	0	0	0	0	0	1.22	18.847
CMF2	0	0	2.6	0	7	0	2.6	0	2.6	0	2.12	0	0	0.707	0	0	0	0	0	0	17.627
WMF	0	0	2.6	0	7	0	0	0	2.6	0	2.12	0	0	0.707	0	0	0	0	0	1.22	16.247
TSWS	0	0	2.6	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.6
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.84
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	6.84
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	4.72

110-93 Late																					
DTMF	0	0	2.6	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	7.8
ETMF	0	0	2.6	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	7.8
CMF1	0	0	2.6	0	0	0	2.6	0	2.6	0	2.12	0	0	1.22	0	0	0	0	0	0	11.14
TCF	0	0	2.6	0	0	0	2.6	0	2.6	0	2.12	0	0	1.22	0	0	0	0	0	0	11.14
TDF	0	0	2.6	0	7	0	2.6	0	2.6	0	2.12	0	0	1.22	0	0	0	0	0	1.22	19.36
CMF2	0	0	2.6	0	7	0	2.6	0	2.6	0	2.12	0	0	1.22	0	0	0	0	0	0	18.14
WMF	0	0	2.6	0	7	0	0	0	2.6	0	2.12	0	0	1.22	0	0	0	0	0	1.22	16.76
TSWS	0	0	2.6	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.6
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	1.22	0	0	6.647
STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	1.22	0	0	6.647
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	4.72
93-86 Early																					
DTMF	0	0	2.6	0	0	0	5.62	0	2.12	0	0	0	0	0	0	0	0	0	0	0	10.34
ETMF	0	0	2.6	0	0	0	5.62	0	2.12	0	0	0	0	0	0	0	0	0	0	0	10.34
CMF1	0	0	2.6	0	0	0	5.62	0	2.12	0	3.45	0	0	1.22	0	0	0	0	0	0	15.01
TCF	0	0	2.6	0	0	0	5.62	0	2.12	0	3.45	0	0	1.22	0	0	0	0	0	0	15.01
TDF	0	0	2.6	0	3.75	0	5.62	0	2.12	0	3.45	0	0	1.22	0	0	0	0	0	0	18.76
CMF2	0	0	2.6	0	3.75	0	5.62	0	2.12	0	3.45	0	0	1.22	0	0	0	0	0	0	18.76
WMF	0	0	2.6	0	3.75	0	0	0	2.12	0	3.45	0	0	1.22	0	0	0	0	0	0	13.14
TSWS	0	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35
TG	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0.707	0	1.22	0	0	7.834
STWS	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0.707	0	1.22	0	0	7.834
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	0	0	0	2.827
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0.707	0	0	0	0	0	2.827
SDST	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
93-86 Late																					
DTMF	0	0	2.6	0	0	0	5.62	0	2.12	0	0	0	0	0	0	0	0	0	0	0	10.34
ETMF	0	0	2.6	0	0	0	5.62	0	2.12	0	0	0	0	0	0	0	0	0	0	0	10.34
CMF1	0	0	2.6	0	0	0	5.62	0	2.12	0	2.6	0	0	1.22	0	0	0	0	0	0	14.16
TCF	0	0	2.6	0	0	0	5.62	0	2.12	0	2.6	0	0	1.22	0	0	0	0	0	0	14.16
TDF	0	0	2.6	0	3.75	0	5.62	0	2.12	0	2.6	0	0	1.22	0	0	0	0	0	0	17.91
CMF2	0	0	2.6	0	3.75	0	5.62	0	2.12	0	2.6	0	0	1.22	0	0	0	0	0	0	17.91
WMF	0	0	2.6	0	3.75	0	0	0	2.12	0	2.6	0	0	1.22	0	0	0	0	0	0	12.29
TSWS	0	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35
TG	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
STWS	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12

HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
86-74 Early																					
DTMF	0	0	2.6	0	0	0	4.93	0	2.12	0	0	0	0	0	0	0	0	0	0	0	9.65
ETMF	0	0	2.6	0	0	0	4.93	0	2.12	0	0	0	0	0	0	0	0	0	0	0	9.65
CMF1	0	0	2.6	0	0	2.12	4.93	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	15.11
TCF	0	0	2.6	0	0	2.12	4.93	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	15.11
TDF	0	0	2.6	0	3.75	2.12	4.93	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	18.86
CMF2	0	0	2.6	0	3.75	2.12	4.93	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	18.86
WMF	0	0	2.6	0	3.75	2.12	0	0	2.12	0	2.12	0	0	1.22	0	0	0	0	0	0	13.93
TSWS	0	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35
TG	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0.707	0	0	0	0	8.697
STWS	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0.707	0	0	0	0	8.697
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
SDST	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
86-74 Mid																					
DTMF	0	0	3.75	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
ETMF	0	0	3.75	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	2.12	0	0	0.707	3.45	0	0	2.12	0	0	0	0	0	0	14.267
TCF	0	0	3.75	0	0	2.12	2.12	0	0	0	3.45	0	0	2.12	0	0	0	0	0	0	13.56
TDF	0	0	3.75	0	5.62	2.12	2.12	0	0	0.707	3.45	0	0	2.12	0	0	1.22	0	0	0	21.107
CMF2	0	0	3.75	0	5.62	2.12	2.12	0	0	0.707	3.45	0	0	2.12	0	0	1.22	0	0	0	21.107
WMF	0	0	3.75	0	5.62	2.12	0	0	0	0.707	3.45	0	0	2.12	0	0	1.22	0	0	0	18.987
TSWS	0	0	3.75	0	5.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.37
TG	4.93	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.86	1.22	0	0	0	0	14.61
STWS	4.93	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.86	1.22	0	0	0	0	14.61
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.86	0	0	0	0	0	8.46
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.86	0	0	0	0	0	8.46
SDST	4.93	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.53
86-74 Late																					
DTMF	0	0	2.6	0	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	7.32
ETMF	0	0	2.6	0	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	0	0	2.12	2.6	0	2.12	0	2.12	0	0	2.12	0	0	0	0	0	0	13.68
TCF	0	0	2.6	0	0	2.12	2.6	0	2.12	0	2.12	0	0	2.12	0	0	0	0	0	0	13.68
TDF	0	0	2.6	0	3.75	2.12	2.6	0	2.12	0	2.12	0	0	2.12	0	0	0.707	0	0	0	18.137
CMF2	0	0	2.6	0	3.75	2.12	2.6	0	2.12	0	2.12	0	0	2.12	0	0	0.707	0	0	0	18.137
WMF	0	0	2.6	0	3.75	2.12	0	0	2.12	0	2.12	0	0	2.12	0	0	0.707	0	0	0	15.537
TSWS	0	0	2.6	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.35

TG	5.86	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0.707	0	0	1.22	0	12.027
STWS	5.86	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0.707	0	0	1.22	0	12.027
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	4.24
SDST	5.86	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.98
74-59 Early																					
DTMF	0	0	3.45	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
ETMF	0	0	3.45	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
CMF1	0	0	3.45	0	0	0	2.12	0	0	0	1.22	0	0	1.22	0	0	0	0	0	0	8.01
TCF	0	0	3.45	0	0	0	2.12	0	0	0	1.22	0	0	1.22	0	0	0	0	0	0	8.01
TDF	0	0	3.45	0	3.45	0	2.12	0	0	0	1.22			1.22	0	0	0	0	0	0.707	12.167
CMF2	0	0	3.45	0	3.45	0	2.12	0	0	0	1.22	0	0	1.22	0	0	0	0	0	0	11.46
WMF	0	0	3.45	0	3.45	0	0	0	0	0	1.22			1.22	0	0	0	0	0	0.707	10.047
TSWS	0	0	3.45	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.9
TG	6.05	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	0	0.707	0	13.057
STWS	6.05	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	0	0.707	0	13.057
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	4.72
SDST	6.05	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.17
74-59 Mid																					
DTMF	0	0	2.6	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
CMF1	0	0	2.6	0	0	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0	5.94
TCF	0	0	2.6	0	0	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0	5.94
TDF	0	0	2.6	0	2.12	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0.707	8.767
CMF2	0	0	2.6	0	2.12	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0	8.06
WMF	0	0	2.6	0	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	0.707	6.647
TSWS	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
TG	4.3	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	0	0	0	12.23
STWS	4.3	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	0	0	0	12.23
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	6.35
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	6.35
SDST	4.3	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.05
74-59 late																					
DTMF	0	0	2.6	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	0	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
CMF1	0	0	2.6	0	0	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0	5.94
TCF	0	0	2.6	0	0	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0	5.94
TDF	0	0	2.6	0	2.12	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0.707	8.767
CMF2	0	0	2.6	0	2.12	0	2.12	0	0	0	1.22	0	0	0	0	0	0	0	0	0	8.06

WMF	0	0	2.6	0	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	0	0	0.707	6.647
TSWS	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.72
TG	4.3	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	0	0	0	12.23
STWS	4.3	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	0	0	0	12.23
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	6.35
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	6.35
SDST	4.3	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.05
59-50																					
DTMF	0	0	3.45	2.12	0	0	1.22	0	2.12	0	0	0	0	0	0	0	0	0	0	0	8.91
ETMF	0	0	3.45	2.12	0	0	1.22	0	2.12	0	0	0	0	0	0	0	0	0	0	0	8.91
CMF1	0	0	3.45	2.12	0	0.707	1.22	0	2.12	2.6	0.707	0	0	0	0	0	0	0	0	0	12.924
TCF	0	0	3.45	2.12	0	0.707	1.22	0	2.12	0	0.707	0	0	0	0	0	0	0	0	0	10.324
TDF	0	0	3.45	2.12	3.75	0.707	1.22	0	2.12	2.6	0.707	0	0	0	0	0	0	0	0	0	16.674
CMF2	0	0	3.45	2.12	3.75	0.707	1.22	0	2.12	2.6	0.707	0	0	0	0	0	0	0	0	0	16.674
WMF	0	0	3.45	2.12	3.75	0.707	0	0	2.12	2.6	0.707	0	0	0	0	0	0	0	0	0	15.454
TSWS	0	0	3.45	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.32
TG	6.66	2.97	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0.707	0	0	2.12	0	15.057
STWS	6.66	2.97	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0.707	0	0	2.12	0	15.057
DSS	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	5.57
HD	0	2.97	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	5.57
SDST	6.66	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.63
50-40																					
DTMF	0	0	3.75	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	8.95
ETMF	0	0	3.75	0	0	0	2.6	0	2.6	0	0	0	0	0	0	0	0	0	0	0	8.95
CMF1	0	0	3.75	0	0	1.22	2.6	0	2.6	0.707	0.707	0	0	0.707	0	0	0	0	0	0	12.291
TCF	0	0	3.75	0	0	1.22	2.6	0	2.6	0	0.707	0	0	0.707	0	0	0	0	0	0	11.584
TDF	0	0	3.75	0	4.02	1.22	2.6	0	2.6	0.707	0.707	0	0	0.707	0	0	0	0	0	0	16.311
CMF2	0	0	3.75	0	4.02	1.22	2.6	0	2.6	0.707	0.707	0	0	0.707	0	0	0	0	0	0	16.311
WMF	0	0	3.75	0	4.02	1.22	0	0	2.6	0.707	0.707	0	0	0.707	0	0	0	0	0	0	13.711
TSWS	0	0	3.75	0	4.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.77
TG	4.12	3.45	0	0	0	0	0	0	0	0	0	0.707	0	0	2.12	0.707	0	0	2.12	0	13.224
STWS	4.12	3.45	0	0	0	0	0	0	0	0	0	0.707	0	0	2.12	0.707	0	0	2.12	0	13.224
DSS	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	5.57
HD	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	5.57
SDST	4.12	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.57
40-34																					
DTMF	0	0	3.75	2.12	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.59
ETMF	0	0	3.75	2.12	0	0	2.12	0	2.6	0	0	0	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	2.12	0	0.707	2.12	0	2.6	0	1.58	0	0	0	0	0	0	0	0	0	12.877
TCF	0	0	3.75	2.12	0	0.707	2.12	0	2.6	0	1.58	0	0	0	0	0	0	0	0	0	12.877
TDF	0	0	3.75	2.12	3.75	0.707	2.12	0	2.6	0	1.58	0	0	0	0	0	0	0	0	0	16.627

CMF2	0	0	3.75	2.12	3.75	0.707	2.12	0	2.6	0	1.58	0	0	0	0	0	0	0	0	0	16.627
WMF	0	0	3.75	2.12	3.75	0.707	0	0	2.6	0	1.58	0	0	0	0	0	0	0	0	0	14.507
TSWS	0	0	3.75	2.12	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.62
TG	6.4	4.12	0	0	0	0	0	0	0	0	0	0	0.707	0	3.75	1.58	0	0	0	0	16.557
STWS	6.4	4.12	0	0	0	0	0	0	0	0	0	0	0.707	0	3.75	1.58	0	0	0	0	16.557
DSS	0	4.12	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	0	0	0	7.87
HD	0	4.12	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	0	0	0	7.87
SDST	6.4	4.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.52
34-29																					
DTMF	0	0	3.75	2.12	0	0	2.12	0	0.707	0	0	0	0	0	0	0	0	0	0	0	8.697
ETMF	0	0	3.75	2.12	0	0	2.12	0	0.707	0	0	0	0	0	0	0	0	0	0	0	8.697
CMF1	0	0	3.75	2.12	0	0	2.12	0	0.707	1.22	0.707	0	0	0	0	0	0	0	0	0	10.624
TCF	0	0	3.75	2.12	0	0	2.12	0	0.707	0	0.707	0	0	0	0	0	0	0	0	0	9.404
TDF	0	0	3.75	2.12	2.6	0	2.12	0	0.707	1.22	0.707	0	0	0	0	0	0	0	0	0	13.224
CMF2	0	0	3.75	2.12	2.6	0	2.12	0	0.707	1.22	0.707	0	0	0	0	0	0	0	0	0	13.224
WMF	0	0	3.75	2.12	2.6	0	0	0	0.707	1.22	0.707	0	0	0	0	0	0	0	0	0	11.104
TSWS	0	0	3.75	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.47
TG	6.66	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.69	2.12	0	0	2.12	0	17.71
STWS	6.66	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.69	2.12	0	0	2.12	0	17.71
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.69	0	0	0	0	0	6.81
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.69	0	0	0	0	0	6.81
SDST	6.66	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.78
29-25																					
DTMF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	8.47
CMF1	0	0	3.75	2.6	0	0	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	0	9.177
TCF	0	0	3.75	2.6	0	0	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	0	9.177
TDF	0	0	3.75	2.6	2.6	0	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	0	11.777
CMF2	0	0	3.75	2.6	2.6	0	2.12	0	0	0	0.707	0	0	0	0	0	0	0	0	0	11.777
WMF	0	0	3.75	2.6	2.6	0	0	0	0	0	0.707	0	0	0	0	0	0	0	0	0	9.657
TSWS	0	0	3.75	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0		0	0	8.95
TG	6.66	4.93	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	2.12	0	15.83
STWS	6.66	4.93	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	2.12	0	15.83
DSS	0	4.93	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.05
HD	0	4.93	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	0	0	0	7.05
SDST	6.66	4.93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.59

Kopais, Greece

	Po	Ar	Pin	Jun	Qu	Car	Ab	Bet	Fra	Chen	Acer	Qu-i	Olea	Pi	Vi	Ost	**TOTAL**
128-115 Early																	
DTMF	0	0	3.75	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	0	10.59
ETMF	0	0	3.75	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	2.6	0	2.12	2.12	2.12	0.707	0	0	0	0	0	0	0	13.417
TCF	0	0	3.75	2.6	0	2.12	2.12	2.12	0	0		0	0	0	0	0	12.71
TDF	0	0	3.75	2.6	6.46	2.12	2.12	2.12	0.707	0	0.707	0	0	0	0	0	20.584
CMF2	0	0	3.75	2.6	6.46	2.12	2.12	2.12	0.707	0	0.707	0	0	0	0	0	20.584
WMF	0	0	3.75	2.6	6.46	2.12	0	0	0.707	0	0.707	3.75	0	0	0		20.094
TSWS	0	0	3.75	2.6	0	0	0	0	0	0	0	3.75		0.707	0	0	10.807
TG	3.45	2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
STWS	3.45	2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
DSS		2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	4.24
HD		2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	4.24
SDST	3.45	2.12	0	0	0	0	0	0	0		0	0	0	0	0	0	5.57
128-115 Mid																	
DTMF	0	0	3.75	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	0	10.59
ETMF	0	0	3.75	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	2.6	0	2.12	2.12	2.12	0.707	0	0	0	0	0	0	0	13.417
TCF	0	0	3.75	2.6	0	2.12	2.12	2.12	0	0	0	0	0	0	0	0	12.71
TDF	0	0	3.75	2.6	6.46	2.12	2.12	2.12	0.707	0	0.707	0	0	0	0	0	20.584
CMF2	0	0	3.75	2.6	6.46	2.12	2.12	2.12	0.707	0	0.707	0	0	0	0	0	20.584
WMF	0	0	3.75	2.6	6.46	2.12	0	0	0.707	0	0.707	1.22	0	0	0	0	17.564
TSWS	0	0	3.75	2.6	0	0	0	0	0	0	0	1.22	3.75	0	0	0	11.32
TG	3.45	2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
STWS	3.45	2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
DSS		2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	4.24
HD		2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	4.24
SDST	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
128-115 Late																	
DTMF	0	0	3.75	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	0	10.59
ETMF	0	0	3.75	2.6	0	0	2.12	2.12	0	0	0	0	0	0	0	0	10.59
CMF1	0	0	3.75	2.6	0	2.12	2.12	2.12	0.707	0	0	0	0	0	0	0	13.417
TCF	0	0	3.75	2.6	0	2.12	2.12	2.12	0	0	0	0	0	0	0	0	12.71
TDF	0	0	3.75	2.6	6.46	2.12	2.12	2.12	0.707	0	0.707	0	0	0	0	0	20.584
CMF2	0	0	3.75	2.6	6.46	2.12	2.12	2.12	0.707	0	0.707	0	0	0	0	0	20.584
WMF	0	0	3.75	2.6	6.46	2.12	0	0	0.707	0	0.707	0	0	0	0	0	16.344
TSWS	0	0	3.75	2.6	0	0	0	0	0	0	0	0	2.12	0	0	0	8.47

TG	3.45	2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
STWS	3.45	2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
DSS		2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	4.24
HD		2.12	0	0	0	0	0	0	0	2.12	0	0	0	0	0	0	4.24
SDST	3.45	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.57
115-110 Early																	
DTMF	0	0	4.3	2.6	0	0	2.12	1.58	0	0	0	0	0	0	0	0	10.6
ETMF	0	0	4.3	2.6	0	0	2.12	1.58	0	0	0	0	0	0	0	0	10.6
CMF1	0	0	4.3	2.6	0	0	2.12	1.58	0	0	0	0	0	0	0	0	10.6
TCF	0	0	4.3	2.6	0	0	2.12	1.58	0	0	0	0	0	0	0	0	10.6
TDF	0	0	4.3	2.6	6.46	0	2.12	1.58	0	0	0.707	0	0	0	0	0	17.767
CMF2	0	0	4.3	2.6	6.46	0	2.12	1.58	0	0	0.707	0	0	0	0	0	17.767
WMF	0	0	4.3	2.6	6.46	0	0	1.58	0	0	0.707	0.707	0	0	0	0	16.354
TSWS	0	0	4.3	2.6	6.46	0	0	0	0	0	0	0.707	0	0	0	0	14.067
TG	5.86	3.08	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.54
STWS	5.86	3.08	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.54
DSS	0	3.08	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	5.68
HD	0	3.08	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	5.68
SDST	5.86	3.08	0	0	0	0	0	0	0		0	0	0	0	0	0	8.94
115-110 Late																	
DTMF	0	0	4.3	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.02
ETMF	0	0	4.3	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.02
CMF1	0	0	4.3	2.6	0		2.12	0	0	0	0	0	0	0	0	0	9.02
TCF	0	0	4.3	2.6	0		2.12	0	0	0	0	0	0	0	0	0	9.02
TDF	0	0	4.3	2.6	6.46		2.12	0	0	0	0.707	0	0	0	0	0	16.187
CMF2	0	0	4.3	2.6	6.46		2.12	0	0	0	0.707	0	0	0	0	0	16.187
WMF	0	0	4.3	2.6	6.46		0	0	0	0	0.707	0.707	0	0	0	0	14.774
TSWS	0	0	4.3	2.6	6.46	0	0	0	0	0	0	0.707	0	0	0	0	14.067
TG	5.86	3.08	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.54
STWS	5.86	3.08	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.54
DSS	0	3.08	0	0	0		0	0	0	2.6	0	0	0	0	0	0	5.68
HD	0	3.08	0	0	0		0	0	0	2.6	0	0	0	0	0	0	5.68
SDST	5.86	3.08	0	0	0		0	0	0		0	0	0	0	0	0	8.94
110-93 Early																	
DTMF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
ETMF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
CMF1	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
TCF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
TDF	0	0	4.62	2.6	5.86	0	2.12	0	0	0	0	0	0	0	0	0	15.2

CMF2	0	0	4.62	2.6	5.86	0	2.12	0	0	0	0	0	0	0	0	0	15.2
WMF	0	0	4.62	2.6	5.86	0	0	0	0	0	0	0	0	0	0	0	13.08
TSWS	0	0	4.62	2.6	5.86	0	0	0	0	0	0	0	0	0.707	0	0	13.787
TG	4.38	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.5
STWS	4.38	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.5
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	4.38	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.5
110-93 Mid																	
DTMF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
ETMF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
CMF1	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
TCF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
TDF	0	0	4.62	2.6	5.86	0	2.12	0	0	0	0.707	0	0	0	0	0	15.907
CMF2	0	0	4.62	2.6	5.86	0	2.12	0	0	0	0.707	0	0	0	0	0	15.907
WMF	0	0	4.62	2.6	5.86	0	0	0	0	0	0.707	0	0	0	0	0	13.787
TSWS	0	0	4.62	2.6	5.86	0	0	0	0	0	0	0	0	0.707	0	0	13.787
TG	4.38	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	9.1
STWS	4.38	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	9.1
DSS	0	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	4.72
SDST	4.38	2.12	0	0	0	0	0	0	0		0	0	0	0	0	0	6.5
110-93 Late																	
DTMF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
ETMF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
CMF1	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
TCF	0	0	4.62	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	9.34
TDF	0	0	4.62	2.6	5.86	0	2.12	0	0	0	0	0	0	0	0	0	15.2
CMF2	0	0	4.62	2.6	5.86	0	2.12	0	0	0	0	0	0	0	0	0	15.2
WMF	0	0	4.62	2.6	5.86	0	0	0	0	0	0	0	0	0	0	0	13.08
TSWS	0	0	4.62	2.6	5.86	0	0	0	0	0	0	0	0	0	0	0	13.08
TG	4.38	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	9.1
STWS	4.38	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	9.1
DSS	0	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	4.72
SDST	4.38	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.5
93-86 Early																	
DTMF	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
ETMF	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84

CMF1	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
TCF	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
TDF	0	0	2.6	2.12	4.02	0	2.12	0	0	0	0	0	0	0	0	0	10.86
CMF2	0	0	2.6	2.12	4.02	0	2.12	0	0	0	0	0	0	0	0	0	10.86
WMF	0	0	2.6	2.12	4.02	0	0	0	0	0	0	0	0	0	0	0	8.74
TSWS	0	0	2.6	2.12	4.02	0	0	0	0	0	0	0	0	0	0	0	8.74
TG	4.12	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.41
STWS	4.12	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.41
DSS	0	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	7.29
HD	0	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	7.29
SDST	4.12	4.69	0	0	0	0	0	0	0		0	0	0	0	0	0	8.81
93-86 Late																	
DTMF	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
ETMF	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
CMF1	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
TCF	0	0	2.6	2.12	0	0	2.12	0	0	0	0	0	0	0	0	0	6.84
TDF	0	0	2.6	2.12	4.02	0	2.12	0	0	0	0	0	0	0	0	0	10.86
CMF2	0	0	2.6	2.12	4.02	0	2.12	0	0	0	0	0	0	0	0	0	10.86
WMF	0	0	2.6	2.12	4.02	0	0	0	0	0	0	0	0	0	0	0	8.74
TSWS	0	0	2.6	2.12	4.02	0	0	0	0	0	0	0	0	0	0	0	8.74
TG	4.12	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.41
STWS	4.12	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	11.41
DSS	0	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	7.29
HD	0	4.69	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	7.29
SDST	4.12	4.69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.81
86-74 Early																	
DTMF	0	0	2.6	2.12	0	0	2.12	2.12	0	0	0	0	0	0	0	0	8.96
ETMF	0	0	2.6	2.12	0	0	2.12	2.12	0	0	0	0	0	0	0	0	8.96
CMF1	0	0	2.6	2.12	0	0	2.12	2.12	0	0	0	0	0	0	0	0	8.96
TCF	0	0	2.6	2.12	0	0	2.12	2.12	0	0	0	0	0	0	0	0	8.96
TDF	0	0	2.6	2.12	5.86	0	2.12	2.12	0	0	1.22	0	0	0	0	0	16.04
CMF2	0	0	2.6	2.12	5.86	0	2.12	2.12	0	0	1.22	0	0	0	0	0	16.04
WMF	0	0	2.6	2.12	5.86	0	0	2.12	0	0	1.22	0	0	0	0	0	13.92
TSWS	0	0	2.6	2.12	5.86	0	0	2.12	0	0	0	2.12	0	0	0	0	14.82
TG	4.38	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	9.58
STWS	4.38	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	9.58
DSS	0	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	5.2
HD	0	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	5.2
SDST	4.38	2.6	0	0	0	0	0	0	0		0	0	0	0	0	0	6.98
86-74 Mid																	

DTMF	0	0	4.02	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.74
ETMF	0	0	4.02	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.74
CMF1	0	0	4.02	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.74
TCF	0	0	4.02	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.74
TDF	0	0	4.02	2.6	3.75	0	2.12	0	0	0	0.707	0	0	0	0	0	13.197
CMF2	0	0	4.02	2.6	3.75	0	2.12	0	0	0	0.707	0	0	0	0	0	13.197
WMF	0	0	4.02	2.6	3.75	0	0	0	0	0	0.707	0.707	0	0	0	0	11.784
TSWS	0	0	4.02	2.6	3.75	0	0	0	0	0	0	0.707	0	0	0	0	11.077
TG	3.45	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	8.65
STWS	3.45	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	8.65
DSS	0	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	5.2
HD	0	2.6	0	0	0	0	0	0	0	2.6	0	0	0	0	0	0	5.2
SDST	3.45	2.6	0	0	0	0	0	0	0		0	0	0	0	0	0	6.05
86-74 Late																	
DTMF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
ETMF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
CMF1	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
TCF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
TDF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
CMF2	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
WMF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
TSWS	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
TG	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.05
STWS	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.05
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	3.45	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.05
74-59 Early																	
DTMF	0	0	3.75	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.35
ETMF	0	0	3.75	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.35
CMF1	0	0	3.75	2.6	0	0	0	0	0.707	0	0	0	0	0	0	0	7.057
TCF	0	0	3.75	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.35
TDF	0	0	3.75	2.6	4.12	0	0	0	0.707	0	0	0	0	0	0	0	11.177
CMF2	0	0	3.75	2.6	4.12	0	0	0	0.707	0	0	0	0	0	0	0	11.177
WMF	0	0	3.75	2.6	4.12	0	0	0	0.707	0	0	0.707	0	0	0	0	11.884
TSWS	0	0	3.75	2.6	4.12	0	0	0	0	0	0	0.707	0	0	0	0	11.177
TG	5.86	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	15.72
STWS	5.86	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	15.72
DSS	0	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	9.86
HD	0	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	9.86
SDST	5.86	4.93	0	0	0	0	0	0	0		0	0	0	0	0	0	10.79

74-59 Mid																	
DTMF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
ETMF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
CMF1	0	0	2.6	2.6	0	0	0	0	0.707	0	0	0	0	0	0	0	5.907
TCF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.2
TDF	0	0	2.6	2.6	2.12	0	0	0	0.707	0	1.22	0	0	0	0	0	9.247
CMF2	0	0	2.6	2.6	2.12	0	0	0	0.707	0	1.22	0	0	0	0	0	9.247
WMF	0	0	2.6	2.6	2.12	0	0	0	0.707	0	1.22	0	0	0	0	0	9.247
TSWS	0	0	2.6	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	7.32
TG	5.86	4.93	0	0	0	0	0	0	0	7	0	0	0	0	0	0	17.79
STWS	5.86	4.93	0	0	0	0	0	0	0	7	0	0	0	0	0	0	17.79
DSS	0	4.93	0	0	0	0	0	0	0	7	0	0	0	0	0	0	11.93
HD	0	4.93	0	0	0	0	0	0	0	7	0	0	0	0	0	0	11.93
SDST	5.86	4.93	0	0	0	0	0	0	0		0	0	0	0	0	0	10.79
74-59 late																	
DTMF	0	0	2.6	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	7.32
ETMF	0	0	2.6	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	2.6	0	0	2.12	0	1.22	0	0	0	0	0	0	0	8.54
TCF	0	0	2.6	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	7.32
TDF	0	0	2.6	2.6	2.12	0	2.12	0	1.22	0	0.707	0	0	0	0	0	11.367
CMF2	0	0	2.6	2.6	2.12	0	2.12	0	1.22	0	0.707	0	0	0	0	0	11.367
WMF	0	0	2.6	2.6	2.12	0	0	0	1.22	0	0.707	0	0	0	0	0	9.247
TSWS	0	0	2.6	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	7.32
TG	5.86	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	15.72
STWS	5.86	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	15.72
DSS	0	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	9.86
HD	0	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	9.86
SDST	5.86	4.93	0	0	0	0	0	0	0		0	0	0	0	0	0	10.79
59-50																	
DTMF	0	0	2.6	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	7.32
ETMF	0	0	2.6	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	2.6	0	0	2.12	0	1.22	0	0	0	0	0	0	0	8.54
TCF	0	0	2.6	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	7.32
TDF	0	0	2.6	2.6	2.12	0	2.12	0	1.22	0	0	0	0	0	0	0	10.66
CMF2	0	0	2.6	2.6	2.12	0	2.12	0	1.22	0	0	0	0	0	0	0	10.66
WMF	0	0	2.6	2.6	2.12	0	0	0	1.22	0	0	0	0	0	0	0	8.54
TSWS	0	0	2.6	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	7.32
TG	5.86	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	15.72
STWS	5.86	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	15.72
DSS	0	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	9.86
HD	0	4.93	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	9.86

SDST	5.86	4.93	0	0	0	0	0	0	0		0	0	0	0	0	0	10.79
50-40																	
DTMF	0	0	3.75	3.75	0	0	2.12	0	0	0	0	0	0	0	0	0	9.62
ETMF	0	0	3.75	3.75	0	0	2.12	0	0	0	0	0	0	0	0	0	9.62
CMF1	0	0	3.75	3.75	0		2.12	0	0	0	0	0	0	0	0	0	9.62
TCF	0	0	3.75	3.75	0		2.12	0	0	0	0	0	0	0	0	0	9.62
TDF	0	0	3.75	3.75	4.26		2.12	0	0	0	0.707	0	0	0	0	0	14.587
CMF2	0	0	3.75	3.75	4.26		2.12	0	0	0	0.707	0	0	0	0	0	14.587
WMF	0	0	3.75	3.75	4.26		0	0	0	0	0.707	0.707	0	0	0	0	13.174
TSWS	0	0	3.75	3.75	4.26	0	0	0	0	0	0	0.707	0	0.707	0	0	13.174
TG	5.35	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	12.85
STWS	5.35	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	12.85
DSS	0	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	7.5
HD	0	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	7.5
SDST	5.35	3.75	0	0	0	0	0	0	0		0	0	0	0	0	0	9.1
40-34																	
DTMF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
CMF1	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
TCF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
TDF	0	0	3.75	2.6	3.75	0	2.12	0	0	0	0.707	0	0	0	0	0	12.927
CMF2	0	0	3.75	2.6	3.75	0	2.12	0	0	0	0.707	0	0	0	0	0	12.927
WMF	0	0	3.75	2.6	3.75	0	0	0	0	0	0.707	0.707	0	0	0	0	11.514
TSWS	0	0	3.75	2.6	3.75	0	0	0	0	0	0	0.707	0	0	0	0	10.807
TG	5.35	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	12.85
STWS	5.35	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	12.85
DSS	0	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	7.5
HD	0	3.75	0	0	0	0	0	0	0	3.75	0	0	0	0	0	0	7.5
SDST	5.35	3.75	0	0	0	0	0	0	0		0	0	0	0	0	0	9.1
34-29																	
DTMF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
ETMF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
CMF1	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
TCF	0	0	3.75	2.6	0	0	2.12	0	0	0	0	0	0	0	0	0	8.47
TDF	0	0	3.75	2.6	3.75	0	2.12	0	0	0	0.707	0	0	0	0	0	12.927
CMF2	0	0	3.75	2.6	3.75	0	2.12	0	0	0	0.707	0	0	0	0	0	12.927
WMF	0	0	3.75	2.6	3.75	0	0	0	0	0	0.707	0	0	0	0	0	10.807
TSWS	0	0	3.75	2.6	3.75	0	0	0	0	0	0	0	0	0	0	0	10.1
TG	5.35	3.75	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	14.03

STWS	5.35	3.75	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	14.03
DSS	0	3.75	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	8.68
HD	0	3.75	0	0	0	0	0	0	0	4.93	0	0	0	0	0	0	8.68
SDST	5.35	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.1

Lago di Bolsena (Lagaccione), Italy

	Po	Ar	Pin	Pic	Jun	Qu	Car	Cor	Ab	Fa	Betula	Fra	Hed	Ilex	Chen	Cy	Acer	**TOTAL**
110-93 Early																		
DTMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
CMF1	0	0	2.6	0	2.12	0	2.6	2.12	0	6.27	0	1.58	0	0	0	0	0	17.29
TCF	0	0	2.6	0	2.12	0	2.6	2.12	0	6.27	0	0	0	0	0	0	0	15.71
TDF	0	0	2.6	0	2.12	4.93	2.6	2.12	0	6.27	0	1.58	2.12	2.12	0	0	1.22	27.68
CMF2	0	0	2.6	0	2.12	4.93	2.6	2.12	0	6.27	0	1.58	0	0	0	0	1.22	23.44
WMF	0	0	2.6	0	2.12	4.93	2.6	2.12	0	6.27	0	1.58	2.12	2.12	0	0	1.22	27.68
TSWS	0	0	2.6	0	2.12	4.93	0	0	0	6.27	0	0	0	0	0	0	0	15.92
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4.24
110-93 Mid																		
DTMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
CMF1	0	0	2.6	0	2.12	0	2.12	2.12	0	6.27	0	1.22	0	0	0	0	0	16.45
TCF	0	0	2.6	0	2.12	0	2.12	2.12	0	6.27	0	0	0	0	0	0	0	15.23
TDF	0	0	2.6	0	2.12	3.45	2.12	2.12	0	6.27	0	1.22	2.12	2.12	0	0	1.22	25.36
CMF2	0	0	2.6	0	2.12	3.45	2.12	2.12	0	6.27	0	1.22	0	0	0	0	1.22	21.12
WMF	0	0	2.6	0	2.12	3.45	2.12	2.12	0	6.27	0	1.22	2.12	2.12	0	0	1.22	25.36
TSWS	0	0	2.6	0	2.12	3.45	0	0	0	6.27	0	0	0	0	0	0	0	14.44
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4.24
110-93 Late																		
DTMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
CMF1	0	0	2.6	0	2.12	0	2.12	2.12	0	6.27	0	0.707	0	0	0	0	0	15.937
TCF	0	0	2.6	0	2.12	0	2.12	2.12	0	6.27	0	0	0	0	0	0	0	15.23
TDF	0	0	2.6	0	2.12	3.45	2.12	2.12	0	6.27	0	0.707	2.12	2.12	0	0	1.22	24.847
CMF2	0	0	2.6	0	2.12	3.45	2.12	2.12	0	6.27	0	0.707	0	0	0	0	1.22	20.607

WMF	0	0	2.6	0	2.12	3.45	2.12	2.12	0	6.27	0	0.707	2.12	2.12	0	0	1.22	24.847
TSWS	0	0	2.6	0	2.12	3.45	0	0	0	6.27	0	0	0	0	0	0	0	14.44
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.24
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0		0	4.24
93-86 Early																		
DTMF	0	0	3.45	0	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	7.69
ETMF	0	0	3.45	2.12	2.12	0	0	0	0	0	2.12	0	0	0	0	0	0	9.81
CMF1	0	0	3.45	0	2.12	0	2.12	0	0	2.12	2.12	0	0	0	0	0	0	11.93
TCF	0	0	3.45	2.12	2.12	0	2.12	0	0	2.12	2.12	0	0	0	0	0	0	14.05
TDF	0	0	3.45	0	2.12	2.12	2.12	0	0	2.12	2.12	0	0	0	0	0	1.22	15.27
CMF2	0	0	3.45	2.12	2.12	2.12	2.12	0	0	2.12	2.12	0	0	0	0	0	1.22	17.39
WMF	0	0	3.45	0	2.12	2.12	2.12	0	0	2.12	2.12	0	0	0	0	0	1.22	15.27
TSWS	0	0	3.45	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	9.81
TG	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	7.5
STWS	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	7.5
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	3.75
HD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	3.75
SDST	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
93-86 Late																		
DTMF	0	0	3.75	0	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	7.09
ETMF	0	0	3.75	2.12	2.12	0	0	0	0	0	1.22	0	0	0	0	0	0	9.21
CMF1	0	0	3.75	0	2.12	0	2.12	0	0	2.12	1.22	0	0	0	0	0	0	11.33
TCF	0	0	3.75	2.12	2.12	0	2.12	0	0	2.12	1.22	0	0	0	0	0	0	13.45
TDF	0	0	3.75	0	2.12	2.12	2.12	0	0	2.12	1.22	0	0	0	0	0	1.22	14.67
CMF2	0	0	3.75	2.12	2.12	2.12	2.12	0	0	2.12	1.22	0	0	0	0	0	1.22	16.79
WMF	0	0	3.75	0	2.12	2.12	2.12	0	0	2.12	1.22	0	0	0	0	0	1.22	14.67
TSWS	0	0	3.75	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	10.11
TG	3.75	6.66	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	14.16
STWS	3.75	6.66	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	14.16
DSS	0	6.66	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	10.41
HD	0	6.66	0	0	0	0	0	0	0	0	0	0	0	0	3.75	0	0	10.41
SDST	3.75	6.66	0	0	0	0	0	0	0	0	0	0	0	0	0		0	10.41
86-74 Early																		
DTMF	0	0	5.15	0	2.12	0	0	0	0	0	6.24	0	0	0	0	0	0	13.51
ETMF	0	0	5.15	2.6	2.12	0	0	0	0	0	6.24	0	0	0	0	0	0	16.11
CMF1	0	0	5.15	0	2.12	0	3.75	2.12	0	3.45	6.24	0	0	0	0	0	0	22.83
TCF	0	0	5.15	2.6	2.12	0	3.75	2.12	0	3.45	6.24	0	0	0	0	0	0	25.43
TDF	0	0	5.15	0	2.12	3.08	3.75	2.12	0	3.45	6.24	0	2.12	2.12	0	0	1.22	31.37

CMF2	0	0	5.15	2.6	2.12	3.08	3.75	2.12	0	3.45	6.24	0	0	0	0	0	1.22	29.73
WMF	0	0	5.15	0	2.12	3.08	3.75	2.12	0	3.45	6.24	0	2.12	2.12	0	0	1.22	31.37
TSWS	0	0	5.15	0	2.12	3.08	0	0	0	3.45	0	0	0	0	0	0	0	13.8
TG	4.26	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	13.52
STWS	4.26	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	13.52
DSS	0	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	9.26
HD	0	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	9.26
SDST	4.26	6.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.92
86-74 Mid																		
DTMF	0	0	2.12	0	2.12	0	0	0	0	0	7.04	0	0	0	0	0	0	11.28
ETMF	0	0	2.12	2.6	2.12	0	0	0	0	0	7.04	0	0	0	0	0	0	13.88
CMF1	0	0	2.12	0	2.12	0	3.45	2.12	0	2.12	7.04	0	0	0	0	0	0	18.97
TCF	0	0	2.12	2.6	2.12	0	3.45	2.12	0	2.12	7.04	0	0	0	0	0	0	21.57
TDF	0	0	2.12	0	2.12	5.19	3.45	2.12	0	2.12	7.04	0	2.12	2.12	0	0	2.12	30.52
CMF2	0	0	2.12	2.6	2.12	5.19	3.45	2.12	0	2.12	7.04	0	0	0	0	0	2.12	28.88
WMF	0	0	2.12	0	2.12	5.19	3.45	2.12	0	2.12	7.04	0	2.12	2.12	0	0	2.12	30.52
TSWS	0	0	2.12	0	2.12	5.19	0	0	0	2.12	0	0	0	0	0	0	0	11.55
TG	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	7.32
STWS	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	7.32
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	4.24
SDST	3.08	2.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2
86-74 Late																		
DTMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	0	2.12	0	3.08	2.12	0	3.08	0	0	0	0	0	0	0	13
TCF	0	0	2.6	2.6	2.12	0	3.08	2.12	0	3.08	0	0	0	0	0	0	0	15.6
TDF	0	0	2.6	0	2.12	5.19	3.08	2.12	0	3.08	0	0	2.12	2.12	0	0	1.22	23.65
CMF2	0	0	2.6	2.6	2.12	5.19	3.08	2.12	0	3.08	0	0	0	0	0	0	1.22	22.01
WMF	0	0	2.6	0	2.12	5.19	3.08	2.12	0	3.08	0	0	2.12	2.12	0	0	1.22	23.65
TSWS	0	0	2.6	0	2.12	5.19	0	0	0	3.08	0	0	0	0	0	0	0	12.99
TG	5.19	4.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	11.91
STWS	5.19	4.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	11.91
DSS	0	4.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	6.72
HD	0	4.12	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	6.72
SDST	5.19	4.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.31
74-59 Early																		
DTMF	0	0	2.6	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	4.72
ETMF	0	0	2.6	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	7.32
CMF1	0	0	2.6	0	2.12	0	2.12	2.12	0	2.12	0	0	0	0	0	0	0	11.08

TCF	0	0	2.6	2.6	2.12	0	2.12	2.12	0	2.12	0	0	0	0	0	0	0	13.68
TDF	0	0	2.6	0	2.12	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	13.2
CMF2	0	0	2.6	2.6	2.12	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.8
WMF	0	0	2.6	0	2.12	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	13.2
TSWS	0	0	2.6	0	2.12	2.12	0	0	0	2.12	0	0	0	0	0	0	0	8.96
TG	4.62	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	11.52
STWS	4.62	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	11.52
DSS	0	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	6.9
HD	0	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	6.9
SDST	4.62	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.92
74-59 Mid																		
DTMF	0	0	4.02	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.62
ETMF	0	0	4.02	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	9.22
CMF1	0	0	4.02	0	2.6	0	2.12	2.12	0	2.12	0	0	0	0	0	0	0	12.98
TCF	0	0	4.02	2.6	2.6	0	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.58
TDF	0	0	4.02	0	2.6	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.1
CMF2	0	0	4.02	2.6	2.6	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	17.7
WMF	0	0	4.02	0	2.6	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.1
TSWS	0	0	4.02	0	2.6	2.12	0	0	0	2.12	0	0	0	0	0	0	0	10.86
TG	4.62	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	15.17
STWS	4.62	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	15.17
DSS	0	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	10.55
HD	0	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	10.55
SDST	4.62	5.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.24
74-59 late																		
DTMF	0	0	4.02	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.62
ETMF	0	0	4.02	2.6	2.6	0	0	0	0	0	0	0	0	0	0	0	0	9.22
CMF1	0	0	4.02	0	2.6	0	2.12	2.12	0	2.12	0	0	0	0	0	0	0	12.98
TCF	0	0	4.02	2.6	2.6	0	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.58
TDF	0	0	4.02	0	2.6	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.1
CMF2	0	0	4.02	2.6	2.6	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	17.7
WMF	0	0	4.02	0	2.6	2.12	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.1
TSWS	0	0	4.02	0	2.6	2.12	0	0	0	2.12	0	0	0	0	0	0	0	10.86
TG	4.62	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	15.17
STWS	4.62	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	15.17
DSS	0	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	10.55
HD	0	5.62	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	10.55
SDST	4.62	5.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.24
59-50																		
DTMF	0	0	2.97	0	2.6	0	0	0		0	0	0	0	0	0	0	0	5.57
ETMF	0	0	2.97	2.12	2.6	0	0	0		0	0	0	0	0	0	0	0	7.69

CMF1	0	0	2.97	0	2.6	0	2.12	2.12		2.12	0	0	0	0	0	0	0	11.93
TCF	0	0	2.97	2.12	2.6	0	2.12	2.12		2.12	0	0	0	0	0	0	0	14.05
TDF	0	0	2.97	0	2.6	3.08	2.12	2.12		2.12	0	0	0	0	0	0	0	15.01
CMF2	0	0	2.97	2.12	2.6	3.08	2.12	2.12		2.12	0	0	0	0	0	0	0	17.13
WMF	0	0	2.97	0	2.6	3.08	2.12	2.12	0	2.12	0	0	0	0	0	0	0	15.01
TSWS	0	0	2.97	0	2.6	3.08	0	0	0	2.12	0	0	0	0	0	0	0	10.77
TG	3.75	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	12.53
STWS	3.75	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	12.53
DSS	0	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	8.78
HD	0	6.66	0	0	0	0	0	0	0	0	0	0	0	0	2.12	0	0	8.78
SDST	3.75	6.66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.41
50-40																		
DTMF	0	0	5.35	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	7.47
ETMF	0	0	5.35	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	0	10.07
CMF1	0	0	5.35	0	2.12	0	2.12	2.6	0	2.6	0	0.707	0	0	0	0	0	15.497
TCF	0	0	5.35	2.6	2.12	0	2.12	2.6	0	2.6	0	0	0	0	0	0	0	17.39
TDF	0	0	5.35	0	2.12	3.75	2.12	2.6	0	2.6	0	0.707	0	0	0	0	0	19.247
CMF2	0	0	5.35	2.6	2.12	3.75	2.12	2.6	0	2.6	0	0.707	0	0	0	0	0	21.847
WMF	0	0	5.35	0	2.12	3.75	2.12	2.6	0	2.6	0	0.707	0	0	0	0	0	19.247
TSWS	0	0	5.35	0	2.12	3.75	0	0	0	2.6	0	0	0	0	0	0	0	13.82
TG	3.75	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	10.65
STWS	3.75	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	10.65
DSS	0	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	6.9
HD	0	4.3	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	6.9
SDST	3.75	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.05
40-34																		
DTMF	0	0	4.3	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.9
ETMF	0	0	4.3	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	9.02
CMF1	0	0	4.3	0	2.6	0	2.12	2.6	0	2.12	0	0	0	0	0	0	0	13.74
TCF	0	0	4.3	2.12	2.6	0	2.12	2.6	0	2.12	0	0	0	0	0	0	0	15.86
TDF	0	0	4.3	0	2.6	2.6	2.12	2.6	0	2.12	0	0	0	0	0	0	0	16.34
CMF2	0	0	4.3	2.12	2.6	2.6	2.12	2.6	0	2.12	0	0	0	0	0	0	0	18.46
WMF	0	0	4.3	0	2.6	2.6	2.12	2.6	0	2.12	0	0	0	0	0	0	0	16.34
TSWS	0	0	4.3	0	2.6	2.6	0	0	0	2.12	0	0	0	0	0	0	0	11.62
TG	4.02	5.35	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	11.97
STWS	4.02	5.35	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	11.97
DSS	0	5.35	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	7.95
HD	0	5.35	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	7.95
SDST	4.02	5.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.37
34-29																		
DTMF	0	0	3.75	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	6.35

ETMF	0	0	3.75	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	8.47
CMF1	0	0	3.75	0	2.6	0	0	2.6	0	2.12	0	0	0	0	0	0	0	11.07
TCF	0	0	3.75	2.12	2.6	0	0	2.6	0	2.12	0	0	0	0	0	0	0	13.19
TDF	0	0	3.75	0	2.6	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	13.19
CMF2	0	0	3.75	2.12	2.6	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	15.31
WMF	0	0	3.75	0	2.6	2.12	0	2.6	0	2.12	0	0	0	0	0	0	0	13.19
TSWS	0	0	3.75	0	2.6	2.12	0	0	0	2.12	0	0	0	0	0	0	0	10.59
TG	4.02	5.35	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	14.3
STWS	4.02	5.35	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	14.3
DSS	0	5.35	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	10.28
HD	0	5.35	0	0	0	0	0	0	0	0	0	0	0	0	4.93	0	0	10.28
SDST	4.02	5.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.37
29-25																	
DTMF	0	0	2.97	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	5.57
ETMF	0	0	2.97	2.12	2.6	0	0	0	0	0	0	0	0	0	0	0	0	7.69
CMF1	0	0	2.97	0	2.6	0	2.12	2.12	0	0	0	1.22	0	0	0	0	0	11.03
TCF	0	0	2.97	2.12	2.6	0	2.12	2.12	0	0	0	0	0	0	0	0	0	11.93
TDF	0	0	2.97	0	2.6	2.12	2.12	2.12	0	0	0	1.22	0	0	0	0	0	13.15
CMF2	0	0	2.97	2.12	2.6	2.12	2.12	2.12	0	0	0	1.22	0	0	0	0	0	15.27
WMF	0	0	2.97	0	2.6	2.12	2.12	2.12	0	0	0	1.22	0	0	0	0	0	13.15
TSWS	0	0	2.97	0	2.6	2.12	0	0	0	0	0	0	0	0	0	0	0	7.69
TG	4.93	6.27	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	13.8
STWS	4.93	6.27	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	13.8
DSS	0	6.27	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	8.87
HD	0	6.27	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	8.87
SDST	4.93	6.27	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	13.8

Timar, Hungary

	Po	Ar	Pin	Pic	Qu	Car	Cor	Fa	Lar	Ulmus	Hed	Til	Chen	Cy	Com	**TOTAL**
110-93Early																
DTMF	0	0	4.62	0	0	0	0	0	0	0	0	0	0	0	0	4.62
ETMF	0	0	4.62	3.75	0	0	0	0	0	0	0	0	0	0	0	8.37
CMF1	0	0	4.62	0	0	2.12	2.12	2.6	0	0	0	1.58	0	0	0	13.04
TCF	0	0	4.62	3.75	0	2.12	2.12	2.6	0	0	0	1.58	0	0	0	16.79
TDF	0	0	4.62	0	2.12	2.12	2.12	2.6	0	0	0	1.58	0	0	0	15.16
CMF2	0	0	4.62	3.75	2.12	2.12	2.12	2.6	0	0	0	1.58	0	0	0	18.91
WMF	0	0	4.62	0	2.12	2.12	2.12	2.6	0	0	0	1.58	0	0	0	15.16
TSWS	0	0	4.62	0	2.12	0	0	2.6	0	0	0	0	0	0	0	9.34
TG	3.75	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	2.12	11.2
STWS	3.75	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	2.12	11.2

DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	0	5.33
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	0	5.33
SDST	3.75	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0.707	0	9.787
110-93 Mid																
DTMF	0	0	4.62	0	0	0	0	0	0	0	0	0	0	0	0	4.62
ETMF	0	0	3.45	3.75	0	0	0	0	0	0	0	0	0	0	0	7.2
CMF1	0	0	3.45	0	0	5.86	2.6	2.6	0	2.12	0	1.58	0	0	0	18.21
TCF	0	0	3.45	3.75	0	5.86	2.6	2.6	0	2.12	0	1.58	0	0	0	21.96
TDF	0	0	3.45	0	2.12	5.86	2.6	2.6	0	2.12		1.58	0	0	0	20.33
CMF2	0	0	3.45	3.75	2.12	5.86	2.6	2.6	0	2.12	0	1.58	0	0	0	24.08
WMF	0	0	3.45	0	2.12	5.86	2.6	2.6	0	2.12		1.58	0	0	0	20.33
TSWS	0	0	3.45	0	2.12	0	0	2.6	0	0	0	0	0	0	0	8.17
TG	3.75	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	2.6	11.68
STWS	3.75	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	2.6	11.68
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	0	5.33
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0	0	5.33
SDST	3.75	3.75	0	0	0	0	0	0	0	0	0	0	1.58	0.707	0	9.787
110-93 Late																
DTMF	0	0	4.62	0	0	0	0	0	0.707	0	0	0	0	0	0	5.327
ETMF	0	0	4.62	3.75	0	0	0	0	0.707	0	0	0	0	0	0	9.077
CMF1	0	0	4.62	0	0	2.12	2.12	2.6	0.707	2.12	0	1.58	0	0	0	15.867
TCF	0	0	4.62	3.75	0	2.12	2.12	2.6	0.707	2.12	0	1.58	0	0	0	19.617
TDF	0	0	4.62	0	2.12	2.12	2.12	2.6	0.707	2.12	0	1.58	0	0	0	17.987
CMF2	0	0	4.62	3.75	2.12	2.12	2.12	2.6	0.707	2.12	0	1.58	0	0	0	21.737
WMF	0	0	4.62	0	2.12	2.12	2.12	2.6	0	2.12	0	1.58	0	0	0	17.28
TSWS	0	0	4.62	0	2.12	0	0	2.6	0	0	0	0	0	0	0	9.34
TG	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	1.58	9.08
STWS	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	0	1.58	9.08
DSS	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
HD	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	0	3.75
SDST	3.75	3.75	0	0	0	0	0	0	0	0	0	0	0	2.97	0	10.47
93-86 Early																
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	0	2.12	0	1.22	0	1.58	0	0	0	10.79
TCF	0	0	3.75	2.12	0	2.12	0	2.12	0	1.22	0	1.58	0	0	0	12.91
TDF	0	0	3.75	0	2.12	2.12	0	2.12	0	1.22	1.58	1.58	0	0	0	14.49
CMF2	0	0	3.75	2.12	2.12	2.12	0	2.12	0	1.22	0	1.58	0	0	0	15.03
WMF	0	0	3.75	0	2.12	2.12	0	2.12	0	1.22	1.58	1.58	0	0	0	14.49
TSWS	0	0	3.75	0	2.12	0	0	2.12	0	0	0	0	0	0	0	7.99
TG	5.62	4.93	0	0	0	0	0	0	0	0	0	0	1.58	0	1.58	13.71
STWS	5.62	4.93	0	0	0	0	0	0	0	0	0	0	1.58	0	1.58	13.71

DSS	0	4.93	0	0	0	0	0	0	0	0	0	0	1.58	0	0	6.51
HD	0	4.93	0	0	0	0	0	0	0	0	0	0	1.58	0	0	6.51
SDST	5.62	4.93	0	0	0	0	0	0	0	0	0	0	1.58	3.75	0	15.88
93-86 Late															
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	2.12	0	0	0	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	0	2.12	0	1.22	0	1.58	0	0	0	10.79
TCF	0	0	3.75	2.12	0	2.12	0	2.12	0	1.22	0	1.58	0	0	0	12.91
TDF	0	0	3.75	0	2.12	2.12	0	2.12	0	1.22	0	1.58	0	0	0	12.91
CMF2	0	0	3.75	2.12	2.12	2.12	0	2.12	0	1.22	0	1.58	0	0	0	15.03
WMF	0	0	3.75	0	2.12	2.12	0	2.12	0	1.22	0	1.58	0	0	0	12.91
TSWS	0	0	3.75	0	2.12	0	0	2.12	0	0	0	0	0	0	0	7.99
TG	5.62	4.93	0	0	0	0	0	0	0	0	0	0	2.6	0	1.58	14.73
STWS	5.62	4.93	0	0	0	0	0	0	0	0	0	0	2.6	0	1.58	14.73
DSS	0	4.93	0	0	0	0	0	0	0	0	0	0	2.6	0	0	7.53
HD	0	4.93	0	0	0	0	0	0	0	0	0	0	2.6	0	0	7.53
SDST	5.62	4.93	0	0	0	0	0	0	0	0	0	0	2.6	1.58	0	14.73

Kiskumfelegyhaza, Hungary

	Po	Ar	Pin	Pic	Qu	Car	Cor	Ab	Lar	Ulm	Chen	Cy	Com	Tha	**TOTAL**
110-93 Early															
DTMF	0	0	6.57	0	0	0	0	2.12	0	0	0	0	0	0	8.69
ETMF	0	0	6.57	2.12	0	0	0	2.12	0	0	0	0	0	0	10.81
CMF1	0	0	6.57	0	0	0	2.6	2.12	0	0	0	0	0	0	11.29
TCF	0	0	6.57	2.12	0	0	2.6	2.12	0	0	0	0	0	0	13.41
TDF	0	0	6.57	0	2.12	0	2.6	2.12	0	0	0	0	0	0	13.41
CMF2	0	0	6.57	2.12	2.12	0	2.6	2.12	0	0	0	0	0	0	15.53
WMF	0	0	6.57	0	2.12	0	2.6	0	0	0	0	0	0	0	11.29
TSWS	0	0	6.57	0	2.12	0	0	0	0	0	0	0	0	0	8.69
TG	2.12	2.6	0	0	0	0	0	0	0	0	1.22	0	2.12	0	8.06
STWS	2.12	2.6	0	0	0	0	0	0	0	0	1.22	0	2.12	0	8.06
DSS	0	2.6	0	0	0	0	0	0	0	0	1.22	0	0	0	3.82
HD	0	2.6	0	0	0	0	0	0	0	0	1.22	0	0	0	3.82
SDST	2.12	2.6	0	0	0	0	0	0	0	0	1.22	5.43	0	0	11.37
110-95 Mid															
DTMF	0	0	3.75	0	0	0	0	2.12	2.12	0	0	0	0	0	7.99
ETMF	0	0	3.75	2.12	0	0	0	2.12	2.12	0	0	0	0	0	10.11
CMF1	0	0	3.75	0	0	2.12	2.12	2.12	2.12	2.12	0	0	0	0	14.35
TCF	0	0	3.75	2.12	0	2.12	2.12	2.12	2.12	2.12	0	0	0	0	16.47
TDF	0	0	3.75	0	2.12	2.12	2.12	2.12	2.12	2.12	0	0	0	0	16.47
CMF2	0	0	3.75	2.12	2.12	2.12	2.12	2.12	2.12	2.12	0	0	0	0	18.59
WMF	0	0	3.75	0	2.12	2.12	2.12	0	0	2.12	0	0	0	0	12.23
TSWS	0	0	3.75	0	2.12	0	0	0	0	0	0	0	0	0	5.87
TG	2.12	2.12	0	0	0	0	0	0	0	0	0	0	2.12	1.22	7.58
STWS	2.12	2.12	0	0	0	0	0	0	0	0	0	0	2.12	1.22	7.58
DSS	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12
HD	0	2.12	0	0	0	0	0	0	0	0	0	0	0	0	2.12
SDST	2.12	2.12	0	0	0	0	0	0	0	0	0	4.42	0	0	8.66
110-93 Late															
DTMF	0	0	6.66	0	0	0	0	0	2.12	0	0	0	0	0	8.78
ETMF	0	0	6.66	2.12	0	0	0	0	2.12	0	0	0	0	0	10.9
CMF1	0	0	6.66	0	0	2.12	2.12	0	2.12	2.12	0	0	0	0	15.14
TCF	0	0	6.66	2.12	0	2.12	2.12	0	2.12	2.12	0	0	0	0	17.26
TDF	0	0	6.66	0	2.12	2.12	2.12	0	2.12	2.12	0	0	0	0	17.26
CMF2	0	0	6.66	2.12	2.12	2.12	2.12	0	2.12	2.12	0	0	0	0	19.38
WMF	0	0	6.66	0	2.12	2.12	2.12	0	0	2.12	0	0	0	0	15.14
TSWS	0	0	6.66	0	2.12	0	0	0	0	0	0	0	0	0	8.78
TG	2.12	2.6	0	0	0	0	0	0	0	0	0	0	2.12	1.22	8.06
STWS	2.12	2.6	0	0	0	0	0	0	0	0	0	0	2.12	1.22	8.06
DSS	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	2.6
HD	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	2.6
SDST	2.12	2.6	0	0	0	0	0	0	0	0	0	4.42	0	0	9.14
93-86 Early															
DTMF	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	2.6
ETMF	0	0	2.6	2.6	0	0	0	0	0	0	0	0	0	0	5.2
CMF1	0	0	2.6	0	0	2.12	2.6	0	0	0	0	0	0	0	7.32
TCF	0	0	2.6	2.6	0	2.12	2.6	0	0	0	0	0	0	0	9.92
TDF	0	0	2.6	0	0	2.12	2.6	0	0	0	0	0	0	0	7.32
CMF2	0	0	2.6	2.6	0	2.12	2.6	0	0	0	0	0	0	0	9.92
WMF	0	0	2.6	0	0	2.12	2.6	0	0	0	0	0	0	0	7.32
TSWS	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	2.6
TG	2.6	2.12	0	0	0	0	0	0	0	0	0	0	2.12	1.22	8.06

STWS	2.6	2.12	0	0	0	0	0	0	0	0	0	0	2.12	1.22	8.06
DSS	0	2.12	0	0	0		0	0	0	0		0	0	0	2.12
HD	0	2.12	0	0	0		0	0	0	0		0	0	0	2.12
SDST	2.6	2.12	0	0	0		0	0	0	0			0	0	4.72
93-86 Late															
DTMF	0	0	2.6	0	0	0	0			0	0	0	0	0	2.6
ETMF	0	0	2.6	2.6	0	0	0			0	0	0	0	0	5.2
CMF1	0	0	2.6	0	0	2.12	2.12				0	0	0	0	6.84
TCF	0	0	2.6	2.6	0	2.12	2.12				0	0	0	0	9.44
TDF	0	0	2.6	0		2.12	2.12				0	0	0	0	6.84
CMF2	0	0	2.6	2.6		2.12	2.12				0	0	0	0	9.44
WMF	0	0	2.6	0		2.12	2.12	0	0		0	0		0	6.84
TSWS	0	0	2.6	0		0	0	0	0	0	0	0			2.6
TG	2.6	2.12	0	0	0	0	0	0	0	0	7.04	0	2.12	0	13.88
STWS	2.6	2.12	0	0	0	0	0	0	0	0	7.04	0	2.12	0	13.88
DSS	0	2.12	0	0	0		0	0	0	0	7.04	0	0	0	9.16
HD	0	2.12	0	0	0		0	0	0	0	7.04	0	0	0	9.16
SDST	2.6	2.12	0	0	0		0	0	0	0	7.04		0	0	11.76
86-74 Early															
DTMF	0	0	2.6	0	0	0	0	2.12		0	0	0	0	0	4.72
ETMF	0	0	2.6	2.12	0	0	0	2.12		0	0	0	0	0	6.84
CMF1	0	0	2.6	0	0		2.12	2.12			0	0	0	0	6.84
TCF	0	0	2.6	2.12	0		2.12	2.12			0	0	0	0	8.96
TDF	0	0	2.6	0	2.12		2.12	2.12			0	0	0	0	8.96
CMF2	0	0	2.6	2.12	2.12		2.12	2.12			0	0	0	0	11.08
WMF	0	0	2.6	0	2.12		2.12	0	0		0	0		0	6.84
TSWS	0	0	2.6	0	2.12	0	0	0	0	0	0	0			4.72
TG	2.12	2.12	0	0	0	0	0	0	0	0	7.38	0	2.12	0	13.74
STWS	2.12	2.12	0	0	0	0	0	0	0	0	7.38	0	2.12	0	13.74
DSS	0	2.12	0	0	0		0	0	0	0	7.38	0	0	0	9.5
HD	0	2.12	0	0	0		0	0	0	0	7.38	0	0	0	9.5
SDST	2.12	2.12	0	0	0		0	0	0	0	7.38		0	0	11.62
86-74 Mid															
DTMF	0	0	2.6	0	0	0	0	2.12		0	0	0	0	0	4.72
ETMF	0	0	2.6	2.12	0	0	0	2.12		0	0	0	0	0	6.84
CMF1	0	0	2.6	0	0		2.12	2.12			0	0	0	0	6.84
TCF	0	0	2.6	2.12	0		2.12	2.12			0	0	0	0	8.96
TDF	0	0	2.6	0	2.12		2.12	2.12			0	0	0	0	8.96
CMF2	0	0	2.6	2.12	2.12		2.12	2.12			0	0	0	0	11.08
WMF	0	0	2.6	0	2.12		2.12	0	0		0	0	1.22	0	8.06
TSWS	0	0	2.6	0	2.12	0	0	0	0	0	0	0	1.22		5.94
TG	2.12	2.12	0	0	0	0	0	0	0	0	7.71	0	0	0	11.95
STWS	2.12	2.12	0	0	0	0	0	0	0	0	7.71	0	0	0	11.95
DSS	0	2.12	0	0	0	0	0	0	0	0	7.71	0	0	0	9.83
HD	0	2.12	0	0	0	0	0	0	0	0	7.71	0	0	0	9.83
SDST	2.12	2.12	0	0	0	0	0	0	0	0	7.71		0	0	11.95
86-74 Late															
DTMF	0	0	2.6	0	0	0	0	2.12		0	0	0	0	0	4.72
ETMF	0	0	2.6	2.12	0	0	0	2.12		0	0	0	0	0	6.84
CMF1	0	0	2.6	0	0		2.12	2.12			0	0	0	0	6.84
TCF	0	0	2.6	2.12	0		2.12	2.12			0	0	0	0	8.96
TDF	0	0	2.6	0	2.12		2.12	2.12			0	0	0	0	8.96
CMF2	0	0	2.6	2.12	2.12		2.12	2.12			0	0	0	0	11.08
WMF	0	0	2.6	0	2.12		2.12	0	0		0	0		0	6.84

TSWS	0	0	2.6	0	2.12	0	0	0	0	0	0	0			4.72
TG	2.12	2.12	0	0	0	0	0	0	0	0	7.71	0	1.22	0	13.17
STWS	2.12	2.12	0	0	0	0	0	0	0	0	7.71	0	1.22	0	13.17
DSS	0	2.12	0	0	0	0	0	0	0	0	7.71	0	0	0	9.83
HD	0	2.12	0	0	0	0	0	0	0	0	7.71	0	0	0	9.83
SDST	2.12	2.12	0	0	0	0	0	0	0	0	7.71		0	0	11.95

Vyazivok, Ukraine

	Po	Ar	Pin	Pic	Qu	Car	Cor	Til	Chen	Bra	Qu-i	Ro	**TOTAL**
115-110 Early													
DTMF	0	0	5.86	0	0	0	0	0	0	0	0	0	5.86
ETMF	0	0	5.86	2.12	0	0	0	0	0	0	0	0	7.98
CMF1	0	0	5.86	0	0	0	2.12	0	0	0	0	0	7.98
TCF	0	0	5.86	2.12	0	0	2.12	0	0	0	0	0	10.1
TDF	0	0	5.86	0	2.12	0	2.12	0	0	0	0	0	10.1
CMF2	0	0	5.86	2.12	2.12	0	2.12	0	0	0	0	0	12.22
WMF	0	0	5.86	0	2.12	0	2.12	0	0	0	0	0	10.1
TSWS	0	0	5.86	0	2.12	0	0	0	0	0	0	0	7.98
TG	2.6	2.12	0	0	0	0	0	0	2.12	0	0	2.12	8.96
STWS	2.6	2.12	0	0	0	0	0	0	2.12	0	0	2.12	8.96
DSS	0	2.12	0	0	0	0	0	0	2.12	0	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	2.12	0	0	0	4.24
SDST	2.6	2.12	0	0	0	0	0	0	2.12	0	0	0	6.84
115-110 Late													
DTMF	0	0	5.86	0	0	0	0	0	0	0	0	0	5.86
ETMF	0	0	5.86	2.12	0	0	0	0	0	0	0	0	7.98
CMF1	0	0	5.86	0	0	0	2.12	0	0	0	0	0	7.98
TCF	0	0	5.86	2.12	0	0	2.12	0	0	0	0	0	10.1
TDF	0	0	5.86	0	2.12	0	2.12	0	0	0	0	0	10.1
CMF2	0	0	5.86	2.12	2.12	0	2.12	0	0	0	0	0	12.22
WMF	0	0	5.86	0	2.12	0	2.12	0	0	0	0	0	10.1
TSWS	0	0	5.86	0	2.12	0	0	0	0	0	0	0	7.98
TG	3.45	2.12	0	0	0	0	0	0	2.12	0	0	2.12	9.81
STWS	3.45	2.12	0	0	0	0	0	0	2.12	0	0	2.12	9.81
DSS	0	2.12	0	0	0	0	0	0	2.12	0	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	2.12	0	0	0	4.24
SDST	3.45	2.12	0	0	0	0	0	0	2.12	0	0	0	7.69
110-93 Early													
DTMF	0	0	5.86	0	0	0	0	0	0	0	0	0	5.86
ETMF	0	0	5.86	2.12	0	0	0	0	0	0	0	0	7.98
CMF1	0	0	5.86	0	0	0	2.12	0	0	0	0	0	7.98
TCF	0	0	5.86	2.12	0	0	2.12	0	0	0	0	0	10.1
TDF	0	0	5.86	0	2.12	0	2.12	0	0	0	0	0	10.1
CMF2	0	0	5.86	2.12	2.12	0	2.12	0	0	0	0	0	12.22
WMF	0	0	5.86	0	2.12	0	2.12	0	0	0	0	0	10.1
TSWS	0	0	5.86	0	2.12	0	0	0	0	0	0	0	7.98
TG	3.45	2.12	0	0	0	0	0	0	2.6	0	0	2.12	10.29
STWS	3.45	2.12	0	0	0	0	0	0	2.6	0	0	2.12	10.29
DSS	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
SDST	3.45	2.12	0	0	0	0	0	0	2.6	0	0	0	8.17
110-93 Mid													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75

ETMF	0	0	3.75	2.12	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	2.6	2.6	0	0	0	0	11.07
TCF	0	0	3.75	2.12	0	2.12	2.6	2.6	0	0	0	0	13.19
TDF	0	0	3.75	0	2.6	2.12	2.6	2.6	0	0	0	0	13.67
CMF2	0	0	3.75	2.12	2.6	2.12	2.6	2.6	0	0	0	0	15.79
WMF	0	0	3.75	0	2.6	2.12	2.6	2.6	0	0	0	0	13.67
TSWS	0	0	3.75	0	2.6	0	0	0	0	0	0	0	6.35
TG	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
STWS	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
DSS	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
SDST	2.6	2.12	0	0	0	0	0	0	2.6	0	0	0	7.32
110-93 Late													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	2.12	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	2.6	2.6	0	0	0	0	11.07
TCF	0	0	3.75	2.12	0	2.12	2.6	2.6	0	0	0	0	13.19
TDF	0	0	3.75	0	2.6	2.12	2.6	2.6	0	0	0	0	13.67
CMF2	0	0	3.75	2.12	2.6	2.12	2.6	2.6	0	0	0	0	15.79
WMF	0	0	3.75	0	2.6	2.12	2.6	2.6	0	0	0	0	13.67
TSWS	0	0	3.75	0	2.6	0	0	0	0	0	0	0	6.35
TG	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
STWS	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
DSS	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
SDST	2.6	2.12	0	0	0	0	0	0	2.6	0	0	0	7.32
93-86 Early													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	2.12	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	2.6	0	0	0	0	0	8.47
TCF	0	0	3.75	2.12	0	2.12	2.6	0	0	0	0	0	10.59
TDF	0	0	3.75	0	2.6	2.12	2.6	0	0	0	0	0	11.07
CMF2	0	0	3.75	2.12	2.6	2.12	2.6	0	0	0	0	0	13.19
WMF	0	0	3.75	0	2.6	2.12	2.6	0	0	0	0	0	11.07
TSWS	0	0	3.75	0	2.6	0	0	0	0	0	0	0	6.35
TG	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
STWS	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
DSS	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
SDST	2.6	2.12	0	0	0	0	0	0	2.6	0	0	0	7.32
93-86 Late													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	2.12	0	0	0	0	0	0	0	0	5.87
CMF1	0	0	3.75	0	0	2.12	2.6	0	0	0	0	0	8.47
TCF	0	0	3.75	2.12	0	2.12	2.6	0	0	0	0	0	10.59
TDF	0	0	3.75	0	2.6	2.12	2.6	0	0	0	0	0	11.07
CMF2	0	0	3.75	2.12	2.6	2.12	2.6	0	0	0	0	0	13.19
WMF	0	0	3.75	0	2.6	2.12	2.6	0	0	0	0	0	11.07
TSWS	0	0	3.75	0	2.6	0	0	0	0	0	0	0	6.35
TG	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
STWS	2.6	2.12	0	0	0	0	0	0	2.6	0	0	2.12	9.44
DSS	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
HD	0	2.12	0	0	0	0	0	0	2.6	0	0	0	4.72
SDST	2.6	2.12	0	0	0	0	0	0	2.6	0	0	0	7.32
86-74 Early													
DTMF	0	0	4.3	0	0	0	0	0	0	0	0	0	4.3
ETMF	0	0	4.3	2.12	0	0	0	0	0	0	0	0	6.42

CMF1	0	0	4.3	0	0	2.6	2.12	0	0	0	0	0	9.02
TCF	0	0	4.3	2.12	0	2.6	2.12	0	0	0	0	0	11.14
TDF	0	0	4.3	0	2.12	2.6	2.12	0	0	0	0	0	11.14
CMF2	0	0	4.3	2.12	2.12	2.6	2.12	0	0	0	0	0	13.26
WMF	0	0	4.3	0	2.12	2.6	2.12	0	0	0	0	0	11.14
TSWS	0	0	4.3	0	2.12	0	0	0	0	0	0	0	6.42
TG	2.12	2.12	0	0	0	0	0	0	3.75	0	0	2.12	10.11
STWS	2.12	2.12	0	0	0	0	0	0	3.75	0	0	2.12	10.11
DSS	0	2.12	0	0	0	0	0	0	3.75	0	0	0	5.87
HD	0	2.12	0	0	0	0	0	0	3.75	0	0	0	5.87
SDST	2.12	2.12	0	0	0	0	0	0	3.75	0	0	0	7.99
86-74 Mid													
DTMF	0	0	0	0	0	0	0	0	0	0	0	0	0
ETMF	0	0	0	0	0	0	0	0	0	0	0	0	0
CMF1	0	0	0	0	0	0	0	0	0	0	0	0	0
TCF	0	0	0	0	0	0	0	0	0	0	0	0	0
TDF	0	0	0	0	0	0	0	0	0	0	0	0	0
CMF2	0	0	0	0	0	0	0	0	0	0	0	0	0
WMF	0	0	0	0	0	0	0	0	0	0	0	0	0
TSWS	0	0	0	0	0	0	0	0	0	0	0	0	0
TG	0	0	0	0	0	0	0	0	0	0	0	0	0
STWS	0	0	0	0	0	0	0	0	0	0	0	0	0
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0
HD	0	0	0	0	0	0	0	0	0	0	0	0	0
SDST	0	0	0	0	0	0	0	0	0	0	0	0	0
86-74 Late													
DTMF	0	0	2.12	0	0	0	0	0	0	0	0	0	2.12
ETMF	0	0	2.12	0	0	0	0	0	0	0	0	0	2.12
CMF1	0	0	2.12	0	0	0	2.12	0.707	0	0	0	0	4.947
TCF	0	0	2.12	0	0	0	2.12	0.707	0	0	0	0	4.947
TDF	0	0	2.12	0	2.12	0	2.12	0.707	0	0	0	0	7.067
CMF2	0	0	2.12	0	2.12	0	2.12	0.707	0	0	0	0	7.067
WMF	0	0	2.12	0	2.12	0	2.12	0.707	0	0	0	0	7.067
TSWS	0	0	2.12	0	2.12	0	0	0	0	0	0	0	4.24
TG	3.75	2.6	0	0	0	0	0	0	3.75	0	0	2.12	12.22
STWS	3.75	2.6	0	0	0	0	0	0	3.75	0.707	0	2.12	12.927
DSS	0	2.6	0	0	0	0	0	0	3.75	0	0	0	6.35
HD	0	2.6	0	0	0	0	0	0	3.75	0	0	0	6.35
SDST	3.75	2.6	0	0	0	0	0	0	3.75	0	0	0	10.1
74-59 Early													
DTMF	0	0	4.93	0	0	0	0	0	0	0	0	0	4.93
ETMF	0	0	4.93	0	0	0	0	0	0	0	0	0	4.93
CMF1	0	0	4.93	0	0	2.6	2.12	2.6	0	0	0	0	12.25
TCF	0	0	4.93	0	0	2.6	2.12	2.6	0	0	0	0	12.25
TDF	0	0	4.93	0	2.6	2.6	2.12	2.6	0	0	0	0	14.85
CMF2	0	0	4.93	0	2.6	2.6	2.12	2.6	0	0	0	0	14.85
WMF	0	0	4.93	0	2.6	2.6	2.12	2.6	0	0	0	0	14.85
TSWS	0	0	4.93	0	2.6	0	0	0	0	0	0	0	7.53
TG	3.75	2.12	0	0	0	0	0	0	1.22	0	0	2.12	9.21
STWS	3.75	2.12	0	0	0	0	0	0	1.22	0.707	0	2.12	9.917
DSS	0	2.12	0	0	0	0	0	0	1.22	0	0	0	3.34
HD	0	2.12	0	0	0	0	0	0	1.22	0	0	0	3.34
SDST	3.75	2.12	0	0	0	0	0	0		0	0	0	5.87
74-59 Mid													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
CMF1	0	0	3.75	0	0	2.12	2.12	0.707	0	0	0	0	8.697

TCF	0	0	3.75	0	0	2.12	2.12	0.707	0	0	0	0	8.697
TDF	0	0	3.75	0	2.12	2.12	2.12	0.707	0	0	0	0	10.817
CMF2	0	0	3.75	0	2.12	2.12	2.12	0.707	0	0	0	0	10.817
WMF	0	0	3.75	0	2.12	2.12	2.12	0.707	0	0	0	0	10.817
TSWS	0	0	3.75	0	2.12	0	0	0	0	0	0	0	5.87
TG	4.02	2.12	0	0	0	0	0	0	1.22	0	0	3.45	10.81
STWS	4.02	2.12	0	0	0	0	0	0	1.22	1.22	0	3.45	12.03
DSS		2.12	0	0	0	0	0	0	1.22	0	0	0	3.34
HD	0	2.12	0	0	0	0	0	0	1.22	0	0	0	3.34
SDST	4.02	2.12	0	0	0	0	0	0		0	0	0	6.14
74-59 Late													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
CMF1	0	0	3.75	0	0	0	2.12	0.707	0	0	0	0	6.577
TCF	0	0	3.75	0	0	0	2.12	0.707	0	0	0	0	6.577
TDF	0	0	3.75	0	2.12	0	2.12	0.707	0	0	0	0	8.697
CMF2	0	0	3.75	0	2.12	0	2.12	0.707	0	0	0	0	8.697
WMF	0	0	3.75	0	2.12	0	2.12	0.707	0	0	0	0	8.697
TSWS	0	0	3.75	0	2.12	0	0	0	0	0	0	0	5.87
TG	3.75	2.12	0	0	0	0	0	0	2.12	0	0	0	7.99
STWS	3.75	2.12	0	0	0	0	0	0	2.12	1.22	0	0	9.21
DSS	0	2.12	0	0	0	0	0	0	2.12	0	0	0	4.24
HD	0	2.12	0	0	0	0	0	0	2.12	0	0	0	4.24
SDST	3.75	2.12	0	0	0	0	0	0		0	0	0	5.87
59-50													
DTMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
ETMF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
CMF1	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
TCF	0	0	3.75	0	0	0	0	0	0	0	0	0	3.75
TDF	0	0	3.75	0	2.12	0	0	0	0	0	0	0	5.87
CMF2	0	0	3.75	0	2.12	0	0	0	0	0	0	0	5.87
WMF	0	0	3.75	0	2.12	0	0	0	0	0	0	0	5.87
TSWS	0	0	3.75	0	2.12	0	0	0	0	0	0	0	5.87
TG	2.6	4.93	0	0	0	0	0	0	4.93	0	0	0.707	13.167
STWS	2.6	4.93	0	0	0	0	0	0	4.93	2.6	0	0.707	15.767
DSS	0	4.93	0	0	0	0	0	0	4.93	0	0	0	9.86
HD	0	4.93	0	0	0	0	0	0	4.93	0	0	0	9.86
SDST	2.6	4.93	0	0	0	0	0	0	4.93	0	0	0	12.46
50-40													
DTMF	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
ETMF	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
CMF1	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
TCF	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
TDF	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
CMF2	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
WMF	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
TSWS	0	0	3.45	0	0	0	0	0	0	0	0	0	3.45
TG	3.75	0	0	0	0	0	0	0	3.75	0	0	0.707	8.207
STWS	3.75	0	0	0	0	0	0	0	3.75	1.58	0	0.707	9.787
DSS	0	0	0	0	0	0	0	0	3.75	0	0	0	3.75
HD	0	0	0	0	0	0	0	0	3.75	0	0	0	3.75
SDST	3.75	0	0	0	0	0	0	0	3.75	0	0	0	7.5

APPENDIX B:
Soreq Cave δ^{18}O to Temperature Conversion

$$10^3\ln\alpha_{c-w} = 2.78(10^6T^{-2}) - 2.89$$
$$10^3\ln\alpha_{c-w} = = \delta_c - \delta_w$$

Age	δ^{18}O	δ^{18}O	δc-δw	δc-δw	O'Neil Formula	Kelvin to	O'Neil Formula	Kelvin to
(Ka BP)	(PDB)	(SMOW)	δw = -7	δw = -4.9	δw = -7	Celsius	δw = -4.9	Celsius
25.06	-2.91	27.860197	34.860197	32.760197	271.3705935	-1.7794065	279.2488726	6.0988726
25.14	-2.76	28.014826	35.014826	32.914826	270.8165131	-2.3334869	278.6452292	5.4952292
25.84	-2.8	27.973592	34.973592	32.873592	270.9639359	-2.1860641	278.8058179	5.6558179
26.54	-2.95	27.818963	34.818963	32.718963	271.5189236	-1.6310764	279.4105079	6.2605079
27.24	-2.96	27.808654	34.808654	32.708654	271.5560441	-1.5939559	279.4509606	6.3009606
27.94	-3.25	27.509705	34.509705	32.409705	272.6392068	-0.5107932	280.6317858	7.4817858
28.64	-2.84	27.932358	34.932358	32.832358	271.1115998	-2.0384002	278.9666846	5.8166846
29.33	-2.94	27.829272	34.829272	32.729272	271.4818183	-1.6681817	279.3700728	6.2200728
30.03	-3.07	27.69526	34.69526	32.59526	271.9653774	-1.1846226	279.8971029	6.7471029
30.73	-2.86	27.91174	34.91174	32.81174	271.1855223	-1.9644777	279.0472225	5.8972225
31.43	-2.88	27.891123	34.891123	32.791123	271.2595054	-1.8904946	279.1278301	5.9778301
32.13	-2.88	27.891123	34.891123	32.791123	271.2595054	-1.8904946	279.1278301	5.9778301
32.27	-3.08	27.684951	34.684951	32.584951	272.0026814	-1.1473186	279.9377674	6.7877674
32.41	-2.87	27.901432	34.901432	32.801432	271.2225063	-1.9274937	279.0875176	5.9375176
32.6	-2.72	28.056061	35.056061	32.956061	270.6693306	-2.4806694	278.4849177	5.3349177
32.7	-2.72	28.056061	35.056061	32.956061	270.6693306	-2.4806694	278.4849177	5.3349177
32.84	-3.42	27.334459	34.334459	32.234459	273.280222	0.130222	281.3309918	8.1809918
32.98	-3.62	27.128287	34.128287	32.028287	274.0401774	0.8901774	282.1603167	9.0103167
33.13	-2.99	27.777729	34.777729	32.677729	271.6674971	-1.4825029	279.5724242	6.4224242
33.27	-3.14	27.6231	34.6231	32.5231	272.2268281	-0.9231719	280.1821267	7.0321267
33.41	-3.23	27.530322	34.530322	32.430322	272.5640895	-0.5859105	280.5498686	7.3998686
33.55	-3.15	27.612791	34.612791	32.512791	272.2642398	-0.8857602	280.2229156	7.0729156
33.7	-3.09	27.674643	34.674643	32.574643	272.0400007	-1.1099993	279.9784495	6.8284495
33.84	-2.93	27.83958	34.83958	32.73958	271.4447281	-1.7052719	279.3296552	6.1796552
33.98	-2.88	27.891123	34.891123	32.791123	271.2595054	-1.8904946	279.1278301	5.9778301
34.02	-2.58	28.200381	35.200381	33.100381	270.1560753	-2.9939247	277.9259985	4.7759985
34.05	-2.61	28.169455	35.169455	33.069455	270.2658128	-2.8841872	278.0454836	4.8954836
34.09	-2.59	28.190073	35.190073	33.090073	270.1926396	-2.9573604	277.9658098	4.8158098
34.13	-2.71	28.066369	35.066369	32.966369	270.6325724	-2.5174276	278.444883	5.294883
34.17	-3.1	27.664334	34.664334	32.564334	272.0773354	-1.0726646	280.0191495	6.8691495
34.2	-2.87	27.901432	34.901432	32.801432	271.2225063	-1.9274937	279.0875176	5.9375176
34.24	-2.96	27.808654	34.808654	32.708654	271.5560441	-1.5939559	279.4509606	6.3009606
34.28	-3.04	27.726186	34.726186	32.626186	271.8535575	-1.2964425	279.7752159	6.6252159
34.32	-2.95	27.818963	34.818963	32.718963	271.5189236	-1.6310764	279.4105079	6.2605079
34.35	-2.74	28.035444	35.035444	32.935444	270.7428918	-2.4071082	278.5650389	5.4150389
34.39	-2.78	27.994209	34.994209	32.894209	270.8901944	-2.2598056	278.7254889	5.5754889
34.43	-2.75	28.025135	35.025135	32.925135	270.7796949	-2.3703051	278.6051254	5.4551254
34.46	-2.74	28.035444	35.035444	32.935444	270.7428918	-2.4071082	278.5650389	5.4150389
34.5	-2.7	28.076678	35.076678	32.976678	270.5958293	-2.5541707	278.4048656	5.2548656
34.54	-2.95	27.818963	34.818963	32.718963	271.5189236	-1.6310764	279.4105079	6.2605079
34.58	-2.5	28.28285	35.28285	33.18285	269.8640943	-3.2859057	277.6081232	4.4581232
34.61	-2.73	28.045752	35.045752	32.945752	270.7061037	-2.4438963	278.5249696	5.3749696
34.65	-3.01	27.757111	34.757111	32.657111	271.7418754	-1.4081246	279.6534879	6.5034879
34.69	-2.78	27.994209	34.994209	32.894209	270.8901944	-2.2598056	278.7254889	5.5754889
34.73	-2.86	27.91174	34.91174	32.81174	271.1855223	-1.9644777	279.0472225	5.8972225
34.76	-2.81	27.963283	34.963283	32.863283	271.0008293	-2.1491707	278.8460085	5.6960085
34.8	-2.72	28.056061	35.056061	32.956061	270.6693306	-2.4806694	278.4849177	5.3349177
34.81	-2.99	27.777729	34.777729	32.677729	271.6674971	-1.4825029	279.5724242	6.4224242
34.82	-2.79	27.983901	34.983901	32.883901	270.9270576	-2.2229424	278.7656447	5.6156447
34.83	-2.83	27.942666	34.942666	32.842666	271.0746612	-2.0753388	278.9264419	5.7764419
34.83	-2.54	28.241616	35.241616	33.141616	270.0099664	-3.1400336	277.7669244	4.6169244
34.84	-2.69	28.086987	35.086987	32.986987	270.5591011	-2.5908989	278.3648654	5.2148654
34.855	-2.68	28.097295	35.097295	32.997295	270.5223878	-2.6276122	278.3248825	5.1748825
34.865	-3.01	27.757111	34.757111	32.657111	271.7418754	-1.4081246	279.6534879	6.5034879
34.87	-2.98	27.788037	34.788037	32.688037	271.6303309	-1.5196691	279.5319187	6.3819187

34.89	-3.25	27.509705	34.509705	32.409705	272.6392068	-0.5107932	280.6317858	7.4817858
34.9	-3.2	27.561248	34.561248	32.461248	272.4515298	-0.6984702	280.4271271	7.2771271
34.91	-3.18	27.581865	34.581865	32.481865	272.3765674	-0.7734326	280.3453889	7.1953889
34.92	-3.72	27.025201	34.025201	31.925201	274.4225404	1.2725404	282.5777389	9.4277389
34.93	-3.61	27.138595	34.138595	32.038595	274.002029	0.852029	282.1186761	8.9686761
34.94	-3.26	27.499396	34.499396	32.399396	272.6767888	-0.4732112	280.6727714	7.5227714
34.955	-3.36	27.39631	34.39631	32.29631	273.0534654	-0.0965346	281.0836168	7.9336168
34.965	-3.3	27.458162	34.458162	32.358162	272.8272723	-0.3227277	280.8368933	7.6868933
34.98	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
34.99	-3.13	27.633408	34.633408	32.533408	272.1894318	-0.9605682	280.1413557	6.9913557
35	-3.4	27.355076	34.355076	32.255076	273.2045737	0.0545737	281.2484609	8.0984609
35.01	-3.43	27.32415	34.32415	32.22415	273.3180697	0.1680697	281.3722845	8.2222845
35.02	-3.21	27.550939	34.550939	32.450939	272.4890342	-0.6609658	280.4680231	7.3180231
35.03	-3.14	27.6231	34.6231	32.5231	272.2268281	-0.9231719	280.1821267	7.0321267
35.05	-3.33	27.427236	34.427236	32.327236	272.9402985	-0.2097015	280.9601738	7.8101738
35.06	-3.49	27.262299	34.262299	32.162299	273.5454867	0.3954867	281.6204231	8.4704231
35.07	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
35.085	-3.3	27.458162	34.458162	32.358162	272.8272723	-0.3227277	280.8368933	7.6868933
35.1	-3.33	27.427236	34.427236	32.327236	272.9402985	-0.2097015	280.9601738	7.8101738
35.12	-3.33	27.427236	34.427236	32.327236	272.9402985	-0.2097015	280.9601738	7.8101738
35.13	-3.28	27.478779	34.478779	32.378779	272.7519994	-0.3980006	280.7547963	7.6047963
35.15	-3.32	27.437545	34.437545	32.337545	272.9026075	-0.2473925	280.9190623	7.7690623
35.16	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
35.18	-3.69	27.056127	34.056127	31.956127	274.3076635	1.1576635	282.4523178	9.3023178
35.19	-3.53	27.221064	34.221064	32.121064	273.6974138	0.5474138	281.786214	8.636214
35.21	-3.44	27.313842	34.313842	32.213842	273.3559332	0.2059332	281.4135954	8.2635954
35.22	-3.49	27.262299	34.262299	32.162299	273.5454867	0.3954867	281.6204231	8.4704231
35.24	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
35.25	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
35.27	-3.39	27.365385	34.365385	32.265385	273.1667731	0.0167731	281.2072227	8.0572227
35.28	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
35.3	-3.5	27.25199	34.25199	32.15199	273.5834448	0.4334448	281.6618434	8.5118434
35.31	-3.53	27.221064	34.221064	32.121064	273.6974138	0.5474138	281.786214	8.636214
35.33	-3.48	27.272607	34.272607	32.172607	273.5075445	0.3575445	281.5790211	8.4290211
35.35	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
35.36	-3.53	27.221064	34.221064	32.121064	273.6974138	0.5474138	281.786214	8.636214
35.38	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
35.39	-3.43	27.32415	34.32415	32.22415	273.3180697	0.1680697	281.3722845	8.2222845
35.41	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
35.42	-3.33	27.427236	34.427236	32.327236	272.9402985	-0.2097015	280.9601738	7.8101738
35.44	-3.38	27.375693	34.375693	32.275693	273.1289882	-0.0210118	281.1660026	8.0160026
35.45	-3.55	27.200447	34.200447	32.100447	273.7734724	0.6234724	281.8692193	8.7192193
35.47	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
35.48	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
35.5	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
35.51	-3.52	27.231373	34.231373	32.131373	273.6594083	0.5094083	281.7447388	8.5947388
35.53	-3.47	27.282916	34.282916	32.182916	273.469618	0.319618	281.5376373	8.3876373
35.54	-3.65	27.097361	34.097361	31.997361	274.1547185	1.0047185	282.2853491	9.1353491
35.56	-3.49	27.262299	34.262299	32.162299	273.5454867	0.3954867	281.6204231	8.4704231
35.58	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
35.59	-3.36	27.39631	34.39631	32.29631	273.0534654	-0.0965346	281.0836168	7.9336168
35.61	-2.89	27.880815	34.880815	32.780815	271.2965196	-1.8534804	279.1681601	6.0181601
35.62	-2.36	28.42717	35.42717	33.32717	269.3553976	-3.7946024	277.0544561	3.9044561
35.64	-3.07	27.69526	34.69526	32.59526	271.9653774	-1.1846226	279.8971029	6.7471029
35.65	-3.03	27.736494	34.736494	32.636494	271.8163149	-1.3336851	279.7346222	6.5846222
35.67	-2.87	27.901432	34.901432	32.801432	271.2225063	-1.9274937	279.0875176	5.9375176
35.68	-2.88	27.891123	34.891123	32.791123	271.2595054	-1.8904946	279.1278301	5.9778301
35.7	-3.07	27.69526	34.69526	32.59526	271.9653774	-1.1846226	279.8971029	6.7471029
35.71	-3.04	27.726186	34.726186	32.626186	271.8535575	-1.2964425	279.7752159	6.6252159
35.73	-2.96	27.808654	34.808654	32.708654	271.5560441	-1.5939559	279.4509606	6.3009606
35.74	-3.02	27.746803	34.746803	32.646803	271.7790875	-1.3709125	279.6940463	6.5440463
35.76	-2.99	27.777729	34.777729	32.677729	271.6674971	-1.4825029	279.5724242	6.4224242
35.77	-3.01	27.757111	34.757111	32.657111	271.7418754	-1.4081246	279.6534879	6.5034879

35.79	-3.02	27.746803	34.746803	32.646803	271.7790875	-1.3709125	279.6940463	6.5440463
35.5	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
35.91	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
36.27	-3.27	27.489088	34.489088	32.389088	272.7143863	-0.4356137	280.7137749	7.5637749
37.4	-3.61	27.138595	34.138595	32.038595	274.002029	0.852029	282.1186761	8.9686761
38.21	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
39.18	-3.07	27.69526	34.69526	32.59526	271.9653774	-1.1846226	279.8971029	6.7471029
39.42	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
39.67	-3.24	27.520014	34.520014	32.420014	272.6016404	-0.5483596	280.5908182	7.4408182
39.91	-3.21	27.550939	34.550939	32.450939	272.4890342	-0.6609658	280.4680231	7.3180231
40.15	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
40.4	-3.7	27.045818	34.045818	31.945818	274.3459398	1.1959398	282.4941063	9.3441063
40.64	-3.69	27.056127	34.056127	31.956127	274.3076635	1.1576635	282.4523178	9.3023178
40.89	-3.69	27.056127	34.056127	31.956127	274.3076635	1.1576635	282.4523178	9.3023178
41.13	-3.79	26.953041	33.953041	31.853041	274.6911488	1.5411488	282.8710393	9.7210393
41.37	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
41.62	-3.52	27.231373	34.231373	32.131373	273.6594083	0.5094083	281.7447388	8.5947388
41.86	-3.52	27.231373	34.231373	32.131373	273.6594083	0.5094083	281.7447388	8.5947388
42.1	-3.44	27.313842	34.313842	32.213842	273.3559332	0.2059332	281.4135954	8.2635954
42.35	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
42.59	-3.74	27.004584	34.004584	31.904584	274.4992052	1.3492052	282.6614459	9.5114459
42.83	-3.9	26.839646	33.839646	31.739646	275.1148459	1.9648459	283.3337906	10.183791
43.08	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
43.32	-3.48	27.272607	34.272607	32.172607	273.5075445	0.3575445	281.5790211	8.4290211
43.56	-3.41	27.344767	34.344767	32.244767	273.24239	0.09239	281.2897173	8.1397173
43.81	-3.25	27.509705	34.509705	32.409705	272.6392068	-0.5107932	280.6317858	7.4817858
44.05	-3.36	27.39631	34.39631	32.29631	273.0534654	-0.0965346	281.0836168	7.9336168
44.3	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
44.54	-3.48	27.272607	34.272607	32.172607	273.5075445	0.3575445	281.5790211	8.4290211
44.78	-3.53	27.221064	34.221064	32.121064	273.6974138	0.5474138	281.786214	8.636214
45.03	-3.27	27.489088	34.489088	32.389088	272.7143863	-0.4356137	280.7137749	7.5637749
45.27	-3.08	27.684951	34.684951	32.584951	272.0026814	-1.1473186	279.9377674	6.7877674
45.51	-3.09	27.674643	34.674643	32.574643	272.0400007	-1.1099993	279.9784495	6.8284495
45.76	-2.81	27.963283	34.963283	32.863283	271.0008293	-2.1491707	278.8460085	5.6960085
46	-2.88	27.891123	34.891123	32.791123	271.2595054	-1.8904946	279.1278301	5.9778301
46.09	-3.38	27.375693	34.375693	32.275693	273.1289882	-0.0210118	281.1660026	8.0160026
45.7	-2.64	28.13853	35.13853	33.03853	270.3756841	-2.7743159	278.1651229	5.0151229
45.79	-2.81	27.963283	34.963283	32.863283	271.0008293	-2.1491707	278.8460085	5.6960085
45.88	-2.83	27.942666	34.942666	32.842666	271.0746612	-2.0753388	278.9264419	5.7764419
45.96	-2.81	27.963283	34.963283	32.863283	271.0008293	-2.1491707	278.8460085	5.6960085
46.05	-2.93	27.83958	34.83958	32.73958	271.4447281	-1.7052719	279.3296552	6.1796552
46.14	-3.03	27.736494	34.736494	32.636494	271.8163149	-1.3336851	279.7346222	6.5846222
46.23	-2.97	27.798346	34.798346	32.698346	271.5931799	-1.5568201	279.4914309	6.3414309
46.31	-2.95	27.818963	34.818963	32.718963	271.5189236	-1.6310764	279.4105079	6.2605079
46.4	-2.48	28.303467	35.303467	33.203467	269.7912469	-3.3587531	277.5288246	4.3788246
46.46	-2.54	28.241616	35.241616	33.141616	270.0099664	-3.1400336	277.7669244	4.6169244
46.51	-2.71	28.066369	35.066369	32.966369	270.6325724	-2.5174276	278.444883	5.294883
46.57	-2.69	28.086987	35.086987	32.986987	270.5591011	-2.5908989	278.3648654	5.2148654
46.63	-2.78	27.994209	34.994209	32.894209	270.8901944	-2.2598056	278.7254889	5.5754889
46.69	-3.28	27.478779	34.478779	32.378779	272.7519994	-0.3980006	280.7547963	7.6047963
46.74	-3.47	27.282916	34.282916	32.182916	273.469618	0.319618	281.5376373	8.3876373
46.8	-3.4	27.355076	34.355076	32.255076	273.2045737	0.0545737	281.2484609	8.0984609
46.86	-3.34	27.416928	34.416928	32.316928	272.9780052	-0.1719948	281.0013034	7.8513034
46.91	-3.67	27.076744	34.076744	31.976744	274.231159	1.081159	282.3687964	9.2187964
46.97	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
47.03	-3.58	27.169521	34.169521	32.069521	273.8876792	0.7376792	281.993865	8.843865
47.09	-3.51	27.241681	34.241681	32.141681	273.6214186	0.4714186	281.703282	8.553282
47.15	-3.32	27.437545	34.437545	32.337545	272.9026075	-0.2473925	280.9190623	7.7690623
47.21	-3.22	27.540631	34.540631	32.440631	272.5265541	-0.6234459	280.5089369	7.3589369
47.27	-3.29	27.468471	34.468471	32.368471	272.7896281	-0.3603719	280.7958358	7.6458358
47.33	-3.24	27.520014	34.520014	32.420014	272.6016404	-0.5483596	280.5908182	7.4408182
47.39	-3.37	27.386002	34.386002	32.286002	273.091219	-0.058781	281.1248007	7.9748007
47.44	-3.34	27.416928	34.416928	32.316928	272.9780052	-0.1719948	281.0013034	7.8513034

47.5	-3.36	27.39631	34.39631	32.29631	273.0534654	-0.0965346	281.0836168	7.9336168
47.9	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
48.3	-3.43	27.32415	34.32415	32.22415	273.3180697	0.1680697	281.3722845	8.2222845
48.35	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
48.38	-3.63	27.117978	34.117978	32.017978	274.0783418	0.9283418	282.2019757	9.0519757
48.4	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
48.3	-3.48	27.272607	34.272607	32.172607	273.5075445	0.3575445	281.5790211	8.4290211
48.45	-3.67	27.076744	34.076744	31.976744	274.231159	1.081159	282.3687964	9.2187964
48.48	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
48.5	-3.67	27.076744	34.076744	31.976744	274.231159	1.081159	282.3687964	9.2187964
48.54	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
48.69	-3.74	27.004584	34.004584	31.904584	274.4992052	1.3492052	282.6614459	9.5114459
48.84	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
48.89	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
49.15	-3.5	27.25199	34.25199	32.15199	273.5834448	0.4334448	281.6618434	8.5118434
49.21	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
49.26	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
49.32	-3.73	27.014892	34.014892	31.914892	274.4608648	1.3108648	282.6195831	9.4695831
49.37	-3.73	27.014892	34.014892	31.914892	274.4608648	1.3108648	282.6195831	9.4695831
49.43	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
49.48	-4.07	26.6644	33.6644	31.5644	275.7735243	2.6235243	284.0534403	10.90344
49.59	-4.17	26.561314	33.561314	31.461314	276.1631991	3.0131991	284.4793337	11.329334
49.64	-3.98	26.757177	33.757177	31.657177	275.4242236	2.2742236	283.6717672	10.521767
49.7	-3.47	27.282916	34.282916	32.182916	273.469618	0.319618	281.5376373	8.3876373
49.75	-3.52	27.231373	34.231373	32.131373	273.6594083	0.5094083	281.7447388	8.5947388
49.81	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
49.92	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
49.97	-3.24	27.520014	34.520014	32.420014	272.6016404	-0.5483596	280.5908182	7.4408182
50.03	-3.42	27.334459	34.334459	32.234459	273.280222	0.130222	281.3309918	8.1809918
50.08	-3.02	27.746803	34.746803	32.646803	271.7790875	-1.3709125	279.6940463	6.5440463
50.14	-3.66	27.087052	34.087052	31.987052	274.1929307	1.0429307	282.3270635	9.1770635
50.19	-3.34	27.416928	34.416928	32.316928	272.9780052	-0.1719948	281.0013034	7.8513034
50.25	-3.43	27.32415	34.32415	32.22415	273.3180697	0.1680697	281.3722845	8.2222845
50.3	-3.34	27.416928	34.416928	32.316928	272.9780052	-0.1719948	281.0013034	7.8513034
50.36	-3.35	27.406619	34.406619	32.306619	273.0157275	-0.1342725	281.0424511	7.8924511
50.41	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
50.46	-3.7	27.045818	34.045818	31.945818	274.3459398	1.1959398	282.4941063	9.3441063
50.52	-3.81	26.932423	33.932423	31.832423	274.768039	1.618039	282.9550072	9.8050072
50.57	-3.94	26.798412	33.798412	31.698412	275.2694044	2.1194044	283.5026278	10.352628
50.63	-3.55	27.200447	34.200447	32.100447	273.7734724	0.6234724	281.8692193	8.7192193
50.68	-3.36	27.39631	34.39631	32.29631	273.0534654	-0.0965346	281.0836168	7.9336168
50.74	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
50.79	-3.73	27.014892	34.014892	31.914892	274.4608648	1.3108648	282.6195831	9.4695831
50.85	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
50.9	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
50.96	-3.74	27.004584	34.004584	31.904584	274.4992052	1.3492052	282.6614459	9.5114459
51	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
51.07	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
51.12	-4.03	26.705634	33.705634	31.605634	275.6181155	2.4681155	283.8836177	10.733618
51.17	-3.94	26.798412	33.798412	31.698412	275.2694044	2.1194044	283.5026278	10.352628
51.23	-4.05	26.685017	33.685017	31.585017	275.695787	2.545787	283.9684909	10.818491
51.28	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
51.34	-3.79	26.953041	33.953041	31.853041	274.6911488	1.5411488	282.8710393	9.7210393
51.39	-3.98	26.757177	33.757177	31.657177	275.4242236	2.2742236	283.6717672	10.521767
51.45	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
51.5	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
51.56	-3.72	27.025201	34.025201	31.925201	274.4225404	1.2725404	282.5777389	9.4277389
51.61	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
51.67	-3.72	27.025201	34.025201	31.925201	274.4225404	1.2725404	282.5777389	9.4277389
51.72	-3.63	27.117978	34.117978	32.017978	274.0783418	0.9283418	282.2019757	9.0519757
51.77	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
51.83	-4.06	26.674708	33.674708	31.574708	275.7346474	2.5846474	284.0109561	10.860956
51.88	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045

51.94	-3.88	26.860263	33.860263	31.760263	275.0376642	1.8876642	283.2494851	10.099485
51.99	-4	26.73656	33.73656	31.63656	275.5017313	2.3517313	283.7564504	10.60645
52.05	-4.17	26.561314	33.561314	31.461314	276.1631991	3.0131991	284.4793337	11.329334
52.1	-4.03	26.705634	33.705634	31.605634	275.6181155	2.4681155	283.8836177	10.733618
52.16	-4.28	26.447919	33.447919	31.347919	276.5937551	3.4437551	284.9500363	11.800036
52.27	-4.05	26.685017	33.685017	31.585017	275.695787	2.545787	283.9684909	10.818491
52.3	-3.83	26.911806	33.911806	31.811806	274.8449939	1.6949939	283.03905	9.88905
52.37	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
52.43	-4.29	26.437611	33.437611	31.337611	276.6329965	3.4829965	284.9929434	11.842943
52.48	-4	26.73656	33.73656	31.63656	275.5017313	2.3517313	283.7564504	10.60645
52.54	-4.11	26.623165	33.623165	31.523165	275.9291961	2.7791961	284.223568	11.073568
52.59	-4.14	26.59224	33.59224	31.49224	276.0461232	2.8961232	284.3513646	11.201365
52.65	-4.28	26.447919	33.447919	31.347919	276.5937551	3.4437551	284.9500363	11.800036
52.7	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
52.76	-4.8	25.911872	32.911872	30.811872	278.656726	5.506726	287.2072413	14.057241
52.81	-4.4	26.324216	33.324216	31.224216	277.0657571	3.9157571	285.4662043	12.316204
52.87	-4.48	26.241747	33.241747	31.141747	277.3817709	4.2317709	285.8118787	12.661879
52.92	-4.92	25.788169	32.788169	30.688169	279.1393867	5.9893867	287.735796	14.585796
52.98	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
53.03	-3.95	26.788103	33.788103	31.688103	275.3080847	2.1580847	283.5448843	10.394884
53.09	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
53.14	-4.16	26.571622	33.571622	31.471622	276.1241572	2.9741572	284.4366581	11.286658
53.19	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
53.25	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
53.3	-4.21	26.520079	33.520079	31.420079	276.3195322	3.1695322	284.6502283	11.500228
53.36	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
53.41	-4.39	26.334525	33.334525	31.234525	277.0263313	3.8763313	285.4230831	12.273083
53.47	-4.55	26.169587	33.169587	31.069587	277.6591717	4.5091717	286.1153762	12.965376
53.52	-5.11	25.592305	32.592305	30.492305	279.9087554	6.7587554	288.578675	15.428675
53.58	-4.3	26.427302	33.427302	31.327302	276.6722546	3.5222546	285.0358699	11.88587
53.63	-4.47	26.252056	33.252056	31.152056	277.34221	4.19221	285.7686008	12.618601
53.69	-4.29	26.437611	33.437611	31.337611	276.6329965	3.4829965	284.9929434	11.842943
53.74	-4.18	26.551005	33.551005	31.451005	276.2022575	3.0522575	284.5220285	11.372028
53.8	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
53.85	-4.66	26.056192	33.056192	30.956192	278.0967738	4.9467738	286.5942604	13.44426
53.9	-3.98	26.757177	33.757177	31.657177	275.4242236	2.2742236	283.6717672	10.521767
53.96	-4	26.73656	33.73656	31.63656	275.5017313	2.3517313	283.7564504	10.60645
54.01	-4.08	26.654091	33.654091	31.554091	275.8124175	2.6624175	284.0959436	10.945944
54.07	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
54.12	-3.51	27.241681	34.241681	32.141681	273.6214186	0.4714186	281.703282	8.553282
54.18	-5.27	25.427368	32.427368	30.327368	280.5616028	7.4116028	289.2942424	16.144242
54.23	-4.18	26.551005	33.551005	31.451005	276.2022575	3.0522575	284.5220285	11.372028
54.29	-4.25	26.478845	33.478845	31.378845	276.4761311	3.3261311	284.8214312	11.671431
54.34	-4.31	26.416993	33.416993	31.316993	276.7115295	3.5615295	285.0788158	11.928816
54.4	-4.86	25.85002	32.85002	30.75002	278.8977431	5.7477431	287.4711542	14.321154
54.425	-3.53	27.221064	34.221064	32.121064	273.6974138	0.5474138	281.786214	8.636214
54.45	-3.28	27.478779	34.478779	32.378779	272.7519994	-0.3980006	280.7547963	7.6047963
54.5	-3.18	27.581865	34.581865	32.481865	272.3765674	-0.7734326	280.3453889	7.1953889
54.56	-3.16	27.602482	34.602482	32.502482	272.3016669	-0.8483331	280.2637222	7.1137222
54.61	-3.21	27.550939	34.550939	32.450939	272.4890342	-0.6609658	280.4680231	7.3180231
54.67	-3.23	27.530322	34.530322	32.430322	272.5640895	-0.5859105	280.5498686	7.3998686
54.72	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
54.78	-3.29	27.468471	34.468471	32.368471	272.7896281	-0.3603719	280.7958358	7.6458358
54.89	-3.58	27.169521	34.169521	32.069521	273.8876792	0.7376792	281.993865	8.843865
54.94	-3.18	27.581865	34.581865	32.481865	272.3765674	-0.7734326	280.3453889	7.1953889
54.97	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
55	-3.7	27.045818	34.045818	31.945818	274.3459398	1.1959398	282.4941063	9.3441063
55.025	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
55.05	-3.24	27.520014	34.520014	32.420014	272.6016404	-0.5483596	280.5908182	7.4408182
55.075	-3.29	27.468471	34.468471	32.368471	272.7896281	-0.3603719	280.7958358	7.6458358
55.1	-3.3	27.458162	34.458162	32.358162	272.8272723	-0.3227277	280.8368933	7.6868933
55.13	-3.41	27.344767	34.344767	32.244767	273.24239	0.09239	281.2897173	8.1397173
55.16	-3.22	27.540631	34.540631	32.440631	272.5265541	-0.6234459	280.5089369	7.3589369

55.185	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
55.24	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
55.27	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
55.295	-3.58	27.169521	34.169521	32.069521	273.8876792	0.7376792	281.993865	8.843865
55.32	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
55.35	-3.55	27.200447	34.200447	32.100447	273.7734724	0.6234724	281.8692193	8.7192193
55.38	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
55.405	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
55.43	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
55.46	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
55.49	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
55.54	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
55.6	-3.55	27.200447	34.200447	32.100447	273.7734724	0.6234724	281.8692193	8.7192193
55.65	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
55.71	-3.58	27.169521	34.169521	32.069521	273.8876792	0.7376792	281.993865	8.843865
55.76	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
55.82	-3.34	27.416928	34.416928	32.316928	272.9780052	-0.1719948	281.0013034	7.8513034
55.87	-3.23	27.530322	34.530322	32.430322	272.5640895	-0.5859105	280.5498686	7.3998686
55.89	-4.36	26.36545	33.36545	31.26545	276.9081547	3.7581547	285.2938368	12.143837
55.915	-3.7	27.045818	34.045818	31.945818	274.3459398	1.1959398	282.4941063	9.3441063
55.94	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
55.96	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
55.983	-3.72	27.025201	34.025201	31.925201	274.4225404	1.2725404	282.5777389	9.4277389
56	-3.76	26.983966	33.983966	31.883966	274.5759344	1.4259344	282.7452273	9.5952273
56.028	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
56.05	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
56.07	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
56.095	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
56.12	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
56.14	-4.17	26.561314	33.561314	31.461314	276.1631991	3.0131991	284.4793337	11.329334
56.164	-4.18	26.551005	33.551005	31.451005	276.2022575	3.0522575	284.5220285	11.372028
56.187	-3.88	26.860263	33.860263	31.760263	275.0376642	1.8876642	283.2494851	10.099485
56.21	-4	26.73656	33.73656	31.63656	275.5017313	2.3517313	283.7564504	10.60645
56.23	-3.95	26.788103	33.788103	31.688103	275.3080847	2.1580847	283.5448843	10.394884
56.255	-3.62	27.128287	34.128287	32.028287	274.0401774	0.8901774	282.1603167	9.0103167
56.278	-3.58	27.169521	34.169521	32.069521	273.8876792	0.7376792	281.993865	8.843865
56.3	-4.06	26.674708	33.674708	31.574708	275.7346474	2.5846474	284.0109561	10.860956
56.323	-3.61	27.138595	34.138595	32.038595	274.002029	0.852029	282.1186761	8.9686761
56.345	-3.81	26.932423	33.932423	31.832423	274.768039	1.618039	282.9550072	9.8050072
56.368	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
56.39	-3.86	26.88088	33.88088	31.78088	274.9605475	1.8105475	283.1652548	10.015255
56.41	-3.55	27.200447	34.200447	32.100447	273.7734724	0.6234724	281.8692193	8.7192193
56.436	-3.79	26.953041	33.953041	31.853041	274.6911488	1.5411488	282.8710393	9.7210393
56.459	-3.69	27.056127	34.056127	31.956127	274.3076635	1.1576635	282.4523178	9.3023178
56.48	-4.11	26.623165	33.623165	31.523165	275.9291961	2.7791961	284.223568	11.073568
56.504	-3.99	26.746869	33.746869	31.646869	275.4629693	2.3129693	283.7140993	10.564099
56.527	-4.21	26.520079	33.520079	31.420079	276.3195322	3.1695322	284.6502283	11.500228
56.55	-4.08	26.654091	33.654091	31.554091	275.8124175	2.6624175	284.0959436	10.945944
56.572	-3.33	27.427236	34.427236	32.327236	272.9402985	-0.2097015	280.9601738	7.8101738
56.594	-3.28	27.478779	34.478779	32.378779	272.7519994	-0.3980006	280.7547963	7.6047963
56.617	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
56.64	-3.58	27.169521	34.169521	32.069521	273.8876792	0.7376792	281.993865	8.843865
56.685	-3.47	27.282916	34.282916	32.182916	273.469618	0.319618	281.5376373	8.3876373
56.708	-3.2	27.561248	34.561248	32.461248	272.4515298	-0.6984702	280.4271271	7.2771271
56.73	-3.48	27.272607	34.272607	32.172607	273.5075445	0.3575445	281.5790211	8.4290211
56.753	-3.36	27.39631	34.39631	32.29631	273.0534654	-0.0965346	281.0836168	7.9336168
56.776	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
56.798	-3.35	27.406619	34.406619	32.306619	273.0157275	-0.1342725	281.0424511	7.8924511
56.821	-3.41	27.344767	34.344767	32.244767	273.24239	0.09239	281.2897173	8.1397173
56.843	-3.38	27.375693	34.375693	32.275693	273.1289882	-0.0210118	281.1660026	8.0160026
56.866	-3.22	27.540631	34.540631	32.440631	272.5265541	-0.6234459	280.5089369	7.3589369
56.889	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
56.911	-3.42	27.334459	34.334459	32.234459	273.280222	0.130222	281.3309918	8.1809918

56.934	-3.39	27.365385	34.365385	32.265385	273.1667731	0.0167731	281.2072227	8.0572227
56.957	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
56.979	-3.22	27.540631	34.540631	32.440631	272.5265541	-0.6234459	280.5089369	7.3589369
57	-3.2	27.561248	34.561248	32.461248	272.4515298	-0.6984702	280.4271271	7.2771271
57.025	-3.39	27.365385	34.365385	32.265385	273.1667731	0.0167731	281.2072227	8.0572227
57.047	-3.74	27.004584	34.004584	31.904584	274.4992052	1.3492052	282.6614459	9.5114459
57.07	-3.49	27.262299	34.262299	32.162299	273.5454867	0.3954867	281.6204231	8.4704231
57.093	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
57.115	-3.79	26.953041	33.953041	31.853041	274.6911488	1.5411488	282.8710393	9.7210393
57.138	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
57.16	-3.63	27.117978	34.117978	32.017978	274.0783418	0.9283418	282.2019757	9.0519757
57.183	-3.62	27.128287	34.128287	32.028287	274.0401774	0.8901774	282.1603167	9.0103167
57.206	-3.16	27.602482	34.602482	32.502482	272.3016669	-0.8483331	280.2637222	7.1137222
57.228	-3.47	27.282916	34.282916	32.182916	273.469618	0.319618	281.5376373	8.3876373
57.251	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
57.274	-3.88	26.860263	33.860263	31.760263	275.0376642	1.8876642	283.2494851	10.099485
57.296	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
57.319	-3.93	26.80872	33.80872	31.70872	275.2307403	2.0807403	283.4603902	10.31039
57.342	-3.86	26.88088	33.88088	31.78088	274.9605475	1.8105475	283.1652548	10.015255
57.387	-4.26	26.468536	33.468536	31.368536	276.5153224	3.3653224	284.8642802	11.71428
57.409	-4.52	26.200513	33.200513	31.100513	277.5401838	4.3901838	285.9851875	12.835188
57.432	-3.83	26.911806	33.911806	31.811806	274.8449939	1.6949939	283.03905	9.88905
57.455	-4.54	26.179896	33.179896	31.079896	277.6194921	4.4694921	286.0719602	12.92196
57.477	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
57.5	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
57.46	-3.95	26.788103	33.788103	31.688103	275.3080847	2.1580847	283.5448843	10.394884
57.52	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
57.58	-3.93	26.80872	33.80872	31.70872	275.2307403	2.0807403	283.4603902	10.31039
57.63	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
57.7	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
57.75	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
57.81	-3.61	27.138595	34.138595	32.038595	274.002029	0.852029	282.1186761	8.9686761
57.87	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
57.93	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
57.99	-4.05	26.685017	33.685017	31.585017	275.695787	2.545787	283.9684909	10.818491
58.04	-4.1	26.633474	33.633474	31.533474	275.8902535	2.7402535	284.1810074	11.031007
58.1	-3.94	26.798412	33.798412	31.698412	275.2694044	2.1194044	283.5026278	10.352628
58.16	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
58.22	-4.15	26.581931	33.581931	31.481931	276.085132	2.935132	284.3940018	11.244002
58.28	-4.23	26.499462	33.499462	31.399462	276.3977984	3.2477984	284.7357911	11.585791
58.34	-4.21	26.520079	33.520079	31.420079	276.3195322	3.1695322	284.6502283	11.500228
58.39	-4.34	26.386068	33.386068	31.286068	276.8294543	3.6794543	285.20777	12.05777
58.45	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
58.51	-3.98	26.757177	33.757177	31.657177	275.4242236	2.2742236	283.6717672	10.521767
58.57	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
58.69	-3.95	26.788103	33.788103	31.688103	275.3080847	2.1580847	283.5448843	10.394884
58.75	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
58.8	-3.64	27.10767	34.10767	32.00767	274.1165222	0.9665222	282.2436532	9.0936532
58.86	-3.71	27.035509	34.035509	31.935509	274.3842321	1.2342321	282.5359133	9.3859133
58.92	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
58.98	-3.89	26.849955	33.849955	31.749955	275.0762469	1.9262469	283.2916285	10.141628
59.04	-3.89	26.849955	33.849955	31.749955	275.0762469	1.9262469	283.2916285	10.141628
59.1	-3.82	26.922115	33.922115	31.822115	274.8065084	1.6565084	282.9970193	9.8470193
59.16	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
59.21	-4.03	26.705634	33.705634	31.605634	275.6181155	2.4681155	283.8836177	10.733618
59.27	-3.65	27.097361	34.097361	31.997361	274.1547185	1.0047185	282.2853491	9.1353491
59.33	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
59.39	-3.67	27.076744	34.076744	31.976744	274.231159	1.081159	282.3687964	9.2187964
59.45	-3.53	27.221064	34.221064	32.121064	273.6974138	0.5474138	281.786214	8.636214
59.51	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
59.56	-3.62	27.128287	34.128287	32.028287	274.0401774	0.8901774	282.1603167	9.0103167
59.62	-3.66	27.087052	34.087052	31.987052	274.1929307	1.0429307	282.3270635	9.1770635
59.68	-3.79	26.953041	33.953041	31.853041	274.6911488	1.5411488	282.8710393	9.7210393

59.74	-3.97	26.767486	33.767486	31.667486	275.3854943	2.2354943	283.6294539	10.479454
59.8	-4.07	26.6644	33.6644	31.5644	275.7735243	2.6235243	284.0534403	10.90344
59.86	-4.19	26.540697	33.540697	31.440697	276.2413325	3.0913325	284.5647425	11.414742
59.92	-4.15	26.581931	33.581931	31.481931	276.085132	2.935132	284.3940018	11.244002
59.97	-3.9	26.839646	33.839646	31.739646	275.1148459	1.9648459	283.3337906	10.183791
60.03	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
60.09	-4.01	26.726251	33.726251	31.626251	275.5405096	2.3905096	283.7988205	10.648821
60.15	-3.98	26.757177	33.757177	31.657177	275.4242236	2.2742236	283.6717672	10.521767
60.21	-4.12	26.612857	33.612857	31.512857	275.9681553	2.8181553	284.2661477	11.116148
60.27	-4.22	26.509771	33.509771	31.409771	276.358657	3.208657	284.693	11.543
60.33	-3.87	26.870572	33.870572	31.770572	274.9990977	1.8490977	283.2073605	10.057361
60.38	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
60.44	-3.42	27.334459	34.334459	32.234459	273.280222	0.130222	281.3309918	8.1809918
60.5	-3.52	27.231373	34.231373	32.131373	273.6594083	0.5094083	281.7447388	8.5947388
60.56	-3.41	27.344767	34.344767	32.244767	273.24239	0.09239	281.2897173	8.1397173
60.62	-3.41	27.344767	34.344767	32.244767	273.24239	0.09239	281.2897173	8.1397173
60.68	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
60.74	-3.66	27.087052	34.087052	31.987052	274.1929307	1.0429307	282.3270635	9.1770635
60.8	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
60.67	-3.78	26.963349	33.963349	31.863349	274.6527279	1.5027279	282.8290833	9.6790833
61	-3.74	27.004584	34.004584	31.904584	274.4992052	1.3492052	282.6614459	9.5114459
61.32	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
61.64	-4.01	26.726251	33.726251	31.626251	275.5405096	2.3905096	283.7988205	10.648821
61.96	-3.89	26.849955	33.849955	31.749955	275.0762469	1.9262469	283.2916285	10.141628
62.05	-3.47	27.282916	34.282916	32.182916	273.469618	0.319618	281.5376373	8.3876373
62.28	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
62.6	-3.79	26.953041	33.953041	31.853041	274.6911488	1.5411488	282.8710393	9.7210393
62.92	-3.51	27.241681	34.241681	32.141681	273.6214186	0.4714186	281.703282	8.553282
63.24	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
63.56	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
63.88	-3.38	27.375693	34.375693	32.275693	273.1289882	-0.0210118	281.1660026	8.0160026
64.2	-3.52	27.231373	34.231373	32.131373	273.6594083	0.5094083	281.7447388	8.5947388
64.52	-3.95	26.788103	33.788103	31.688103	275.3080847	2.1580847	283.5448843	10.394884
64.84	-4.12	26.612857	33.612857	31.512857	275.9681553	2.8181553	284.2661477	11.116148
64.7	-3.24	27.520014	34.520014	32.420014	272.6016404	-0.5483596	280.5908182	7.4408182
65.3	-3.24	27.520014	34.520014	32.420014	272.6016404	-0.5483596	280.5908182	7.4408182
65.5	-3.12	27.643717	34.643717	32.543717	272.152051	-0.997949	280.1006025	6.9506025
65.9	-3.19	27.571557	34.571557	32.471557	272.4140409	-0.7359591	280.3862491	7.2362491
66.2	-3.11	27.654025	34.654025	32.554025	272.1146855	-1.0353145	280.0598671	6.9098671
66.5	-2.97	27.798346	34.798346	32.698346	271.5931799	-1.5568201	279.4914309	6.3414309
66.8	-3.43	27.32415	34.32415	32.22415	273.3180697	0.1680697	281.3722845	8.2222845
67.1	-3.17	27.592174	34.592174	32.492174	272.3391094	-0.8108906	280.3045466	7.1545466
67.3	-3.43	27.32415	34.32415	32.22415	273.3180697	0.1680697	281.3722845	8.2222845
67.6	-3.41	27.344767	34.344767	32.244767	273.24239	0.09239	281.2897173	8.1397173
67.9	-3.48	27.272607	34.272607	32.172607	273.5075445	0.3575445	281.5790211	8.4290211
68.2	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
68.5	-3.38	27.375693	34.375693	32.275693	273.1289882	-0.0210118	281.1660026	8.0160026
68.8	-3.46	27.293224	34.293224	32.193224	273.4317073	0.2817073	281.4962718	8.3462718
69.1	-3.32	27.437545	34.437545	32.337545	272.9026075	-0.2473925	280.9190623	7.7690623
69.4	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
69.7	-3.35	27.406619	34.406619	32.306619	273.0157275	-0.1342725	281.0424511	7.8924511
70	-3.39	27.365385	34.365385	32.265385	273.1667731	0.0167731	281.2072227	8.0572227
70.1	-3.23	27.530322	34.530322	32.430322	272.5640895	-0.5859105	280.5498686	7.3998686
70.2	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
70.3	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
70.4	-3.86	26.88088	33.88088	31.78088	274.9605475	1.8105475	283.1652548	10.015255
70.55	-4.19	26.540697	33.540697	31.440697	276.2413325	3.0913325	284.5647425	11.414742
70.7	-4.12	26.612857	33.612857	31.512857	275.9681553	2.8181553	284.2661477	11.116148
70.8	-3.81	26.932423	33.932423	31.832423	274.768039	1.618039	282.9550072	9.8050072
70.9	-3.78	26.963349	33.963349	31.863349	274.6527279	1.5027279	282.8290833	9.6790833
71	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
71.1	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
71.2	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146

71.3	-4.25	26.478845	33.478845	31.378845	276.4761311	3.3261311	284.8214312	11.671431
71.4	-4.17	26.561314	33.561314	31.461314	276.1631991	3.0131991	284.4793337	11.329334
71.5	-3.98	26.757177	33.757177	31.657177	275.4242236	2.2742236	283.6717672	10.521767
71.61	-3.63	27.117978	34.117978	32.017978	274.0783418	0.9283418	282.2019757	9.0519757
71.64	-3.23	27.530322	34.530322	32.430322	272.5640895	-0.5859105	280.5498686	7.3998686
71.675	-3.4	27.355076	34.355076	32.255076	273.2045737	0.0545737	281.2484609	8.0984609
71.71	-3.51	27.241681	34.241681	32.141681	273.6214186	0.4714186	281.703282	8.553282
71.74	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
71.775	-3.65	27.097361	34.097361	31.997361	274.1547185	1.0047185	282.2853491	9.1353491
71.81	-3.66	27.087052	34.087052	31.987052	274.1929307	1.0429307	282.3270635	9.1770635
71.84	-3.67	27.076744	34.076744	31.976744	274.231159	1.081159	282.3687964	9.2187964
71.87	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
71.91	-3.82	26.922115	33.922115	31.822115	274.8065084	1.6565084	282.9970193	9.8470193
71.94	-3.7	27.045818	34.045818	31.945818	274.3459398	1.1959398	282.4941063	9.3441063
71.97	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
72.01	-3.89	26.849955	33.849955	31.749955	275.0762469	1.9262469	283.2916285	10.141628
72.04	-4.28	26.447919	33.447919	31.347919	276.5937551	3.4437551	284.9500363	11.800036
72.07	-4.21	26.520079	33.520079	31.420079	276.3195322	3.1695322	284.6502283	11.500228
72.105	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
72.14	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
72.17	-4.31	26.416993	33.416993	31.316993	276.7115295	3.5615295	285.0788158	11.928816
72.2	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
72.237	-4.45	26.272673	33.272673	31.172673	277.263139	4.113139	285.6821037	12.532104
72.27	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
72.3	-4.6	26.118044	33.118044	31.018044	277.8578255	4.7078255	286.332753	13.182753
72.335	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
72.37	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
72.4	-4.47	26.252056	33.252056	31.152056	277.34221	4.19221	285.7686008	12.618601
72.435	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
72.56	-4.7	26.014958	33.014958	30.914958	278.2564156	5.1064156	286.7689972	13.618997
72.6	-4.82	25.891255	32.891255	30.791255	278.7369956	5.5869956	287.2951315	14.145132
72.63	-4.52	26.200513	33.200513	31.100513	277.5401838	4.3901838	285.9851875	12.835188
72.67	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
72.7	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
72.73	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
72.765	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
72.8	-3.66	27.087052	34.087052	31.987052	274.1929307	1.0429307	282.3270635	9.1770635
72.83	-3.64	27.10767	34.10767	32.00767	274.1165222	0.9665222	282.2436532	9.0936532
72.86	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
72.897	-3.49	27.262299	34.262299	32.162299	273.5454867	0.3954867	281.6204231	8.4704231
72.93	-3.72	27.025201	34.025201	31.925201	274.4225404	1.2725404	282.5777389	9.4277389
72.96	-3.82	26.922115	33.922115	31.822115	274.8065084	1.6565084	282.9970193	9.8470193
72.995	-4.06	26.674708	33.674708	31.574708	275.7346474	2.5846474	284.0109561	10.860956
73.03	-3.76	26.983966	33.983966	31.883966	274.5759344	1.4259344	282.7452273	9.5952273
73.06	-3.68	27.066435	34.066435	31.966435	274.2694033	1.1194033	282.4105478	9.2605478
73.095	-3.59	27.159213	34.159213	32.059213	273.9257799	0.7757799	282.0354503	8.8854503
73.13	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
73.16	-3.86	26.88088	33.88088	31.78088	274.9605475	1.8105475	283.1652548	10.015255
73.195	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
73.23	-4.03	26.705634	33.705634	31.605634	275.6181155	2.4681155	283.8836177	10.733618
73.26	-4.03	26.705634	33.705634	31.605634	275.6181155	2.4681155	283.8836177	10.733618
73.29	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
73.325	-3.96	26.777794	33.777794	31.677794	275.3467813	2.1967813	283.5871597	10.43716
73.36	-3.99	26.746869	33.746869	31.646869	275.4629693	2.3129693	283.7140993	10.564099
73.39	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
73.425	-4	26.73656	33.73656	31.63656	275.5017313	2.3517313	283.7564504	10.60645
73.46	-4.12	26.612857	33.612857	31.512857	275.9681553	2.8181553	284.2661477	11.116148
73.49	-3.74	27.004584	34.004584	31.904584	274.4992052	1.3492052	282.6614459	9.5114459
73.52	-3.96	26.777794	33.777794	31.677794	275.3467813	2.1967813	283.5871597	10.43716
73.555	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
73.59	-3.99	26.746869	33.746869	31.646869	275.4629693	2.3129693	283.7140993	10.564099
73.62	-4.22	26.509771	33.509771	31.409771	276.358657	3.208657	284.693	11.543
73.655	-4.12	26.612857	33.612857	31.512857	275.9681553	2.8181553	284.2661477	11.116148

73.69	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
73.72	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
73.755	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
73.79	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
73.82	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
73.85	-3.88	26.860263	33.860263	31.760263	275.0376642	1.8876642	283.2494851	10.099485
73.89	-3.97	26.767486	33.767486	31.667486	275.3854943	2.2354943	283.6294539	10.479454
73.92	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
73.95	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
73.985	-3.81	26.932423	33.932423	31.832423	274.768039	1.618039	282.9550072	9.8050072
74.02	-3.83	26.911806	33.911806	31.811806	274.8449939	1.6949939	283.03905	9.88905
74.05	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
74.085	-3.82	26.922115	33.922115	31.822115	274.8065084	1.6565084	282.9970193	9.8470193
74.12	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
74.15	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
74.18	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
74.22	-3.83	26.911806	33.911806	31.811806	274.8449939	1.6949939	283.03905	9.88905
74.25	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
74.28	-3.76	26.983966	33.983966	31.883966	274.5759344	1.4259344	282.7452273	9.5952273
74.32	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
74.35	-3.77	26.973658	33.973658	31.873658	274.6143231	1.4643231	282.787146	9.637146
74.38	-3.97	26.767486	33.767486	31.667486	275.3854943	2.2354943	283.6294539	10.479454
74.425	-3.99	26.746869	33.746869	31.646869	275.4629693	2.3129693	283.7140993	10.564099
74.45	-3.9	26.839646	33.839646	31.739646	275.1148459	1.9648459	283.3337906	10.183791
74.48	-4.22	26.509771	33.509771	31.409771	276.358657	3.208657	284.693	11.543
74.51	-4.14	26.59224	33.59224	31.49224	276.0461232	2.8961232	284.3513646	11.201365
74.545	-4.3	26.427302	33.427302	31.327302	276.6722546	3.5222546	285.0358699	11.88587
74.58	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
74.61	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
74.645	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
74.68	-4.33	26.396376	33.396376	31.296376	276.7901293	3.6401293	285.1647658	12.014766
74.71	-4.22	26.509771	33.509771	31.409771	276.358657	3.208657	284.693	11.543
74.745	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
74.9	-4.68	26.035575	33.035575	30.935575	278.1765604	5.0265604	286.6815888	13.531589
75	-4.66	26.056192	33.056192	30.956192	278.0967738	4.9467738	286.5942604	13.44426
75.3	-4.76	25.953106	32.953106	30.853106	278.4963946	5.3463946	287.0317027	13.881703
75.6	-4.65	26.066501	33.066501	30.966501	278.0569063	4.9069063	286.5506261	13.400626
75.8	-4.65	26.066501	33.066501	30.966501	278.0569063	4.9069063	286.5506261	13.400626
76.1	-4.52	26.200513	33.200513	31.100513	277.5401838	4.3901838	285.9851875	12.835188
76.4	-4.63	26.087118	33.087118	30.987118	277.9772227	4.8272227	286.4634172	13.313417
76.7	-4.52	26.200513	33.200513	31.100513	277.5401838	4.3901838	285.9851875	12.835188
76.9	-4.37	26.355142	33.355142	31.255142	276.9475301	3.7975301	285.3368994	12.186899
77.2	-4.24	26.489154	33.489154	31.389154	276.4369564	3.2869564	284.7786015	11.628601
77.5	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
77.8	-4.63	26.087118	33.087118	30.987118	277.9772227	4.8272227	286.4634172	13.313417
78.1	-4.58	26.138661	33.138661	31.038661	277.7783128	4.6283128	286.2457429	13.095743
78.3	-4.92	25.788169	32.788169	30.688169	279.1393867	5.9893867	287.735796	14.585796
78.6	-5.2	25.499528	32.499528	30.399528	280.2754205	7.1254205	288.9805273	15.830527
78.9	-4.98	25.726317	32.726317	30.626317	279.3816595	6.2316595	288.0011699	14.85117
79.2	-5.58	25.107801	32.107801	30.007801	281.8396027	8.6896027	290.6959372	17.545937
79.4	-5.66	25.025332	32.025332	29.925332	282.1722541	9.0222541	291.0609846	17.910985
79.7	-5.73	24.953172	31.953172	29.853172	282.4642923	9.3142923	291.3815317	18.231532
80	-5.81	24.870703	31.870703	29.770703	282.7991631	9.6491631	291.7491713	18.599171
80.4	-5.65	25.035641	32.035641	29.935641	282.1306082	8.9806082	291.0152784	17.865278
80.9	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
81.3	-5.41	25.283047	32.283047	30.183047	281.1366071	7.9866071	289.92475	16.77475
81.7	-5.54	25.149036	32.149036	30.049036	281.6737176	8.5237176	290.5139278	17.363928
82.2	-5.22	25.478911	32.478911	30.378911	280.3570975	7.2070975	289.070056	15.920056
82.6	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
83	-5	25.7057	32.7057	30.6057	279.4625574	6.3125574	288.0897912	14.939791
83.5	-5.14	25.56138	32.56138	30.46138	280.0308171	6.8808171	288.7124394	15.562439
83.9	-5.31	25.386133	32.386133	30.286133	280.7255296	7.5755296	289.4739676	16.323968
84.4	-5.34	25.355208	32.355208	30.255208	280.8486635	7.6986635	289.6089814	16.458981

84.8	-5.62	25.066567	32.066567	29.966567	282.0057813	8.8557813	290.8782891	17.728289
85.2	-5.25	25.447985	32.447985	30.347985	280.479747	7.329747	289.2045053	16.054505
85.7	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
86.1	-5.2	25.499528	32.499528	30.399528	280.2754205	7.1254205	288.9805273	15.830527
86.5	-5.15	25.551071	32.551071	30.451071	280.0715399	6.9215399	288.7570689	15.607069
87	-5.18	25.520145	32.520145	30.420145	280.1938148	7.0438148	288.8910817	15.741082
87.4	-5	25.7057	32.7057	30.6057	279.4625574	6.3125574	288.0897912	14.939791
87.8	-5.04	25.664466	32.664466	30.564466	279.6245642	6.4745642	288.2672795	15.11728
88.17	-4.26	26.468536	33.468536	31.368536	276.5153224	3.3653224	284.8642802	11.71428
88.33	-4.31	26.416993	33.416993	31.316993	276.7115295	3.5615295	285.0788158	11.928816
88.48	-4.42	26.303599	33.303599	31.203599	277.1446593	3.9946593	285.5525053	12.402505
88.64	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
88.869	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
88.8	-4.47	26.252056	33.252056	31.152056	277.34221	4.19221	285.7686008	12.618601
88.95	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
89.11	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
89.27	-4.06	26.674708	33.674708	31.574708	275.7346474	2.5846474	284.0109561	10.860956
89.43	-4.23	26.499462	33.499462	31.399462	276.3977984	3.2477984	284.7357911	11.585791
89.59	-4.39	26.334525	33.334525	31.234525	277.0263313	3.8763313	285.4230831	12.273083
89.74	-4.53	26.190204	33.190204	31.090204	277.5798294	4.4298294	286.028564	12.878564
89.9	-4.33	26.396376	33.396376	31.296376	276.7901293	3.6401293	285.1647658	12.014766
90.02	-4.47	26.252056	33.252056	31.152056	277.34221	4.19221	285.7686008	12.618601
90.53	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
90.69	-4.54	26.179896	33.179896	31.079896	277.6194921	4.4694921	286.0719602	12.92196
90.85	-4.4	26.324216	33.324216	31.224216	277.0657571	3.9157571	285.4662043	12.316204
91	-4.35	26.375759	33.375759	31.275759	276.8687962	3.7187962	285.2507936	12.100794
91.16	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
91.32	-4.31	26.416993	33.416993	31.316993	276.7115295	3.5615295	285.0788158	11.928816
91.48	-4.26	26.468536	33.468536	31.368536	276.5153224	3.3653224	284.8642802	11.71428
91.63	-4.36	26.36545	33.36545	31.26545	276.9081547	3.7581547	285.2938368	12.143837
91.79	-4.46	26.262364	33.262364	31.162364	277.3026661	4.1526661	285.7253424	12.575342
91.95	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
92.11	-4.28	26.447919	33.447919	31.347919	276.5937551	3.4437551	284.9500363	11.800036
92.26	-4.12	26.612857	33.612857	31.512857	275.9681553	2.8181553	284.2661477	11.116148
92.42	-4.3	26.427302	33.427302	31.327302	276.6722546	3.5222546	285.0358699	11.88587
92.58	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
92.73	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
92.89	-4.5	26.22113	33.22113	31.12113	277.4609434	4.3109434	285.8984937	12.748494
93.05	-4.51	26.210821	33.210821	31.110821	277.5005551	4.3505551	285.9418308	12.791831
93.36	-4.35	26.375759	33.375759	31.275759	276.8687962	3.7187962	285.2507936	12.100794
93.52	-4.36	26.36545	33.36545	31.26545	276.9081547	3.7581547	285.2938368	12.143837
93.68	-4.19	26.540697	33.540697	31.440697	276.2413325	3.0913325	284.5647425	11.414742
93.83	-4.08	26.654091	33.654091	31.554091	275.8124175	2.6624175	284.0959436	10.945944
93.99	-4.07	26.6644	33.6644	31.5644	275.7735243	2.6235243	284.0534403	10.90344
94.15	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
94.31	-4.05	26.685017	33.685017	31.585017	275.695787	2.545787	283.9684909	10.818491
94.46	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
94.62	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
94.78	-4.21	26.520079	33.520079	31.420079	276.3195322	3.1695322	284.6502283	11.500228
94.94	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
95.09	-4.29	26.437611	33.437611	31.337611	276.6329965	3.4829965	284.9929434	11.842943
95.25	-4.37	26.355142	33.355142	31.255142	276.9475301	3.7975301	285.3368994	12.186899
95.4	-4.44	26.282982	33.282982	31.182982	277.2236289	4.0736289	285.6388847	12.488885
95.56	-4.54	26.179896	33.179896	31.079896	277.6194921	4.4694921	286.0719602	12.92196
95.72	-4.32	26.406685	33.406685	31.306685	276.750821	3.600821	285.1217811	11.971781
95.88	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
96.1	-4.16	26.571622	33.571622	31.471622	276.1241572	2.9741572	284.4366581	11.286658
96.4	-4.28	26.447919	33.447919	31.347919	276.5937551	3.4437551	284.9500363	11.800036
96.8	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
97.1	-4.15	26.581931	33.581931	31.481931	276.085132	2.935132	284.3940018	11.244002
97.5	-4.29	26.437611	33.437611	31.337611	276.6329965	3.4829965	284.9929434	11.842943
97.9	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
98.2	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685

98.6	-4.1	26.633474	33.633474	31.533474	275.8902535	2.7402535	284.1810074	11.031007
98.9	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
99.3	-4.23	26.499462	33.499462	31.399462	276.3977984	3.2477984	284.7357911	11.585791
99.6	-4.24	26.489154	33.489154	31.389154	276.4369564	3.2869564	284.7786015	11.628601
100	-4.14	26.59224	33.59224	31.49224	276.0461232	2.8961232	284.3513646	11.201365
100.09	-4.1	26.633474	33.633474	31.533474	275.8902535	2.7402535	284.1810074	11.031007
100.18	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
100.21	-5.5	25.19027	32.19027	30.09027	281.5081251	8.3581251	290.3322599	17.18226
100.34	-5.57	25.11811	32.11811	30.01811	281.798104	8.648104	290.6504028	17.500403
100.46	-4.73	25.984032	32.984032	30.884032	278.3763275	5.2263275	286.9002597	13.75026
100.59	-4.51	26.210821	33.210821	31.110821	277.5005551	4.3505551	285.9418308	12.791831
100.72	-4.75	25.963415	32.963415	30.863415	278.456355	5.306355	286.9878683	13.837868
100.84	-4.9	25.808786	32.808786	30.708786	279.0587691	5.9087691	287.6475009	14.497501
100.97	-5.48	25.210887	32.210887	30.110887	281.4254383	8.2754383	290.2415536	17.091554
101.1	-5.73	24.953172	31.953172	29.853172	282.4642923	9.3142923	291.3815317	18.231532
101.22	-5.49	25.200579	32.200579	30.100579	281.4667726	8.3167726	290.2868961	17.136896
101.35	-5.65	25.035641	32.035641	29.935641	282.1306082	8.9806082	291.0152784	17.865278
101.48	-5.78	24.901629	31.901629	29.801629	282.673447	9.523447	291.6111434	18.461143
101.6	-5.93	24.747	31.747	29.647	283.30371	10.15371	292.3032492	19.153249
101.73	-6.23	24.437742	31.437742	29.337742	284.5769877	11.426988	293.7023744	20.552374
101.86	-5.71	24.973789	31.973789	29.873789	282.3807603	9.2307603	291.2898387	18.139839
101.98	-5.79	24.891321	31.891321	29.791321	282.7153338	9.5653338	291.6571309	18.507131
102.11	-5.41	25.283047	32.283047	30.183047	281.1366071	7.9866071	289.92475	16.77475
102.24	-5.33	25.365516	32.365516	30.265516	280.8076009	7.6576009	289.5639558	16.413956
102.36	-5.44	25.252122	32.252122	30.152122	281.260283	8.110283	290.0603959	16.910396
102.49	-5.37	25.324282	32.324282	30.224282	280.9719595	7.8219595	289.7441844	16.594184
102.62	-5.69	24.994407	31.994407	29.894407	282.2973024	9.1473024	291.1982323	18.048232
102.74	-5.49	25.200579	32.200579	30.100579	281.4667726	8.3167726	290.2868961	17.136896
102.87	-6.01	24.664531	31.664531	29.564531	283.6415788	10.491579	292.6743931	19.524393
103	-6	24.67484	31.67484	29.57484	283.5992791	10.449279	292.6279228	19.477923
103.12	-5.43	25.26243	32.26243	30.16243	281.2190396	8.0690396	290.0151594	16.865159
103.25	-5.32	25.375825	32.375825	30.275825	280.7665562	7.6165562	289.5189512	16.368951
103.38	-5.5	25.19027	32.19027	30.09027	281.5081251	8.3581251	290.3322599	17.18226
103.5	-5.47	25.221196	32.221196	30.121196	281.3841222	8.2341222	290.1962324	17.046232
103.63	-4.82	25.891255	32.891255	30.791255	278.7369956	5.5869956	287.2951315	14.145132
103.76	-5.02	25.685083	32.685083	30.585083	279.5435256	6.3935256	288.1784944	15.028494
103.89	-4.84	25.870638	32.870638	30.770638	278.8173346	5.6673346	287.3831024	14.233102
104.16	-4.7	26.014958	33.014958	30.914958	278.2564156	5.1064156	286.7689972	13.618997
104.42	-4.71	26.004649	33.004649	30.904649	278.296369	5.146369	286.8127313	13.662731
104.69	-4.88	25.829403	32.829403	30.729403	278.9782213	5.8282213	287.559287	14.409287
104.95	-4.9	25.808786	32.808786	30.708786	279.0587691	5.9087691	287.6475009	14.497501
105.22	-4.62	26.097427	33.097427	30.997427	277.9374065	4.7874065	286.4198426	13.269843
105.48	-4.2	26.530388	33.530388	31.430388	276.280424	3.130424	284.6074757	11.457476
105.74	-5.19	25.509837	32.509837	30.409837	280.2346087	7.0846087	288.9357941	15.785794
106	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
106.27	-6.44	24.221262	31.221262	29.121262	285.4785663	12.328566	294.6938026	21.543803
106.54	-6.95	23.695523	30.695523	28.595523	287.7042916	14.554292	297.1439841	23.993984
106.8	-6.99	23.654289	30.654289	28.554289	287.8810679	14.731068	297.3387499	24.18875
107.06	-5.92	24.757309	31.757309	29.657309	283.2615613	10.111561	292.2569554	19.106955
107.33	-6.15	24.520211	31.520211	29.420211	284.2357692	11.085769	293.3273109	20.177311
107.59	-5.51	25.179961	32.179961	30.079961	281.5494959	8.3994959	290.3776449	17.227645
107.86	-5.51	25.179961	32.179961	30.079961	281.5494959	8.3994959	290.3776449	17.227645
108.12	-5.43	25.26243	32.26243	30.16243	281.2190396	8.0690396	290.0151594	16.865159
108.39	-5.16	25.540762	32.540762	30.440762	280.1122804	6.9622804	288.8017191	15.651719
108.65	-5.31	25.386133	32.386133	30.286133	280.7255296	7.5755296	289.4739676	16.323968
108.91	-4.91	25.798477	32.798477	30.698477	279.0990692	5.9490692	287.6916383	14.541638
109.18	-4.66	26.056192	33.056192	30.956192	278.0967738	4.9467738	286.5942604	13.44426
109.44	-4.45	26.272673	33.272673	31.172673	277.263139	4.113139	285.6821037	12.532104
109.92	-4.71	26.004649	33.004649	30.904649	278.296369	5.146369	286.8127313	13.662731
110.5	-4.74	25.973724	32.973724	30.873724	278.4163327	5.2663327	286.944054	13.794054
111.08	-4.84	25.870638	32.870638	30.770638	278.8173346	5.6673346	287.3831024	14.233102
111.67	-4.82	25.891255	32.891255	30.791255	278.7369956	5.5869956	287.2951315	14.145132
112.65	-4.58	26.138661	33.138661	31.038661	277.7783128	4.6283128	286.2457429	13.095743

112.83	-4.56	26.159278	33.159278	31.059278	277.6988684	4.5488684	286.158812	13.008812
113.42	-4.71	26.004649	33.004649	30.904649	278.296369	5.146369	286.8127313	13.662731
114.14	-4.66	26.056192	33.056192	30.956192	278.0967738	4.9467738	286.5942604	13.44426
114.2	-4.63	26.087118	33.087118	30.987118	277.9772227	4.8272227	286.4634172	13.313417
114.26	-4.87	25.839712	32.839712	30.739712	278.9379735	5.7879735	287.5152105	14.36521
114.31	-4.82	25.891255	32.891255	30.791255	278.7369956	5.5869956	287.2951315	14.145132
114.37	-4.71	26.004649	33.004649	30.904649	278.296369	5.146369	286.8127313	13.662731
114.43	-4.95	25.757243	32.757243	30.657243	279.2604443	6.1104443	287.8683912	14.718391
114.55	-4.93	25.77786	32.77786	30.67786	279.1797218	6.0297218	287.779974	14.629974
114.61	-4.7	26.014958	33.014958	30.914958	278.2564156	5.1064156	286.7689972	13.618997
114.66	-4.68	26.035575	33.035575	30.935575	278.1765604	5.0265604	286.6815888	13.531589
114.72	-4.88	25.829403	32.829403	30.729403	278.9782213	5.8282213	287.559287	14.409287
114.78	-4.76	25.953106	32.953106	30.853106	278.4963946	5.3463946	287.0317027	13.881703
114.84	-4.78	25.932489	32.932489	30.832489	278.5765257	5.4265257	287.1194318	13.969432
114.9	-4.85	25.860329	32.860329	30.760329	278.8575302	5.7075302	287.4271182	14.277118
114.96	-4.87	25.839712	32.839712	30.739712	278.9379735	5.7879735	287.5152105	14.36521
115.01	-4.97	25.736626	32.736626	30.636626	279.3412369	6.1912369	287.95689	14.80689
115.07	-5.09	25.612923	32.612923	30.512923	279.8274695	6.6774695	288.4896019	15.339602
115.13	-4.81	25.901563	32.901563	30.801563	278.6968521	5.5468521	287.2511763	14.101176
115.19	-5.01	25.695391	32.695391	30.595391	279.5030327	6.3530327	288.1341326	14.984133
115.25	-4.8	25.911872	32.911872	30.811872	278.656726	5.506726	287.2072413	14.057241
115.31	-4.95	25.757243	32.757243	30.657243	279.2604443	6.1104443	287.8683912	14.718391
115.36	-5.14	25.56138	32.56138	30.46138	280.0308171	6.8808171	288.7124394	15.562439
115.42	-5.05	25.654157	32.654157	30.554157	279.66511	6.51511	288.3117029	15.161703
115.48	-5.17	25.530454	32.530454	30.430454	280.1530387	7.0030387	288.8463901	15.69639
115.54	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
115.6	-5.04	25.664466	32.664466	30.564466	279.6245642	6.4745642	288.2672795	15.11728
115.67	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
115.71	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
115.77	-4.9	25.808786	32.808786	30.708786	279.0587691	5.9087691	287.6475009	14.497501
115.83	-5.08	25.623231	32.623231	30.523231	279.7868531	6.6368531	288.4450962	15.295096
115.89	-4.99	25.716009	32.716009	30.616009	279.4220997	6.2720997	288.0454704	14.89547
115.95	-5.03	25.674774	32.674774	30.574774	279.5840361	6.4340361	288.2228767	15.072877
116	-4.89	25.819095	32.819095	30.719095	279.0184865	5.8684865	287.6033838	14.453384
116.06	-4.89	25.819095	32.819095	30.719095	279.0184865	5.8684865	287.6033838	14.453384
116.12	-4.5	26.22113	33.22113	31.12113	277.4609434	4.3109434	285.8984937	12.748494
116.18	-4.85	25.860329	32.860329	30.760329	278.8575302	5.7075302	287.4271182	14.277118
116.24	-4.89	25.819095	32.819095	30.719095	279.0184865	5.8684865	287.6033838	14.453384
116.3	-4.91	25.798477	32.798477	30.698477	279.0990692	5.9490692	287.6916383	14.541638
116.35	-5	25.7057	32.7057	30.6057	279.4625574	6.3125574	288.0897912	14.939791
116.41	-5.13	25.571688	32.571688	30.471688	279.9901121	6.8401121	288.6678306	15.517831
116.47	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
116.53	-4.98	25.726317	32.726317	30.626317	279.3816595	6.2316595	288.0011699	14.85117
116.59	-5.17	25.530454	32.530454	30.430454	280.1530387	7.0030387	288.8463901	15.69639
116.65	-5.19	25.509837	32.509837	30.409837	280.2346087	7.0846087	288.9357941	15.785794
116.7	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
116.76	-5.07	25.63354	32.63354	30.53354	279.7462544	6.5962544	288.4006112	15.250611
116.82	-5.07	25.63354	32.63354	30.53354	279.7462544	6.5962544	288.4006112	15.250611
116.88	-5.15	25.551071	32.551071	30.451071	280.0715399	6.9215399	288.7570689	15.607069
116.94	-5.14	25.56138	32.56138	30.46138	280.0308171	6.8808171	288.7124394	15.562439
117	-5.24	25.458294	32.458294	30.358294	280.4388459	7.2888459	289.159668	16.009668
117.05	-5.2	25.499528	32.499528	30.399528	280.2754205	7.1254205	288.9805273	15.830527
117.11	-5.21	25.489219	32.489219	30.389219	280.31625	7.16625	289.0252813	15.875281
117.17	-5.15	25.551071	32.551071	30.451071	280.0715399	6.9215399	288.7570689	15.607069
117.23	-5.13	25.571688	32.571688	30.471688	279.9901121	6.8401121	288.6678306	15.517831
117.29	-5.2	25.499528	32.499528	30.399528	280.2754205	7.1254205	288.9805273	15.830527
117.35	-5.11	25.592305	32.592305	30.492305	279.9087554	6.7587554	288.578675	15.428675
117.4	-5.23	25.468602	32.468602	30.368602	280.3979627	7.2479627	289.1148516	15.964852
117.46	-5.25	25.447985	32.447985	30.347985	280.479747	7.329747	289.2045053	16.054505
117.52	-5.24	25.458294	32.458294	30.358294	280.4388459	7.2888459	289.159668	16.009668
117.58	-5.15	25.551071	32.551071	30.451071	280.0715399	6.9215399	288.7570689	15.607069
117.64	-5.13	25.571688	32.571688	30.471688	279.9901121	6.8401121	288.6678306	15.517831
117.7	-5.22	25.478911	32.478911	30.378911	280.3570975	7.2070975	289.070056	15.920056

117.74	-5.21	25.489219	32.489219	30.389219	280.31625	7.16625	289.0252813	15.875281
117.81	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
117.87	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
117.93	-5.35	25.344899	32.344899	30.244899	280.8897441	7.7397441	289.6540281	16.504028
117.99	-5.34	25.355208	32.355208	30.255208	280.8486635	7.6986635	289.6089814	16.458981
118.05	-5.32	25.375825	32.375825	30.275825	280.7665562	7.6165562	289.5189512	16.368951
118.1	-5.21	25.489219	32.489219	30.389219	280.31625	7.16625	289.0252813	15.875281
118.17	-5.04	25.664466	32.664466	30.564466	279.6245642	6.4745642	288.2672795	15.11728
118.22	-5.17	25.530454	32.530454	30.430454	280.1530387	7.0030387	288.8463901	15.69639
118.28	-5.37	25.324282	32.324282	30.224282	280.9719595	7.8219595	289.7441844	16.594184
118.34	-5.46	25.231504	32.231504	30.131504	281.3428243	8.1928243	290.1509324	17.000932
118.4	-5.4	25.293356	32.293356	30.193356	281.0954181	7.9454181	289.8795769	16.729577
118.45	-5.42	25.272739	32.272739	30.172739	281.1778143	8.0278143	289.9699441	16.819944
118.51	-5.39	25.303665	32.303665	30.203665	281.0542472	7.9042472	289.834425	16.684425
118.57	-5.23	25.468602	32.468602	30.368602	280.3979627	7.2479627	289.1148516	15.964852
118.63	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
118.69	-5.14	25.56138	32.56138	30.46138	280.0308171	6.8808171	288.7124394	15.562439
118.75	-4.99	25.716009	32.716009	30.616009	279.4220997	6.2720997	288.0454704	14.89547
119.5	-7	23.64398	30.64398	28.54398	287.9253129	14.775313	297.3875012	24.237501
120	-7.01	23.633671	30.633671	28.533671	287.9695783	14.819578	297.4362765	24.286276
120.5	-7.8	22.819292	29.819292	27.719292	291.5323987	18.382399	301.3670422	28.217042
120.97	-7.63	22.994538	29.994538	27.894538	290.754553	17.604553	300.5080265	27.358027
121.6	-8.04	22.571886	29.571886	27.471886	292.6412388	19.491239	302.5924085	29.442409
122.3	-8.15	22.458491	29.458491	27.358491	293.1537032	20.003703	303.1590525	30.009052
122.9	-7.96	22.654354	29.654354	27.554354	292.2702208	19.120221	302.1822938	29.032294
123.5	-8.3	22.303862	29.303862	27.203862	293.8568771	20.706877	303.9369041	30.786904
124.2	-8.24	22.365714	29.365714	27.265714	293.5750008	20.425001	303.6250455	30.475046
124.8	-8.34	22.262628	29.262628	27.162628	294.0452463	20.895246	304.1453444	30.995344
125.5	-8.29	22.314171	29.314171	27.214171	293.8098413	20.659841	303.8848609	30.734861
126.1	-8.29	22.314171	29.314171	27.214171	293.8098413	20.659841	303.8848609	30.734861
126.7	-8.25	22.355405	29.355405	27.255405	293.6219239	20.471924	303.6769553	30.526955
127.4	-7.85	22.767749	29.767749	27.667749	291.7623676	18.612368	301.6210992	28.471099
128	-7.64	22.98423	29.98423	27.88423	290.8001364	17.650136	300.5583536	27.408354
128	-7.21	23.427499	30.427499	28.327499	288.8591964	15.709196	298.4168501	25.26685
128.06	-7.55	23.077007	30.077007	27.977007	290.390656	17.240656	300.1063175	26.956317

Peqiin Cave δ^{18}O to Temperature Conversion

Age (Ka BP)	δ^{18}O	δ^{18}O (SMOW)	δc-δw δw = -7	δc-δw δw = -4.9	O'Neil Formula δw = -7	Kelvin to Celsius	O'Neil Formula δw = -4.9	Kelvin to Celsius
31.53	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
32.78	-3.97	26.767486	33.767486	31.667486	275.3854943	2.2354943	283.6294539	10.479454
34	-3.75	26.994275	33.994275	31.894275	274.5375618	1.3875618	282.7033273	9.5533273
34.5	-3.85	26.891189	33.891189	31.791189	274.9220134	1.7720134	283.1231678	9.9731678
35	-4.09	26.643783	33.643783	31.543783	275.8513273	2.7013273	284.1384659	10.988466
35.25	-3.45	27.303533	34.303533	32.203533	273.3938123	0.2438123	281.4549245	8.3049245
35.5	-3.97	26.767486	33.767486	31.667486	275.3854943	2.2354943	283.6294539	10.479454
35.75	-4.1	26.633474	33.633474	31.533474	275.8902535	2.7402535	284.1810074	11.031007
36	-4.1	26.633474	33.633474	31.533474	275.8902535	2.7402535	284.1810074	11.031007
37	-4.89	25.819095	32.819095	30.719095	279.0184865	5.8684865	287.6033838	14.453384
38	-4.16	26.571622	33.571622	31.471622	276.1241572	2.9741572	284.4366581	11.286658
39	-4.15	26.581931	33.581931	31.481931	276.085132	2.935132	284.3940018	11.244002
40	-4.29	26.437611	33.437611	31.337611	276.6329965	3.4829965	284.9929434	11.842943
41	-4.31	26.416993	33.416993	31.316993	276.7115295	3.5615295	285.0788158	11.928816
42	-4.25	26.478845	33.478845	31.378845	276.4761311	3.3261311	284.8214312	11.671431

43	-4.32	26.406685	33.406685	31.306685	276.750821	3.600821	285.1217811	11.971781
44	-4.07	26.6644	33.6644	31.5644	275.7735243	2.6235243	284.0534403	10.90344
44.63	-4.4	26.324216	33.324216	31.224216	277.0657571	3.9157571	285.4662043	12.316204
44.7	-4.58	26.138661	33.138661	31.038661	277.7783128	4.6283128	286.2457429	13.095743
44.75	-4.81	25.901563	32.901563	30.801563	278.6968521	5.5468521	287.2511763	14.101176
44.8	-5.37	25.324282	32.324282	30.224282	280.9719595	7.8219595	289.7441844	16.594184
44.85	-4.42	26.303599	33.303599	31.203599	277.1446593	3.9946593	285.5525053	12.402505
44.93	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
45	-4.76	25.953106	32.953106	30.853106	278.4963946	5.3463946	287.0317027	13.881703
45.08	-4.39	26.334525	33.334525	31.234525	277.0263313	3.8763313	285.4230831	12.273083
45.15	-4.15	26.581931	33.581931	31.481931	276.085132	2.935132	284.3940018	11.244002
45.23	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
45.3	-3.91	26.829337	33.829337	31.729337	275.1534611	2.0034611	283.3759716	10.225972
45.38	-3.89	26.849955	33.849955	31.749955	275.0762469	1.9262469	283.2916285	10.141628
45.45	-3.6	27.148904	34.148904	32.048904	273.9638965	0.8138965	282.077054	8.927054
45.53	-4.05	26.685017	33.685017	31.585017	275.695787	2.545787	283.9684909	10.818491
45.6	-3.99	26.746869	33.746869	31.646869	275.4629693	2.3129693	283.7140993	10.564099
45.68	-3.78	26.963349	33.963349	31.863349	274.6527279	1.5027279	282.8290833	9.6790833
45.75	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
45.83	-4.02	26.715943	33.715943	31.615943	275.5793044	2.4293044	283.8412096	10.69121
45.9	-3.57	27.17983	34.17983	32.07983	273.8495943	0.6995943	281.9522981	8.8022981
46.13	-3.55	27.200447	34.200447	32.100447	273.7734724	0.6234724	281.8692193	8.7192193
46.5	-3.84	26.901498	33.901498	31.801498	274.8834955	1.7334955	283.0810995	9.9310995
47	-3.88	26.860263	33.860263	31.760263	275.0376642	1.8876642	283.2494851	10.099485
47.5	-3.63	27.117978	34.117978	32.017978	274.0783418	0.9283418	282.2019757	9.0519757
48	-3.54	27.210756	34.210756	32.110756	273.7354352	0.5854352	281.8277075	8.6777075
48.5	-3.83	26.911806	33.911806	31.811806	274.8449939	1.6949939	283.03905	9.88905
49	-3.56	27.190138	34.190138	32.090138	273.8115254	0.6615254	281.9107495	8.7607495
49.3	-3.82	26.922115	33.922115	31.822115	274.8065084	1.6565084	282.9970193	9.8470193
49.9	-3.76	26.983966	33.983966	31.883966	274.5759344	1.4259344	282.7452273	9.5952273
50.4	-3.62	27.128287	34.128287	32.028287	274.0401774	0.8901774	282.1603167	9.0103167
51.2	-4.24	26.489154	33.489154	31.389154	276.4369564	3.2869564	284.7786015	11.628601
52	-4.64	26.07681	33.07681	30.97681	278.0170559	4.8670559	286.5070117	13.357012
52.5	-5.05	25.654157	32.654157	30.554157	279.66511	6.51511	288.3117029	15.161703
53	-4.81	25.901563	32.901563	30.801563	278.6968521	5.5468521	287.2511763	14.101176
53.5	-4.62	26.097427	33.097427	30.997427	277.9374065	4.7874065	286.4198426	13.269843
54	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
54.6	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
55.1	-4.25	26.478845	33.478845	31.378845	276.4761311	3.3261311	284.8214312	11.671431
55.8	-4.38	26.344833	33.344833	31.244833	276.9869223	3.8369223	285.3799815	12.229981
56.2	-4.43	26.29329	33.29329	31.19329	277.1841357	4.0341357	285.5956852	12.445685
56.8	-4.46	26.262364	33.262364	31.162364	277.3026661	4.1526661	285.7253424	12.575342
57.3	-4.48	26.241747	33.241747	31.141747	277.3817709	4.2317709	285.8118787	12.661879
57.8	-4.5	26.22113	33.22113	31.12113	277.4609434	4.3109434	285.8984937	12.748494
58.3	-3.96	26.777794	33.777794	31.677794	275.3467813	2.1967813	283.5871597	10.43716
58.9	-4.36	26.36545	33.36545	31.26545	276.9081547	3.7581547	285.2938368	12.143837
59.4	-4.25	26.478845	33.478845	31.378845	276.4761311	3.3261311	284.8214312	11.671431
59.9	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
60.4	-3.65	27.097361	34.097361	31.997361	274.1547185	1.0047185	282.2853491	9.1353491
61	-4.1	26.633474	33.633474	31.533474	275.8902535	2.7402535	284.1810074	11.031007
61.5	-4.18	26.551005	33.551005	31.451005	276.2022575	3.0522575	284.5220285	11.372028
62	-4.19	26.540697	33.540697	31.440697	276.2413325	3.0913325	284.5647425	11.414742
62.5	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
63	-4.47	26.252056	33.252056	31.152056	277.34221	4.19221	285.7686008	12.618601
63.6	-4.88	25.829403	32.829403	30.729403	278.9782213	5.8282213	287.559287	14.409287
64.1	-3.97	26.767486	33.767486	31.667486	275.3854943	2.2354943	283.6294539	10.479454
64.7	-4.27	26.458228	33.458228	31.358228	276.5545304	3.4045304	284.9071486	11.757149
65.2	-4.05	26.685017	33.685017	31.585017	275.695787	2.545787	283.9684909	10.818491
65.6	-4.13	26.602548	33.602548	31.502548	276.007131	2.857131	284.3087466	11.158747
65.8	-4.23	26.499462	33.499462	31.399462	276.3977984	3.2477984	284.7357911	11.585791
66	-4.36	26.36545	33.36545	31.26545	276.9081547	3.7581547	285.2938368	12.143837
66.3	-4.4	26.324216	33.324216	31.224216	277.0657571	3.9157571	285.4662043	12.316204
66.5	-4.5	26.22113	33.22113	31.12113	277.4609434	4.3109434	285.8984937	12.748494
66.7	-4.65	26.066501	33.066501	30.966501	278.0569063	4.9069063	286.5506261	13.400626
67	-4.95	25.757243	32.757243	30.657243	279.2604443	6.1104443	287.8683912	14.718391

67.2	-4.46	26.262364	33.262364	31.162364	277.3026661	4.1526661	285.7253424	12.575342
67.4	-4.35	26.375759	33.375759	31.275759	276.8687962	3.7187962	285.2507936	12.100794
67.7	-4.42	26.303599	33.303599	31.203599	277.1446593	3.9946593	285.5525053	12.402505
67.9	-4.42	26.303599	33.303599	31.203599	277.1446593	3.9946593	285.5525053	12.402505
68.1	-3.61	27.138595	34.138595	32.038595	274.002029	0.852029	282.1186761	8.9686761
68.4	-4.22	26.509771	33.509771	31.409771	276.358657	3.208657	284.693	11.543
68.6	-4.14	26.59224	33.59224	31.49224	276.0461232	2.8961232	284.3513646	11.201365
68.8	-4.33	26.396376	33.396376	31.296376	276.7901293	3.6401293	285.1647658	12.014766
69.1	-4.53	26.190204	33.190204	31.090204	277.5798294	4.4298294	286.028564	12.878564
69.3	-4.56	26.159278	33.159278	31.059278	277.6988684	4.5488684	286.158812	13.008812
69.6	-3.92	26.819029	33.819029	31.719029	275.1920926	2.0420926	283.4181715	10.268172
69.8	-4.46	26.262364	33.262364	31.162364	277.3026661	4.1526661	285.7253424	12.575342
70	-4.29	26.437611	33.437611	31.337611	276.6329965	3.4829965	284.9929434	11.842943
70.3	-4.53	26.190204	33.190204	31.090204	277.5798294	4.4298294	286.028564	12.878564
70.5	-4.86	25.85002	32.85002	30.75002	278.8977431	5.7477431	287.4711542	14.321154
70.7	-4.45	26.272673	33.272673	31.172673	277.263139	4.113139	285.6821037	12.532104
71	-4.3	26.427302	33.427302	31.327302	276.6722546	3.5222546	285.0358699	11.88587
71.2	-4.68	26.035575	33.035575	30.935575	278.1765604	5.0265604	286.6815888	13.531589
71.6	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
71.9	-4.88	25.829403	32.829403	30.729403	278.9782213	5.8282213	287.559287	14.409287
72.1	-4.91	25.798477	32.798477	30.698477	279.0990692	5.9490692	287.6916383	14.541638
72.4	-4.85	25.860329	32.860329	30.760329	278.8575302	5.7075302	287.4271182	14.277118
72.6	-4.62	26.097427	33.097427	30.997427	277.9374065	4.7874065	286.4198426	13.269843
72.8	-4.66	26.056192	33.056192	30.956192	278.0967738	4.9467738	286.5942604	13.44426
73	-4.68	26.035575	33.035575	30.935575	278.1765604	5.0265604	286.6815888	13.531589
73.3	-4.73	25.984032	32.984032	30.884032	278.3763275	5.2263275	286.9002597	13.75026
73.5	-4.72	25.994341	32.994341	30.894341	278.3363397	5.1863397	286.8564855	13.706486
73.8	-4.78	25.932489	32.932489	30.832489	278.5765257	5.4265257	287.1194318	13.969432
74	-4.53	26.190204	33.190204	31.090204	277.5798294	4.4298294	286.028564	12.878564
74.2	-4.79	25.922181	32.922181	30.822181	278.6166172	5.4666172	287.1633265	14.013326
74.5	-5	25.7057	32.7057	30.6057	279.4625574	6.3125574	288.0897912	14.939791
74.7	-5.06	25.643848	32.643848	30.543848	279.7056734	6.5556734	288.3561468	15.206147
74.9	-4.91	25.798477	32.798477	30.698477	279.0990692	5.9490692	287.6916383	14.541638
75.2	-5.22	25.478911	32.478911	30.378911	280.3570975	7.2070975	289.070056	15.920056
75.4	-5.21	25.489219	32.489219	30.389219	280.31625	7.16625	289.0252813	15.875281
75.6	-5.26	25.437676	32.437676	30.337676	280.5206659	7.3706659	289.2493634	16.099363
75.9	-5.2	25.499528	32.499528	30.399528	280.2754205	7.1254205	288.9805273	15.830527
76.1	-4.52	26.200513	33.200513	31.100513	277.5401838	4.3901838	285.9851875	12.835188
76.6	-4.61	26.107735	33.107735	31.007735	277.8976075	4.7476075	286.3762879	13.226288
76.9	-4.65	26.066501	33.066501	30.966501	278.0569063	4.9069063	286.5506261	13.400626
77.2	-5.26	25.437676	32.437676	30.337676	280.5206659	7.3706659	289.2493634	16.099363
77.6	-5.26	25.437676	32.437676	30.337676	280.5206659	7.3706659	289.2493634	16.099363
77.9	-5.29	25.406751	32.406751	30.306751	280.6435303	7.4935303	289.3840631	16.234063
78.2	-5.52	25.169653	32.169653	30.069653	281.5908849	8.4408849	290.4230512	17.273051
78.5	-5.52	25.169653	32.169653	30.069653	281.5908849	8.4408849	290.4230512	17.273051
78.9	-5.89	24.788235	31.788235	29.688235	283.1352278	9.9852278	292.118206	18.968206
79.2	-5.87	24.808852	31.808852	29.708852	283.0510993	9.9010993	292.025816	18.875816
79.5	-5.87	24.808852	31.808852	29.708852	283.0510993	9.9010993	292.025816	18.875816
79.8	-5.7	24.984098	31.984098	29.884098	282.3390221	9.1890221	291.2440247	18.094025
80.2	-6.26	24.406816	31.406816	29.306816	284.7052618	11.555262	293.8433945	20.693395
80.5	-6.07	24.60268	31.60268	29.50268	283.8957752	10.745775	292.9536807	19.803681
80.8	-5.86	24.81916	31.81916	29.71916	283.0090632	9.8590632	291.9796539	18.829654
81.1	-5.83	24.850086	31.850086	29.750086	282.8830671	9.7330671	291.8412988	18.691299
81.4	-5.75	24.932555	31.932555	29.832555	282.5478985	9.3978985	291.4733113	18.323311
81.8	-5.81	24.870703	31.870703	29.770703	282.7991631	9.6491631	291.7491713	18.599171
82.1	-5.66	25.025332	32.025332	29.925332	282.1722541	9.0222541	291.0609846	17.910985
82.4	-5.76	24.922246	31.922246	29.822246	282.5897294	9.4397294	291.5192336	18.369234
82.7	-5.48	25.210887	32.210887	30.110887	281.4254383	8.2754383	290.2415536	17.091554
83	-5.62	25.066567	32.066567	29.966567	282.0057813	8.8557813	290.8782891	17.728289
83.4	-5.67	25.015024	32.015024	29.915024	282.2139184	9.0639184	291.1067122	17.956712
83.7	-5.75	24.932555	31.932555	29.832555	282.5478985	9.3978985	291.4733113	18.323311
84	-5.95	24.726383	31.726383	29.626383	283.388064	10.238064	292.3959028	19.245903
84.3	-5.85	24.829469	31.829469	29.729469	282.9670458	9.8170458	291.9335137	18.783514
84.7	-5.76	24.922246	31.922246	29.822246	282.5897294	9.4397294	291.5192336	18.369234
85	-5.86	24.81916	31.81916	29.71916	283.0090632	9.8590632	291.9796539	18.829654

85.4	-7.1	23.540894	30.540894	28.440894	288.368888	15.218888	297.8763368	24.726337
85.8	-6.2	24.468668	31.468668	29.368668	284.4488868	11.298887	293.561557	20.411557
86.3	-6.15	24.520211	31.520211	29.420211	284.2357692	11.085769	293.3273109	20.177311
86.8	-5.83	24.850086	31.850086	29.750086	282.8830671	9.7330671	291.8412988	18.691299
87.6	-4.93	25.77786	32.77786	30.67786	279.1797218	6.0297218	287.779974	14.629974
88.1	-5.2	25.499528	32.499528	30.399528	280.2754205	7.1254205	288.9805273	15.830527
88.5	-5.21	25.489219	32.489219	30.389219	280.31625	7.16625	289.0252813	15.875281
88.9	-5.11	25.592305	32.592305	30.492305	279.9087554	6.7587554	288.578675	15.428675
89.4	-4.63	26.087118	33.087118	30.987118	277.9772227	4.8272227	286.4634172	13.313417
89.8	-4.54	26.179896	33.179896	31.079896	277.6194921	4.4694921	286.0719602	12.92196
90.2	-4.41	26.313907	33.313907	31.213907	277.1051998	3.9551998	285.509345	12.359345
90.7	-4.56	26.159278	33.159278	31.059278	277.6988684	4.5488684	286.158812	13.008812
91.1	-4.23	26.499462	33.499462	31.399462	276.3977984	3.2477984	284.7357911	11.585791
91.6	-4.48	26.241747	33.241747	31.141747	277.3817709	4.2317709	285.8118787	12.661879
92	-4.46	26.262364	33.262364	31.162364	277.3026661	4.1526661	285.7253424	12.575342
91.71	-4.49	26.231439	33.231439	31.131439	277.4213487	4.2713487	285.8551764	12.705176
92.3	-4.55	26.169587	33.169587	31.069587	277.6591717	4.5091717	286.1153762	12.965376
92.9	-4.53	26.190204	33.190204	31.090204	277.5798294	4.4298294	286.028564	12.878564
93.4	-4.82	25.891255	32.891255	30.791255	278.7369956	5.5869956	287.2951315	14.145132
94	-4.82	25.891255	32.891255	30.791255	278.7369956	5.5869956	287.2951315	14.145132
94.6	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
95.1	-4.9	25.808786	32.808786	30.708786	279.0587691	5.9087691	287.6475009	14.497501
95.7	-4.92	25.788169	32.788169	30.688169	279.1393867	5.9893867	287.735796	14.585796
96.3	-4.96	25.746934	32.746934	30.646934	279.3008318	6.1508318	287.9126304	14.76263
96.9	-5.1	25.602614	32.602614	30.502614	279.8681036	6.7181036	288.5341281	15.384128
97.4	-5.04	25.664466	32.664466	30.564466	279.6245642	6.4745642	288.2672795	15.11728
98	-5.12	25.581997	32.581997	30.481997	279.9494249	6.7994249	288.6232424	15.473242
98.6	-4.97	25.736626	32.736626	30.636626	279.3412369	6.1912369	287.95689	14.80689
99.1	-5.15	25.551071	32.551071	30.451071	280.0715399	6.9215399	288.7570689	15.607069
99.7	-5.37	25.324282	32.324282	30.224282	280.9719595	7.8219595	289.7441844	16.594184
100.3	-5.95	24.726383	31.726383	29.626383	283.388064	10.238064	292.3959028	19.245903
100.9	-6.09	24.582063	31.582063	29.482063	283.9806593	10.830659	293.0469544	19.896954
101.4	-5.82	24.860395	31.860395	29.760395	282.8411058	9.6911058	291.7952241	18.645224
102	-5.9	24.777926	31.777926	29.677926	283.1773202	10.02732	292.1644338	19.014434
102.7	-6.17	24.499594	31.499594	29.399594	284.3209587	11.170959	293.4209421	20.270942
103.3	-6.01	24.664531	31.664531	29.564531	283.6415788	10.491579	292.6743931	19.524393
104	-5.98	24.695457	31.695457	29.595457	283.5147364	10.364736	292.5350486	19.385049
104.7	-5.78	24.901629	31.901629	29.801629	282.673447	9.523447	291.6111434	18.461143
105.3	-5.43	25.26243	32.26243	30.16243	281.2190396	8.0690396	290.0151594	16.865159
106	-5.43	25.26243	32.26243	30.16243	281.2190396	8.0690396	290.0151594	16.865159
106.25	-5.23	25.468602	32.468602	30.368602	280.3979627	7.2479627	289.1148516	15.964852
106.5	-5.97	24.705766	31.705766	29.605766	283.4724934	10.322493	292.4886446	19.338645
106.75	-6.14	24.53052	31.53052	29.43052	284.1932031	11.043203	293.280529	20.130529
107	-6.04	24.633606	31.633606	29.533606	283.7685916	10.618592	292.813937	19.663937
107.3	-6.26	24.406816	31.406816	29.306816	284.7052618	11.555262	293.8433945	20.693395
107.6	-5.87	24.808852	31.808852	29.708852	283.0510993	9.9010993	292.025816	18.875816
107.9	-5.92	24.757309	31.757309	29.657309	283.2615613	10.111561	292.2569554	19.106955
108.2	-5.88	24.798543	31.798543	29.698543	283.0931542	9.9431542	292.072	18.922
108.5	-5.31	25.386133	32.386133	30.286133	280.7255296	7.5755296	289.4739676	16.323968
108.8	-5.94	24.736692	31.736692	29.636692	283.3458776	10.195878	292.349565	19.199565
109.1	-5.11	25.592305	32.592305	30.492305	279.9087554	6.7587554	288.578675	15.428675
109.4	-5.3	25.396442	32.396442	30.296442	280.684521	7.534521	289.4290049	16.279005
109.7	-5.12	25.581997	32.581997	30.481997	279.9494249	6.7994249	288.6232424	15.473242
110	-5.01	25.695391	32.695391	30.595391	279.5030327	6.3530327	288.1341326	14.984133
110.4	-4.25	26.478845	33.478845	31.378845	276.4761311	3.3261311	284.8214312	11.671431
110.8	-4.31	26.416993	33.416993	31.316993	276.7115295	3.5615295	285.0788158	11.928816
111.2	-4.3	26.427302	33.427302	31.327302	276.6722546	3.5222546	285.0358699	11.88587
111.6	-4.51	26.210821	33.210821	31.110821	277.5005551	4.3505551	285.9418308	12.791831
112.1	-4.58	26.138661	33.138661	31.038661	277.7783128	4.6283128	286.2457429	13.095743
112.6	-4.48	26.241747	33.241747	31.141747	277.3817709	4.2317709	285.8118787	12.661879
113	-4.52	26.200513	33.200513	31.100513	277.5401838	4.3901838	285.9851875	12.835188
113.8	-4.39	26.334525	33.334525	31.234525	277.0263313	3.8763313	285.4230831	12.273083
114.7	-4.37	26.355142	33.355142	31.255142	276.9475301	3.7975301	285.3368994	12.186899
115.5	-3.8	26.942732	33.942732	31.842732	274.7295858	1.5795858	282.9130139	9.7630139
116.3	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045

117.2	-4.22	26.509771	33.509771	31.409771	276.358657	3.208657	284.693	11.543
118	-4.17	26.561314	33.561314	31.461314	276.1631991	3.0131991	284.4793337	11.329334
118.4	-4.32	26.406685	33.406685	31.306685	276.750821	3.600821	285.1217811	11.971781
118.8	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
119.2	-4.04	26.695326	33.695326	31.595326	275.6569431	2.5069431	283.9260448	10.776045
119.6	-4.71	26.004649	33.004649	30.904649	278.296369	5.146369	286.8127313	13.662731
120	-5.36	25.33459	32.33459	30.23459	280.9308428	7.7808428	289.6990957	16.549096
120.1	-6.34	24.324348	31.324348	29.224348	285.048176	11.898176	294.2204437	21.070444
120.2	-6.43	24.23157	31.23157	29.13157	285.4354395	12.285439	294.6463638	21.496364
120.25	-6.46	24.200644	31.200644	29.100644	285.5648785	12.414878	294.7887488	21.638749
120.3	-6.27	24.396508	31.396508	29.296508	284.7480584	11.598058	293.8904464	20.740446
120.4	-6.34	24.324348	31.324348	29.224348	285.048176	11.898176	294.2204437	21.070444
120.5	-6.13	24.540828	31.540828	29.440828	284.1506562	11.000656	293.2337694	20.083769
120.6	-6.23	24.437742	31.437742	29.337742	284.5769877	11.426988	293.7023744	20.552374
120.65	-6.85	23.798609	30.798609	28.698609	287.2637716	14.113772	296.6587393	23.508739
120.7	-7.31	23.324413	30.324413	28.224413	289.3071084	16.157108	298.9107878	25.760788
120.8	-6.92	23.726449	30.726449	28.626449	287.5719229	14.421923	296.9981607	23.848161
120.9	-6.82	23.829535	30.829535	28.729535	287.1320098	13.98201	296.5136288	23.363629
121	-6.89	23.757375	30.757375	28.657375	287.4397367	14.289737	296.8525518	23.702552
121.1	-6.61	24.046015	31.046015	28.946015	286.2147253	13.064725	295.5037829	22.353783
121.2	-7.72	22.901761	29.901761	27.801761	291.165577	18.015577	300.9618831	27.811883
121.25	-7.16	23.479042	30.479042	28.379042	288.6360191	15.486019	298.1707978	25.020798
121.3	-6.91	23.736757	30.736757	28.636757	287.5278405	14.377841	296.9496006	23.799601
121.4	-7.54	23.087316	30.087316	27.987316	290.3452649	17.195265	300.056217	26.906217
121.5	-7.09	23.551203	30.551203	28.451203	288.3244382	15.174438	297.8273447	24.677345
121.6	-6.46	24.200644	31.200644	29.100644	285.5648785	12.414878	294.7887488	21.638749
121.7	-7.44	23.190402	30.190402	28.090402	289.8925212	16.742521	299.5565887	26.406589
121.8	-6.93	23.71614	30.71614	28.61614	287.6160255	14.466025	297.0467447	23.896745
121.9	-6.5	24.15941	31.15941	29.05941	285.7377381	12.587738	294.9789169	21.828917
122	-7.16	23.479042	30.479042	28.379042	288.6360191	15.486019	298.1707978	25.020798
122.05	-6.7	23.953238	30.953238	28.853238	286.6067694	13.456769	295.935309	22.785309
122.1	-7.06	23.582128	30.582128	28.482128	288.1912121	15.041212	297.6805134	24.530513
122.2	-6.73	23.922312	30.922312	28.822312	286.7378093	13.587809	296.0795717	22.929572
122.3	-7.34	23.293488	30.293488	28.193488	289.4418888	16.291889	299.059448	25.909448
122.4	-6.66	23.994472	30.994472	28.894472	286.4323288	13.282329	295.7432864	22.593286
122.5	-6.39	24.272805	31.272805	29.172805	285.2631276	12.113128	294.4568378	21.306838
122.6	-7.06	23.582128	30.582128	28.482128	288.1912121	15.041212	297.6805134	24.530513
122.7	-6.74	23.912004	30.912004	28.812004	286.7815292	13.631529	296.1277061	22.977706
122.8	-7.06	23.582128	30.582128	28.482128	288.1912121	15.041212	297.6805134	24.530513
122.9	-6.79	23.860461	30.860461	28.760461	287.000429	13.850429	296.3687311	23.218731
123	-6.68	23.973855	30.973855	28.873855	286.5195093	13.369509	295.8392509	22.689251
123.1	-6.95	23.695523	30.695523	28.595523	287.7042916	14.554292	297.1439841	23.993984
123.2	-7.46	23.169784	30.169784	28.069784	289.9829005	16.8329	299.6563147	26.506315
123.3	-7.53	23.097624	30.097624	27.997624	290.299895	17.149895	300.0061417	26.856142
123.4	-7.11	23.530585	30.530585	28.430585	288.4133583	15.263358	297.925353	24.775353
123.5	-7.42	23.211019	30.211019	28.111019	289.8022263	16.652226	299.4569623	26.306962
123.7	-7.84	22.778058	29.778058	27.678058	291.7163303	18.56633	301.5702364	28.420236
123.8	-7.51	23.118241	30.118241	28.018241	290.2092191	17.059219	299.9060661	26.756066
123.9	-7.16	23.479042	30.479042	28.379042	288.6360191	15.486019	298.1707978	25.020798
124	-6.99	23.654289	30.654289	28.554289	287.8810679	14.731068	297.3387499	24.18875
124.05	-6.97	23.674906	30.674906	28.574906	287.792639	14.642639	297.2413191	24.091319
124.1	-6.98	23.664597	30.664597	28.564597	287.8368433	14.686843	297.2900225	24.140023
124.2	-7.48	23.149167	30.149167	28.049167	290.0733644	16.923364	299.7561404	26.60614
124.3	-6.98	23.664597	30.664597	28.564597	287.8368433	14.686843	297.2900225	24.140023
124.4	-6.84	23.808918	30.808918	28.708918	287.2198309	14.069831	296.6103455	23.460346
124.5	-6.86	23.7883	30.7883	28.6883	287.3077326	14.157733	296.7071569	23.557157
124.6	-6.99	23.654289	30.654289	28.554289	287.8810679	14.731068	297.3387499	24.18875
124.7	-7.15	23.489351	30.489351	28.389351	288.5914457	15.441446	298.1216603	24.97166
124.8	-7.23	23.406882	30.406882	28.306882	288.9486123	15.798612	298.5154418	25.365442
124.9	-7.14	23.49966	30.49966	28.39966	288.5468929	15.396893	298.0725471	24.922547
125	-7.03	23.613054	30.613054	28.513054	288.0581704	14.90817	297.5338991	24.383899
125.1	-7.8	22.819292	29.819292	27.719292	291.5323987	18.382399	301.3670422	28.217042
125.2	-6.75	23.901695	30.901695	28.801695	286.8252691	13.675269	296.1758641	23.025864
125.3	-6.92	23.726449	30.726449	28.626449	287.5719229	14.421923	296.9981607	23.848161
125.4	-6.73	23.922312	30.922312	28.822312	286.7378093	13.587809	296.0795717	22.929572

125.5	-6.8	23.850152	30.850152	28.750152	287.0442691	13.894269	296.4170067	23.267007
125.55	-6.87	23.777992	30.777992	28.677992	287.3517138	14.201714	296.7555981	23.605598
125.6	-6.59	24.066633	31.066633	28.966633	286.1278227	12.977823	295.4081443	22.258144
125.7	-6.68	23.973855	30.973855	28.873855	286.5195093	13.369509	295.8392509	22.689251
125.8	-6.72	23.932621	30.932621	28.832621	286.6941094	13.544109	296.0314607	22.881461
125.9	-6.73	23.922312	30.922312	28.822312	286.7378093	13.587809	296.0795717	22.929572
126	-7.31	23.324413	30.324413	28.224413	289.3071084	16.157108	298.9107878	25.760788
126.1	-7.27	23.365648	30.365648	28.265648	289.1276937	15.977694	298.7129186	25.562919
126.2	-6.88	23.767683	30.767683	28.667683	287.3957151	14.245715	296.8040631	23.654063
126.4	-7.16	23.479042	30.479042	28.379042	288.6360191	15.486019	298.1707978	25.020798
126.5	-6.87	23.777992	30.777992	28.677992	287.3517138	14.201714	296.7555981	23.605598
126.6	-7.26	23.375956	30.375956	28.275956	289.0828921	15.932892	298.6635126	25.513513
126.7	-6.86	23.7883	30.7883	28.6883	287.3077326	14.157733	296.7071569	23.557157
126.8	-6.59	24.066633	31.066633	28.966633	286.1278227	12.977823	295.4081443	22.258144
126.9	-6.75	23.901695	30.901695	28.801695	286.8252691	13.675269	296.1758641	23.025864
127	-6.72	23.932621	30.932621	28.832621	286.6941094	13.544109	296.0314607	22.881461
127.1	-7.09	23.551203	30.551203	28.451203	288.3244382	15.174438	297.8273447	24.677345
127.2	-6.83	23.819226	30.819226	28.719226	287.1759102	14.02591	296.5619753	23.411975
127.3	-6.6	24.056324	31.056324	28.956324	286.1712641	13.021264	295.455952	22.305952
127.4	-6.58	24.076941	31.076941	28.976941	286.0844011	12.934401	295.3603598	22.21036
127.45	-6.92	23.726449	30.726449	28.626449	287.5719229	14.421923	296.9981607	23.848161
127.5	-7.1	23.540894	30.540894	28.440894	288.368888	15.218888	297.8763368	24.726337
127.6	-7.03	23.613054	30.613054	28.513054	288.0581704	14.90817	297.5338991	24.383899
127.7	-6.76	23.891386	30.891386	28.791386	286.869029	13.719029	296.2240455	23.074046
127.8	-7.09	23.551203	30.551203	28.451203	288.3244382	15.174438	297.8273447	24.677345
127.85	-7.08	23.561511	30.561511	28.461511	288.280009	15.130009	297.7783768	24.628377
127.9	-7.33	23.303796	30.303796	28.203796	289.3969411	16.246941	299.00987	25.85987
128	-7.47	23.159476	30.159476	28.059476	290.0281218	16.878122	299.7062151	26.556215
128.05	-7.22	23.417191	30.417191	28.317191	288.903894	15.753894	298.4661337	25.316134
128.1	-7.55	23.077007	30.077007	27.977007	290.390656	17.240656	300.1063175	26.956317

Ma’ale Efrayim Cave δ^{18}O to Temperature Conversion

Age	δ^{18}O	δ^{18}O	δc-δw	δc-δw	O'Neil Formula	Kelvin to	O'Neil Formula	Kelvin to
(Ka BP)		(SMOW)	δw = -7	δw = -4.9	δw = -7	Celsius	δw = -4.9	Celsius
25	-3.1	27.664334	31.164334	33.964334	285.7170796	12.56708	274.6490583	1.4990583
25.1	-3.15	27.612791	31.112791	33.912791	285.9335491	12.783549	274.8413166	1.6913166
25.2	-3.11	27.654025	31.154025	33.954025	285.7603341	12.610334	274.6874777	1.5374777
25.3	-3.08	27.684951	31.184951	33.984951	285.6306293	12.480629	274.5722679	1.4222679
25.4	-3.06	27.705568	31.205568	34.005568	285.5442574	12.394257	274.4955418	1.3455418
26	-3.34	27.416928	30.916928	33.716928	286.7606434	13.610643	275.5755976	2.4255976
26.6	-3.56	27.190138	30.690138	33.490138	287.7273575	14.577357	276.4332148	3.2832148
27.2	-3.52	27.231373	30.731373	33.531373	287.550864	14.400864	276.2766888	3.1266888
27.94	-3.92	26.819029	30.319029	33.119029	289.330562	16.180562	277.854026	4.704026
28.05	-3.75	26.994275	30.494275	33.294275	288.5701621	15.420162	277.1803637	4.0303637
28.15	-3.25	27.509705	31.009705	33.809705	286.3679684	13.217968	275.2270475	2.0770475
28.25	-3.17	27.592174	31.092174	33.892174	286.0202748	12.870275	274.918333	1.768333
28.35	-3.14	27.6231	31.1231	33.9231	285.8902158	12.740216	274.8028326	1.6528326
28.52	-2.85	27.922049	31.422049	34.222049	284.6420583	11.492058	273.6937824	0.5437824
29	-3.14	27.6231	31.1231	33.9231	285.8902158	12.740216	274.8028326	1.6528326
29.17	-3.4	27.355076	30.855076	33.655076	287.023326	13.873326	275.8087013	2.6587013
29.34	-3.18	27.581865	31.081865	33.881865	286.0636673	12.913667	274.9568655	1.8068655
29.52	-3.33	27.427236	30.927236	33.727236	286.7169331	13.566933	275.5368044	2.3868044
29.7	-3.07	27.69526	31.19526	33.99526	285.5874336	12.437434	274.5338968	1.3838968
29.87	-3.48	27.272607	30.772607	33.572607	287.3746949	14.224695	276.1204284	2.9704284
30.05	-3.65	27.097361	30.597361	33.397361	288.125659	14.975659	276.7863734	3.6363734
30.22	-3.4	27.355076	30.855076	33.655076	287.023326	13.873326	275.8087013	2.6587013
30.4	-3.23	27.530322	31.030322	33.830322	286.2809261	13.130926	275.1497714	1.9997714
30.57	-3.37	27.386002	30.886002	33.686002	286.8918945	13.741895	275.6920755	2.5420755
30.75	-3.77	26.973658	30.473658	33.273658	288.6593098	15.50931	277.2593638	4.1093638
30.93	-3.75	26.994275	30.494275	33.294275	288.5701621	15.420162	277.1803637	4.0303637
31.1	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567

31.28	-3.54	27.210756	30.710756	33.510756	287.6390701	14.48907	276.3549186	3.2049186
31.45	-3.52	27.231373	30.731373	33.531373	287.550864	14.400864	276.2766888	3.1266888
31.63	-3.35	27.406619	30.906619	33.706619	286.8043738	13.654374	275.6144071	2.4644071
31.8	-3.04	27.726186	31.226186	34.026186	285.4579639	12.307964	274.41888	1.26888
31.81	-3.74	27.004584	30.504584	33.304584	288.5256192	15.375619	277.1408889	3.9908889
31.825	-3.78	26.963349	30.463349	33.263349	288.7039147	15.553915	277.2988893	4.1488893
31.84	-3.71	27.035509	30.535509	33.335509	288.3921141	15.242114	277.0225658	3.8725658
31.85	-3.57	27.17983	30.67983	33.47983	287.7715316	14.621532	276.4723879	3.3223879
31.865	-3.37	27.386002	30.886002	33.686002	286.8918945	13.741895	275.6920755	2.5420755
31.88	-3.4	27.355076	30.855076	33.655076	287.023326	13.873326	275.8087013	2.6587013
31.89	-3.04	27.726186	31.226186	34.026186	285.4579639	12.307964	274.41888	1.26888
31.9	-3.37	27.386002	30.886002	33.686002	286.8918945	13.741895	275.6920755	2.5420755
31.92	-3.7	27.045818	30.545818	33.345818	288.3476536	15.197654	276.9831584	3.8331584
31.93	-3.58	27.169521	30.669521	33.469521	287.8157261	14.665726	276.5115777	3.3615777
31.94	-3.12	27.643717	31.143717	33.943717	285.8036084	12.653608	274.7259132	1.5759132
31.95	-3.27	27.489088	30.989088	33.789088	286.4550901	13.30509	275.3043888	2.1543888
31.97	-3.18	27.581865	31.081865	33.881865	286.0636673	12.913667	274.9568655	1.8068655
31.98	-3.27	27.489088	30.989088	33.789088	286.4550901	13.30509	275.3043888	2.1543888
31.99	-3.42	27.334459	30.834459	33.634459	287.1110474	13.961047	275.8865341	2.7365341
32	-3.42	27.334459	30.834459	33.634459	287.1110474	13.961047	275.8865341	2.7365341
32.02	-3.5	27.25199	30.75199	33.55199	287.462739	14.312739	276.1985254	3.0485254
32.03	-3.68	27.066435	30.566435	33.366435	288.2587942	15.108794	276.904394	3.754394
32.045	-3.11	27.654025	31.154025	33.954025	285.7603341	12.610334	274.6874777	1.5374777
32.06	-4.24	26.489154	29.989154	32.789154	290.7783604	17.62836	279.1355344	5.9855344
32.07	-3.41	27.344767	30.844767	33.644767	287.0671766	13.917177	275.8476094	2.6976094
32.08	-3.45	27.303533	30.803533	33.603533	287.2427804	14.09278	276.0034069	2.8534069
32.097	-4.13	26.602548	30.102548	32.902548	290.2782312	17.128231	278.6930181	5.5430181
32.11	-3.48	27.272607	30.772607	33.572607	287.3746949	14.224695	276.1204284	2.9704284
32.12	-3.95	26.788103	30.288103	33.088103	289.4653752	16.315375	277.9734182	4.8234182
32.13	-3.72	27.025201	30.525201	33.325201	288.4365952	15.286595	277.06199	3.91199
32.15	-3.61	27.138595	30.638595	33.438595	287.948432	14.798432	276.629247	3.479247
32.16	-3.58	27.169521	30.669521	33.469521	287.8157261	14.665726	276.5115777	3.3615777
32.17	-3.75	26.994275	30.494275	33.294275	288.5701621	15.420162	277.1803637	4.0303637
32.187	-4.55	26.169587	29.669587	32.469587	292.2018453	19.051845	280.394058	7.244058
32.2	-4.83	25.880946	29.380946	32.180946	293.5057057	20.355706	281.5455428	8.3955428
32.24	-3.71	27.035509	30.535509	33.335509	288.3921141	15.242114	277.0225658	3.8725658
32.29	-3.8	26.942732	30.442732	33.242732	288.7931865	15.643186	277.3779908	4.2279908
32.33	-3.4	27.355076	30.855076	33.655076	287.023326	13.873326	275.8087013	2.6587013
32.37	-4.11	26.623165	30.123165	32.923165	290.1875755	17.037576	278.6127864	5.4627864
32.41	-4.13	26.602548	30.102548	32.902548	290.2782312	17.128231	278.6930181	5.5430181
32.46	-3.86	26.88088	30.38088	33.18088	289.0614996	15.9115	277.6157023	4.4657023
32.5	-3.92	26.819029	30.319029	33.119029	289.330562	16.180562	277.854026	4.704026
32.55	-3.14	27.6231	31.1231	33.9231	285.8902158	12.740216	274.8028326	1.6528326
32.59	-3.14	27.6231	31.1231	33.9231	285.8902158	12.740216	274.8028326	1.6528326
32.63	-3.54	27.210756	30.710756	33.510756	287.6390701	14.48907	276.3549186	3.2049186
32.68	-3.59	27.159213	30.659213	33.459213	287.859941	14.709941	276.5507841	3.4007841
32.72	-3.48	27.272607	30.772607	33.572607	287.3746949	14.224695	276.1204284	2.9704284
32.76	-3.51	27.241681	30.741681	33.541681	287.5067914	14.356791	276.2375988	3.0875988
32.81	-3.23	27.530322	31.030322	33.830322	286.2809261	13.130926	275.1497714	1.9997714
32.85	-3.25	27.509705	31.009705	33.809705	286.3679684	13.217968	275.2270475	2.0770475
32.89	-4.05	26.685017	30.185017	32.985017	289.9161174	16.766117	278.3725067	5.2225067
32.94	-4.06	26.674708	30.174708	32.974708	289.9613075	16.811308	278.4125101	5.2625101
32.98	-4.23	26.499462	29.999462	32.799462	290.7327873	17.582787	279.0952185	5.9452185
33.02	-4.42	26.303599	29.803599	32.603599	291.6023593	18.452359	279.864221	6.714221
33.07	-3.92	26.819029	30.319029	33.119029	289.330562	16.180562	277.854026	4.704026
33.11	-3.58	27.169521	30.669521	33.469521	287.8157261	14.665726	276.5115777	3.3615777
33.15	-3.94	26.798412	30.298412	33.098412	289.4204165	16.270417	277.9336037	4.7836037
33.2	-3.69	27.056127	30.556127	33.356127	288.3032136	15.153214	276.9437678	3.7937678
33.24	-4.01	26.726251	30.226251	33.026251	289.735568	16.585568	278.2126651	5.0626651
33.28	-3.99	26.746869	30.246869	33.046869	289.6454197	16.49542	278.1328475	4.9828475
33.33	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567
33.37	-4.07	26.6644	30.1644	32.9644	290.0065188	16.856519	278.4525309	5.3025309
33.41	-3.98	26.757177	30.257177	33.057177	289.6003771	16.450377	278.0929645	4.9429645
33.45	-3.9	26.839646	30.339646	33.139646	289.240791	16.090791	277.7745166	4.6245166
33.49	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567

33.53	-3.67	27.076744	30.576744	33.376744	288.2143953	15.064395	276.865037	3.715037
33.57	-3.92	26.819029	30.319029	33.119029	289.330562	16.180562	277.854026	4.704026
33.61	-4.16	26.571622	30.071622	32.871622	290.4143741	17.264374	278.8134956	5.6634956
33.65	-3.66	27.087052	30.587052	33.387052	288.1700169	15.020017	276.8256968	3.6756968
33.69	-3.87	26.870572	30.370572	33.170572	289.1062912	15.956291	277.6553803	4.5053803
33.73	-3.49	27.262299	30.762299	33.562299	287.4187068	14.268707	276.1594686	3.0094686
33.77	-3.38	27.375693	30.875693	33.675693	286.9356849	13.785685	275.7309343	2.5809343
33.81	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567
33.85	-3.8	26.942732	30.442732	33.242732	288.7931865	15.643186	277.3779908	4.2279908
33.89	-3.71	27.035509	30.535509	33.335509	288.3921141	15.242114	277.0225658	3.8725658
33.93	-3.92	26.819029	30.319029	33.119029	289.330562	16.180562	277.854026	4.704026
33.97	-4.14	26.59224	30.09224	32.89224	290.3235909	17.173591	278.7331599	5.5831599
34.01	-4.05	26.685017	30.185017	32.985017	289.9161174	16.766117	278.3725067	5.2225067
34.04	-4	26.73656	30.23656	33.03656	289.6904833	16.540483	278.1727477	5.0227477
34.07	-4.43	26.29329	29.79329	32.59329	291.6483427	18.498343	279.9048711	6.7548711
34.11	-4.18	26.551005	30.051005	32.851005	290.5052425	17.355243	278.8939008	5.7439008
34.15	-4.38	26.344833	29.844833	32.644833	291.4186432	18.268643	279.7017975	6.5517975
34.19	-4.18	26.551005	30.051005	32.851005	290.5052425	17.355243	278.8939008	5.7439008
34.23	-4.22	26.509771	30.009771	32.809771	290.6872355	17.537236	279.0549201	5.9049201
34.28	-3.92	26.819029	30.319029	33.119029	289.330562	16.180562	277.854026	4.704026
34.32	-3.2	27.561248	31.061248	33.861248	286.1505114	13.000511	275.0339792	1.8839792
34.36	-3.24	27.520014	31.020014	33.820014	286.3244374	13.174437	275.1884013	2.0384013
34.42	-3.35	27.406619	30.906619	33.706619	286.8043738	13.654374	275.6144071	2.4644071
34.48	-4.49	26.231439	29.731439	32.531439	291.9247004	18.7747	280.1491442	6.9991442
34.54	-2.87	27.901432	31.401432	34.201432	284.7276138	11.577614	273.7698379	0.6198379
34.6	-3.07	27.69526	31.19526	33.99526	285.5874336	12.437434	274.5338968	1.3838968
34.65	-4.22	26.509771	30.009771	32.809771	290.6872355	17.537236	279.0549201	5.9049201
34.7	-3.49	27.262299	30.762299	33.562299	287.4187068	14.268707	276.1594686	3.0094686
34.75	-3.38	27.375693	30.875693	33.675693	286.9356849	13.785685	275.7309343	2.5809343
34.8	-2.9	27.870506	31.370506	34.170506	284.8560918	11.706092	273.8840402	0.7340402
34.95	-2.99	27.777729	31.277729	34.077729	285.2425719	12.092572	274.2275063	1.0775063
35.1	-3.41	27.344767	30.844767	33.644767	287.0671766	13.917177	275.8476094	2.6976094
35.25	-4.81	25.901563	29.401563	32.201563	293.4119934	20.261993	281.462823	8.312823
35.4	-3.88	26.860263	30.360263	33.160263	289.1511036	16.001104	277.6950754	4.5450754
35.55	-3.75	26.994275	30.494275	33.294275	288.5701621	15.420162	277.1803637	4.0303637
35.7	-3.89	26.849955	30.349955	33.149955	289.1959369	16.045937	277.7347874	4.5847874
35.85	-4.9	25.808786	29.308786	32.108786	293.8344072	20.684407	281.8356375	8.6856375
36	-3.46	27.293224	30.793224	33.593224	287.2867317	14.136732	276.0423975	2.8923975
36.15	-3.58	27.169521	30.669521	33.469521	287.8157261	14.665726	276.5115777	3.3615777
36.3	-3.25	27.509705	31.009705	33.809705	286.3679684	13.217968	275.2270475	2.0770475
36.45	-3.79	26.953041	30.453041	33.253041	288.7485402	15.59854	277.3384316	4.1884316
36.6	-3.71	27.035509	30.535509	33.335509	288.3921141	15.242114	277.0225658	3.8725658
36.75	-4.19	26.540697	30.040697	32.840697	290.5507087	17.400709	278.9341295	5.7841295
36.9	-3.93	26.80872	30.30872	33.10872	289.3754788	16.225479	277.8938063	4.7438063
37.05	-3.75	26.994275	30.494275	33.294275	288.5701621	15.420162	277.1803637	4.0303637
37.2	-4.06	26.674708	30.174708	32.974708	289.9613075	16.811308	278.4125101	5.2625101
37.35	-4.26	26.468536	29.968536	32.768536	290.8695711	17.719571	279.2162186	6.0662186
37.5	-3.62	27.128287	30.628287	33.428287	287.9927081	14.842708	276.6685035	3.5185035
37.65	-4.01	26.726251	30.226251	33.026251	289.735568	16.585568	278.2126651	5.0626651
37.8	-3.75	26.994275	30.494275	33.294275	288.5701621	15.420162	277.1803637	4.0303637
37.95	-3.83	26.911806	30.411806	33.211806	288.9272496	15.77725	277.4967702	4.3467702
38.1	-3.78	26.963349	30.463349	33.263349	288.7039147	15.553915	277.2988893	4.1488893
38.24	-3.01	27.757111	31.257111	34.057111	285.3286702	12.17867	274.3040077	1.1540077
38.5	-3.62	27.128287	30.628287	33.428287	287.9927081	14.842708	276.6685035	3.5185035
38.75	-3.65	27.097361	30.597361	33.397361	288.125659	14.975659	276.7863734	3.6363734
39	-3.58	27.169521	30.669521	33.469521	287.8157261	14.665726	276.5115777	3.3615777
39.25	-4.17	26.561314	30.061314	32.861314	290.4597976	17.309798	278.8536895	5.7036895
39.5	-4.05	26.685017	30.185017	32.985017	289.9161174	16.766117	278.3725067	5.2225067
39.75	-4.12	26.612857	30.112857	32.912857	290.2328927	17.082893	278.6528936	5.5028936
40	-4.37	26.355142	29.855142	32.655142	291.3727683	18.222768	279.6612358	6.5112358
40.9	-4.28	26.447919	29.947919	32.747919	290.9608676	17.810868	279.2969728	6.1469728
41.8	-4.16	26.571622	30.071622	32.871622	290.4143741	17.264374	278.8134956	5.6634956
42.7	-4.08	26.654091	30.154091	32.954091	290.0517512	16.901751	278.4925688	5.3425688
43.66	-4	26.73656	30.23656	33.03656	289.6904833	16.540483	278.1727477	5.0227477
44.57	-3.98	26.757177	30.257177	33.057177	289.6003771	16.450377	278.0929645	4.9429645

45.49	-4.01	26.726251	30.226251	33.026251	289.735568	16.585568	278.2126651	5.0626651
46.3	-3.71	27.035509	30.535509	33.335509	288.3921141	15.242114	277.0225658	3.8725658
46.67	-4.07	26.6644	30.1644	32.9644	290.0065188	16.856519	278.4525309	5.3025309
46.81	-4.07	26.6644	30.1644	32.9644	290.0065188	16.856519	278.4525309	5.3025309
46.95	-4.12	26.612857	30.112857	32.912857	290.2328927	17.082893	278.6528936	5.5028936
47.09	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
47.22	-4.49	26.231439	29.731439	32.531439	291.9247004	18.7747	280.1491442	6.9991442
47.36	-4.42	26.303599	29.803599	32.603599	291.6023593	18.452359	279.864221	6.714221
47.5	-4.2	26.530388	30.030388	32.830388	290.5961963	17.446196	278.9743756	5.8243756
47.64	-3.98	26.757177	30.257177	33.057177	289.6003771	16.450377	278.0929645	4.9429645
47.91	-4.68	26.035575	29.535575	32.335575	292.8050438	19.655044	280.9269158	7.7769158
48.05	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
48.19	-4.44	26.282982	29.782982	32.582982	291.6943478	18.544348	279.9455389	6.7955389
48.32	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
48.46	-4.14	26.59224	30.09224	32.89224	290.3235909	17.173591	278.7331599	5.5831599
48.6	-4.26	26.468536	29.968536	32.768536	290.8695711	17.719571	279.2162186	6.0662186
48.73	-4.04	26.695326	30.195326	32.995326	289.8709484	16.720948	278.3325205	5.1825205
49.01	-4.53	26.190204	29.690204	32.490204	292.109376	18.959376	280.3123487	7.1623487
49.15	-4.6	26.118044	29.618044	32.418044	292.4334033	19.283403	280.5986443	7.4486443
49.29	-4.5	26.22113	29.72113	32.52113	291.9708365	18.820836	280.1899186	7.0399186
49.42	-4.36	26.36545	29.86545	32.66545	291.3269152	18.176915	279.6206917	6.4706917
49.56	-4.9	25.808786	29.308786	32.108786	293.8344072	20.684407	281.8356375	8.6856375
49.62	-4.54	26.179896	29.679896	32.479896	292.1555997	19.0056	280.3531945	7.2031945
49.68	-4.21	26.520079	30.020079	32.820079	290.6417052	17.491705	279.0146391	5.8646391
49.73	-4.47	26.252056	29.752056	32.552056	291.8324939	18.682494	280.0676488	6.9176488
49.79	-4.58	26.138661	29.638661	32.438661	292.340714	19.190714	280.5167561	7.3667561
49.85	-4.37	26.355142	29.855142	32.655142	291.3727683	18.222768	279.6612358	6.5112358
49.91	-4.75	25.963415	29.463415	32.263415	293.1313943	19.981394	281.2151005	8.0651005
49.96	-3.94	26.798412	30.298412	33.098412	289.4204165	16.270417	277.9336037	4.7836037
50.02	-3.93	26.80872	30.30872	33.10872	289.3754788	16.225479	277.8938063	4.7438063
50.08	-3.36	27.39631	30.89631	33.69631	286.8481241	13.698124	275.6532331	2.5032331
50.2	-4.27	26.458228	29.958228	32.758228	290.9152086	17.765209	279.2565869	6.1065869
50.4	-4.98	25.726317	29.226317	32.026317	294.2114217	21.061422	282.1682748	9.0182748
50.6	-4.59	26.128353	29.628353	32.428353	292.3870476	19.237048	280.5576912	7.4076912
50.8	-5.06	25.643848	29.143848	31.943848	294.5898912	21.439891	282.5020927	9.3520927
51	-4.69	26.025267	29.525267	32.325267	292.8515986	19.701599	280.9680308	7.8180308
51.2	-4.93	25.77786	29.27786	32.07786	293.9756177	20.825618	281.9602386	8.8102386
51.4	-4.59	26.128353	29.628353	32.428353	292.3870476	19.237048	280.5576912	7.4076912
51.6	-4.81	25.901563	29.401563	32.201563	293.4119934	20.261993	281.462823	8.312823
51.8	-5.36	25.33459	28.83459	31.63459	296.0222711	22.872271	283.7645444	10.614544
52	-4.47	26.252056	29.752056	32.552056	291.8324939	18.682494	280.0676488	6.9176488
52.2	-5.38	25.313973	28.813973	31.613973	296.1185076	22.968508	283.8493108	10.699311
52.4	-3.91	26.829337	30.329337	33.129337	289.2856661	16.135666	277.8142627	4.6642627
52.6	-4.49	26.231439	29.731439	32.531439	291.9247004	18.7747	280.1491442	6.9991442
52.8	-4.56	26.159278	29.659278	32.459278	292.2481129	19.098113	280.4349395	7.2849395
52.9	-5.47	25.221196	28.721196	31.521196	296.5527362	23.402736	284.2317019	11.081702
53	-4.63	26.087118	29.587118	32.387118	292.5726026	19.422603	280.7216112	7.5716112
53.1	-3.52	27.231373	30.731373	33.531373	287.550864	14.400864	276.2766888	3.1266888
53.2	-4.82	25.891255	29.391255	32.191255	293.4588384	20.308838	281.5041738	8.3541738
53.3	-4.54	26.179896	29.679896	32.479896	292.1555997	19.0056	280.3531945	7.2031945
53.4	-3.22	27.540631	31.040631	33.840631	286.2374348	13.087435	275.1111578	1.9611578
53.6	-2.96	27.808654	31.308654	34.108654	285.1135705	11.96357	274.112874	0.962874
53.8	-3.08	27.684951	31.184951	33.984951	285.6306293	12.480629	274.5722679	1.4222679
53.95	-2.86	27.91174	31.41174	34.21174	284.6848264	11.534826	273.7318022	0.5818022
54.1	-4.47	26.252056	29.752056	32.552056	291.8324939	18.682494	280.0676488	6.9176488
54.15	-4.5	26.22113	29.72113	32.52113	291.9708365	18.820836	280.1899186	7.0399186
54.2	-4.73	25.984032	29.484032	32.284032	293.0380399	19.88804	281.1326715	7.9826715
54.3	-4.63	26.087118	29.587118	32.387118	292.5726026	19.422603	280.7216112	7.5716112
54.8	-4.54	26.179896	29.679896	32.479896	292.1555997	19.0056	280.3531945	7.2031945
55.3	-4.52	26.200513	29.700513	32.500513	292.0631742	18.913174	280.2715209	7.1215209
55.5	-4.76	25.953106	29.453106	32.253106	293.1781049	20.028105	281.2563421	8.1063421
55.6	-4.62	26.097427	29.597427	32.397427	292.5261807	19.376181	280.6806043	7.5306043
55.7	-4.53	26.190204	29.690204	32.490204	292.109376	18.959376	280.3123487	7.1623487
55.8	-4.57	26.14897	29.64897	32.44897	292.2944025	19.144402	280.4758388	7.3258388
55.9	-4.48	26.241747	29.741747	32.541747	291.8785863	18.728586	280.1083876	6.9583876

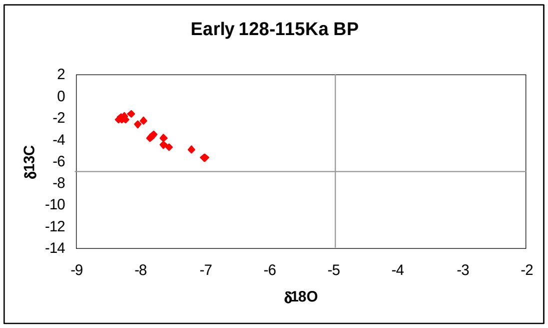
56	-4.46	26.262364	29.762364	32.562364	291.7864234	18.636423	280.0269277	6.8769277
56.1	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
56.2	-4.29	26.437611	29.937611	32.737611	291.0065481	17.856548	279.3373762	6.1873762
56.3	-4.54	26.179896	29.679896	32.479896	292.1555997	19.0056	280.3531945	7.2031945
56.4	-4.5	26.22113	29.72113	32.52113	291.9708365	18.820836	280.1899186	7.0399186
56.5	-3.86	26.88088	30.38088	33.18088	289.0614996	15.9115	277.6157023	4.4657023
56.6	-3.8	26.942732	30.442732	33.242732	288.7931865	15.643186	277.3779908	4.2279908
56.7	-3.97	26.767486	30.267486	33.067486	289.5553554	16.405355	278.0530986	4.9030986
56.8	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567
56.9	-3.72	27.025201	30.525201	33.325201	288.4365952	15.286595	277.06199	3.91199
57	-3.63	27.117978	30.617978	33.417978	288.0370046	14.887005	276.7077767	3.5577767
57.14	-3.91	26.829337	30.329337	33.129337	289.2856661	16.135666	277.8142627	4.6642627
57.42	-3.7	27.045818	30.545818	33.345818	288.3476536	15.197654	276.9831584	3.8331584
57.7	-4.22	26.509771	30.009771	32.809771	290.6872355	17.537236	279.0549201	5.9049201
57.8	-3.74	27.004584	30.504584	33.304584	288.5256192	15.375619	277.1408889	3.9908889
57.9	-3.59	27.159213	30.659213	33.459213	287.859941	14.709941	276.5507841	3.4007841
57.97	-3.73	27.014892	30.514892	33.314892	288.4810969	15.331097	277.101431	3.951431
58.11	-3.68	27.066435	30.566435	33.366435	288.2587942	15.108794	276.904394	3.754394
58.25	-4.21	26.520079	30.020079	32.820079	290.6417052	17.491705	279.0146391	5.8646391
58.39	-4.31	26.416993	29.916993	32.716993	291.0979737	17.947974	279.4182356	6.2682356
58.54	-3.94	26.798412	30.298412	33.098412	289.4204165	16.270417	277.9336037	4.7836037
58.67	-3.98	26.757177	30.257177	33.057177	289.6003771	16.450377	278.0929645	4.9429645
58.75	-4.18	26.551005	30.051005	32.851005	290.5052425	17.355243	278.8939008	5.7439008
58.85	-4.17	26.561314	30.061314	32.861314	290.4597976	17.309798	278.8536895	5.7036895
58.9	-4.16	26.571622	30.071622	32.871622	290.4143741	17.264374	278.8134956	5.6634956
58.95	-4.25	26.478845	29.978845	32.778845	290.823955	17.673955	279.1758677	6.0258677
59.05	-4.63	26.087118	29.587118	32.387118	292.5726026	19.422603	280.7216112	7.5716112
59.2	-4.87	25.839712	29.339712	32.139712	293.6934	20.5434	281.7112015	8.5612015
59.3	-4.56	26.159278	29.659278	32.459278	292.2481129	19.098113	280.4349395	7.2849395
59.4	-4.73	25.984032	29.484032	32.284032	293.0380399	19.88804	281.1326715	7.9826715
59.45	-4.61	26.107735	29.607735	32.407735	292.479781	19.329781	280.6396153	7.4896153
59.5	-4.58	26.138661	29.638661	32.438661	292.340714	19.190714	280.5167561	7.3667561
59.55	-4.56	26.159278	29.659278	32.459278	292.2481129	19.098113	280.4349395	7.2849395
59.6	-4.39	26.334525	29.834525	32.634525	291.4645397	18.31454	279.7423768	6.5923768
59.65	-4.43	26.29329	29.79329	32.59329	291.6483427	18.498343	279.9048711	6.7548711
59.7	-4.43	26.29329	29.79329	32.59329	291.6483427	18.498343	279.9048711	6.7548711
59.75	-4.47	26.252056	29.752056	32.552056	291.8324939	18.682494	280.0676488	6.9176488
59.8	-4.32	26.406685	29.906685	32.706685	291.1437188	17.993719	279.4586916	6.3086916
59.85	-4.65	26.066501	29.566501	32.366501	292.6655126	19.515513	280.803679	7.653679
59.92	-4.2	26.530388	30.030388	32.830388	290.5961963	17.446196	278.9743756	5.8243756
59.96	-4.24	26.489154	29.989154	32.789154	290.7783604	17.62836	279.1355344	5.9855344
60	-4.22	26.509771	30.009771	32.809771	290.6872355	17.537236	279.0549201	5.9049201
60.04	-4.05	26.685017	30.185017	32.985017	289.9161174	16.766117	278.3725067	5.2225067
60.08	-4.53	26.190204	29.690204	32.490204	292.109376	18.959376	280.3123487	7.1623487
60.12	-4.62	26.097427	29.597427	32.397427	292.5261807	19.376181	280.6806043	7.5306043
60.16	-4.66	26.056192	29.556192	32.356192	292.7120009	19.562001	280.8447399	7.6947399
60.2	-4.57	26.14897	29.64897	32.44897	292.2944025	19.144402	280.4758388	7.3258388
60.24	-4.52	26.200513	29.700513	32.500513	292.0631742	18.913174	280.2715209	7.1215209
60.28	-4.27	26.458228	29.958228	32.758228	290.9152086	17.765209	279.2565869	6.1065869
60.32	-4.19	26.540697	30.040697	32.840697	290.5507087	17.400709	278.9341295	5.7841295
60.4	-4.54	26.179896	29.679896	32.479896	292.1555997	19.0056	280.3531945	7.2031945
60.44	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
60.48	-4.53	26.190204	29.690204	32.490204	292.109376	18.959376	280.3123487	7.1623487
60.52	-4.72	25.994341	29.494341	32.294341	292.9913962	19.841396	281.0914842	7.9414842
60.56	-4.55	26.169587	29.669587	32.469587	292.2018453	19.051845	280.394058	7.244058
60.6	-4.74	25.973724	29.473724	32.273724	293.084706	19.934706	281.1738769	8.0238769
60.64	-4.48	26.241747	29.741747	32.541747	291.8785863	18.728586	280.1083876	6.9583876
60.68	-4.5	26.22113	29.72113	32.52113	291.9708365	18.820836	280.1899186	7.0399186
60.72	-4.61	26.107735	29.607735	32.407735	292.479781	19.329781	280.6396153	7.4896153
60.76	-4.73	25.984032	29.484032	32.284032	293.0380399	19.88804	281.1326715	7.9826715
60.8	-4.89	25.819095	29.319095	32.119095	293.7873822	20.637382	281.7941405	8.6441405
60.9	-4.74	25.973724	29.473724	32.273724	293.084706	19.934706	281.1738769	8.0238769
61	-4.62	26.097427	29.597427	32.397427	292.5261807	19.376181	280.6806043	7.5306043
61.1	-4.56	26.159278	29.659278	32.459278	292.2481129	19.098113	280.4349395	7.2849395
61.2	-4.8	25.911872	29.411872	32.211872	293.3651709	20.215171	281.4214905	8.2714905

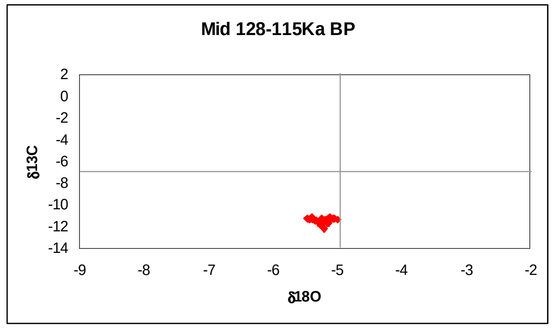
61.3	-4.68	26.035575	29.535575	32.335575	292.8050438	19.655044	280.9269158	7.7769158
61.4	-4.62	26.097427	29.597427	32.397427	292.5261807	19.376181	280.6806043	7.5306043
61.5	-4.46	26.262364	29.762364	32.562364	291.7864234	18.636423	280.0269277	6.8769277
61.6	-4.68	26.035575	29.535575	32.335575	292.8050438	19.655044	280.9269158	7.7769158
61.6	-4.52	26.200513	29.700513	32.500513	292.0631742	18.913174	280.2715209	7.1215209
61.7	-4.42	26.303599	29.803599	32.603599	291.6023593	18.452359	279.864221	6.714221
61.8	-4.44	26.282982	29.782982	32.582982	291.6943478	18.544348	279.9455389	6.7955389
61.9	-4.64	26.07681	29.57681	32.37681	292.6190465	19.469047	280.7626361	7.6126361
62	-4.59	26.128353	29.628353	32.428353	292.3870476	19.237048	280.5576912	7.4076912
62.2	-4.78	25.932489	29.432489	32.232489	293.2715932	20.121593	281.33888	8.18888
62.3	-4.44	26.282982	29.782982	32.582982	291.6943478	18.544348	279.9455389	6.7955389
62.4	-4.67	26.045884	29.545884	32.345884	292.7585113	19.608511	280.8858188	7.7358188
62.5	-4.68	26.035575	29.535575	32.335575	292.8050438	19.655044	280.9269158	7.7769158
62.6	-4.68	26.035575	29.535575	32.335575	292.8050438	19.655044	280.9269158	7.7769158
62.68	-4.82	25.891255	29.391255	32.191255	293.4588384	20.308838	281.5041738	8.3541738
62.9	-4.94	25.767552	29.267552	32.067552	294.0227332	20.872733	282.001809	8.851809
63.05	-5.08	25.623231	29.123231	31.923231	294.684737	21.534737	282.5857324	9.4357324
63.19	-4.98	25.726317	29.226317	32.026317	294.2114217	21.061422	282.1682748	9.0182748
63.33	-4.66	26.056192	29.556192	32.356192	292.7120009	19.562001	280.8447399	7.6947399
63.46	-4.72	25.994341	29.494341	32.294341	292.9913962	19.841396	281.0914842	7.9414842
63.6	-4.57	26.14897	29.64897	32.44897	292.2944025	19.144402	280.4758388	7.3258388
63.74	-4.65	26.066501	29.566501	32.366501	292.6655126	19.515513	280.803679	7.653679
63.88	-4.68	26.035575	29.535575	32.335575	292.8050438	19.655044	280.9269158	7.7769158
64	-4.53	26.190204	29.690204	32.490204	292.109376	18.959376	280.3123487	7.1623487
64.15	-4.44	26.282982	29.782982	32.582982	291.6943478	18.544348	279.9455389	6.7955389
64.29	-4.27	26.458228	29.958228	32.758228	290.9152086	17.765209	279.2565869	6.1065869
64.42	-4.12	26.612857	30.112857	32.912857	290.2328927	17.082893	278.6528936	5.5028936
64.56	-4.16	26.571622	30.071622	32.871622	290.4143741	17.264374	278.8134956	5.6634956
64.7	-4.43	26.29329	29.79329	32.59329	291.6483427	18.498343	279.9048711	6.7548711
64.74	-4.57	26.14897	29.64897	32.44897	292.2944025	19.144402	280.4758388	7.3258388
64.78	-4.64	26.07681	29.57681	32.37681	292.6190465	19.469047	280.7626361	7.6126361
64.82	-4.55	26.169587	29.669587	32.469587	292.2018453	19.051845	280.394058	7.244058
64.85	-4.51	26.210821	29.710821	32.510821	292.0169944	18.866994	280.2307108	7.0807108
64.89	-4.5	26.22113	29.72113	32.52113	291.9708365	18.820836	280.1899186	7.0399186
64.93	-4.63	26.087118	29.587118	32.387118	292.5726026	19.422603	280.7216112	7.5716112
64.97	-4.57	26.14897	29.64897	32.44897	292.2944025	19.144402	280.4758388	7.3258388
65	-4.43	26.29329	29.79329	32.59329	291.6483427	18.498343	279.9048711	6.7548711
65.05	-4.53	26.190204	29.690204	32.490204	292.109376	18.959376	280.3123487	7.1623487
65.08	-4.39	26.334525	29.834525	32.634525	291.4645397	18.31454	279.7423768	6.5923768
65.12	-4.35	26.375759	29.875759	32.675759	291.2810837	18.131084	279.5801653	6.4301653
65.16	-4.39	26.334525	29.834525	32.634525	291.4645397	18.31454	279.7423768	6.5923768
65.2	-4.34	26.386068	29.886068	32.686068	291.2352738	18.085274	279.5396565	6.3896565
65.24	-4.42	26.303599	29.803599	32.603599	291.6023593	18.452359	279.864221	6.714221
65.28	-4.27	26.458228	29.958228	32.758228	290.9152086	17.765209	279.2565869	6.1065869
65.32	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
65.36	-4.34	26.386068	29.886068	32.686068	291.2352738	18.085274	279.5396565	6.3896565
65.4	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
65.43	-4.34	26.386068	29.886068	32.686068	291.2352738	18.085274	279.5396565	6.3896565
65.46	-4.24	26.489154	29.989154	32.789154	290.7783604	17.62836	279.1355344	5.9855344
65.5	-4.29	26.437611	29.937611	32.737611	291.0065481	17.856548	279.3373762	6.1873762
65.54	-4.04	26.695326	30.195326	32.995326	289.8709484	16.720948	278.3325205	5.1825205
65.58	-4.26	26.468536	29.968536	32.768536	290.8695711	17.719571	279.2162186	6.0662186
65.62	-4.31	26.416993	29.916993	32.716993	291.0979737	17.947974	279.4182356	6.2682356
65.65	-4.06	26.674708	30.174708	32.974708	289.9613075	16.811308	278.4125101	5.2625101
65.69	-3.88	26.860263	30.360263	33.160263	289.1511036	16.001104	277.6950754	4.5450754
65.73	-4.11	26.623165	30.123165	32.923165	290.1875755	17.037576	278.6127864	5.4627864
65.77	-3.84	26.901498	30.401498	33.201498	288.9719788	15.821979	277.5363972	4.3863972
65.8	-3.9	26.839646	30.339646	33.139646	289.240791	16.090791	277.7745166	4.6245166
65.84	-3.95	26.788103	30.288103	33.088103	289.4653752	16.315375	277.9734182	4.8234182
65.88	-3.89	26.849955	30.349955	33.149955	289.1959369	16.045937	277.7347874	4.5847874
65.923	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567
65.96	-4.46	26.262364	29.762364	32.562364	291.7864234	18.636423	280.0269277	6.8769277
66	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
66.03	-4.1	26.633474	30.133474	32.933474	290.1422796	16.99228	278.5726966	5.4226966
66.07	-4.08	26.654091	30.154091	32.954091	290.0517512	16.901751	278.4925688	5.3425688

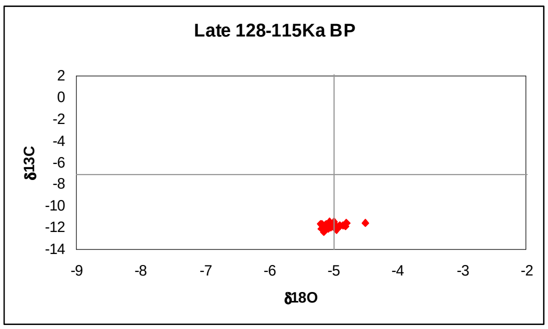
66.11	-4.16	26.571622	30.071622	32.871622	290.4143741	17.264374	278.8134956	5.6634956
66.15	-4.07	26.6644	30.1644	32.9644	290.0065188	16.856519	278.4525309	5.3025309
66.19	-4.34	26.386068	29.886068	32.686068	291.2352738	18.085274	279.5396565	6.3896565
66.23	-3.95	26.788103	30.288103	33.088103	289.4653752	16.315375	277.9734182	4.8234182
66.26	-4.17	26.561314	30.061314	32.861314	290.4597976	17.309798	278.8536895	5.7036895
66.3	-4.18	26.551005	30.051005	32.851005	290.5052425	17.355243	278.8939008	5.7439008
66.34	-4.29	26.437611	29.937611	32.737611	291.0065481	17.856548	279.3373762	6.1873762
66.38	-4.41	26.313907	29.813907	32.613907	291.5563977	18.406398	279.8235886	6.6735886
66.42	-3.84	26.901498	30.401498	33.201498	288.9719788	15.821979	277.5363972	4.3863972
66.45	-3.9	26.839646	30.339646	33.139646	289.240791	16.090791	277.7745166	4.6245166
66.49	-3.95	26.788103	30.288103	33.088103	289.4653752	16.315375	277.9734182	4.8234182
66.53	-3.89	26.849955	30.349955	33.149955	289.1959369	16.045937	277.7347874	4.5847874
66.57	-3.81	26.932423	30.432423	33.232423	288.8378535	15.687853	277.417567	4.267567
66.61	-4.46	26.262364	29.762364	32.562364	291.7864234	18.636423	280.0269277	6.8769277
66.64	-4.4	26.324216	29.824216	32.624216	291.5104578	18.360458	279.7829739	6.6329739
66.68	-4.1	26.633474	30.133474	32.933474	290.1422796	16.99228	278.5726966	5.4226966
66.72	-4.08	26.654091	30.154091	32.954091	290.0517512	16.901751	278.4925688	5.3425688
66.76	-4.16	26.571622	30.071622	32.871622	290.4143741	17.264374	278.8134956	5.6634956
66.8	-4.07	26.6644	30.1644	32.9644	290.0065188	16.856519	278.4525309	5.3025309
66.84	-4.34	26.386068	29.886068	32.686068	291.2352738	18.085274	279.5396565	6.3896565
66.88	-3.95	26.788103	30.288103	33.088103	289.4653752	16.315375	277.9734182	4.8234182
66.91	-4.17	26.561314	30.061314	32.861314	290.4597976	17.309798	278.8536895	5.7036895
66.95	-4.18	26.551005	30.051005	32.851005	290.5052425	17.355243	278.8939008	5.7439008
66.97	-4.29	26.437611	29.937611	32.737611	291.0065481	17.856548	279.3373762	6.1873762
67	-4.41	26.313907	29.813907	32.613907	291.5563977	18.406398	279.8235886	6.6735886

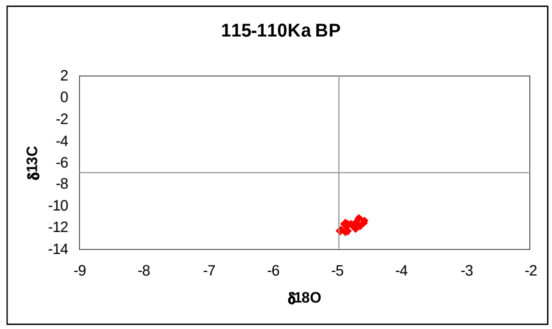
APPENDIX C:

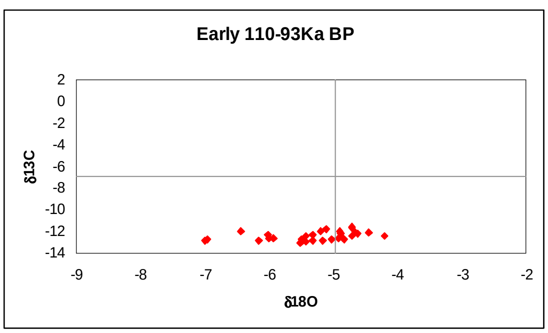
Scatter plots of $\delta^{18}O$ to $\delta^{13}C$ from Soreq Cave speleothem record.

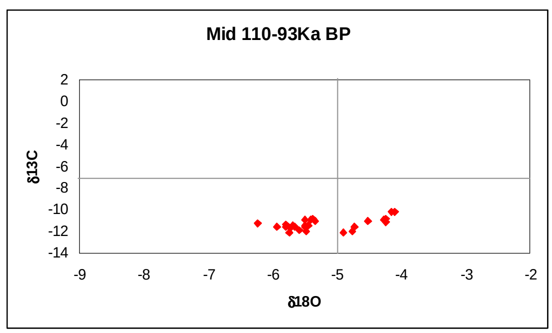


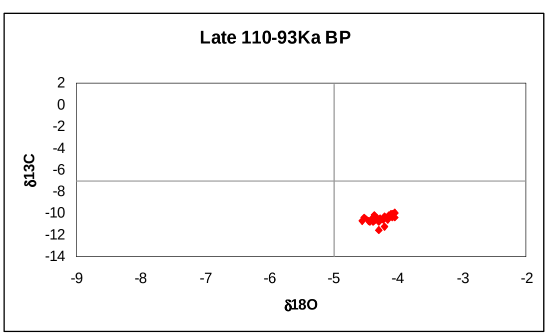


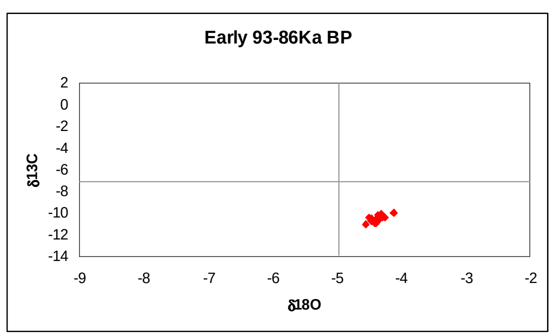


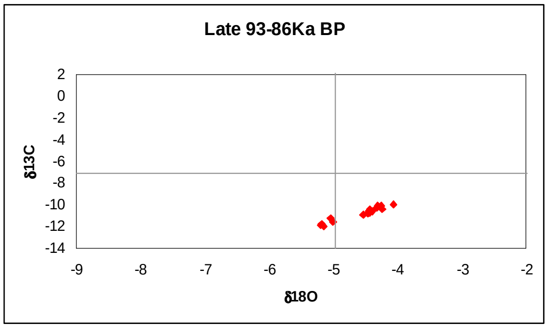


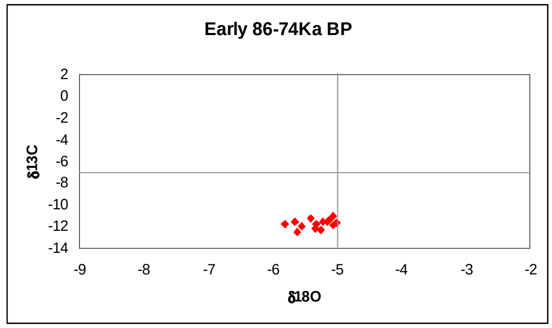


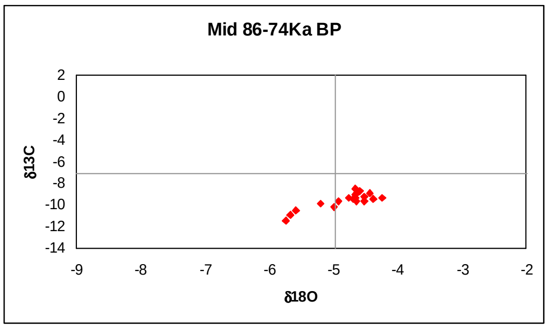


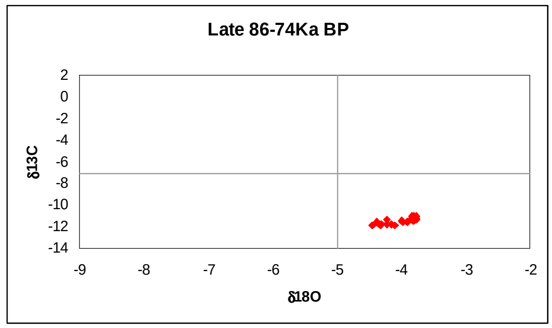


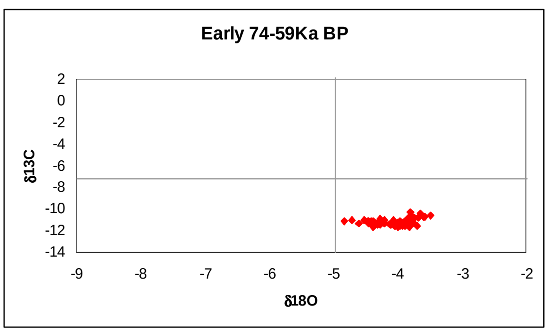


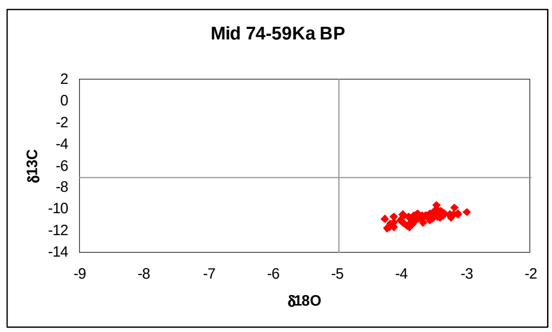

Late 93-86Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

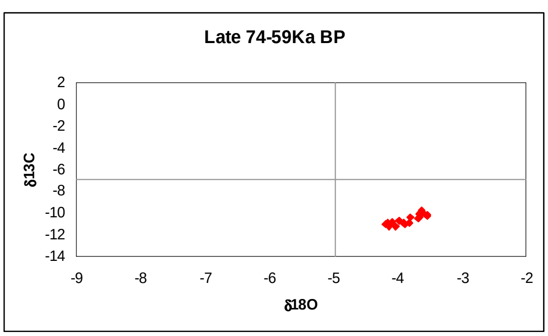

Early 86-74Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

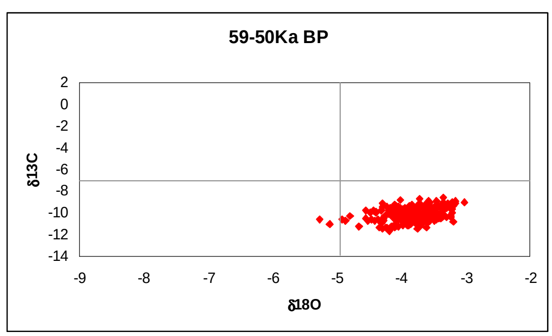

Mid 86-74Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

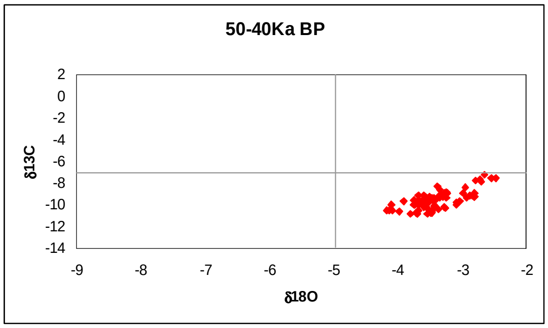

Late 86-74Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

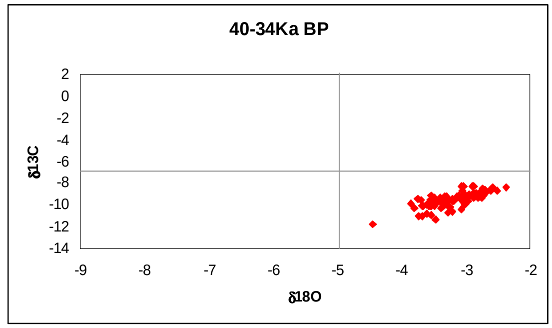

Early 74-59Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

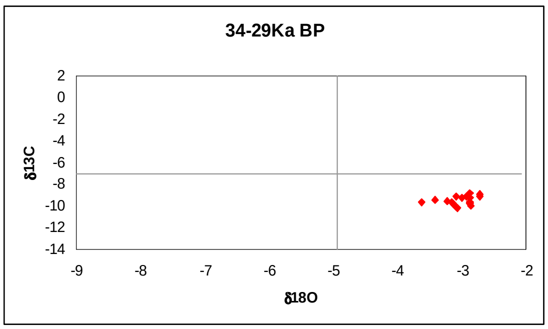

Mid 74-59Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

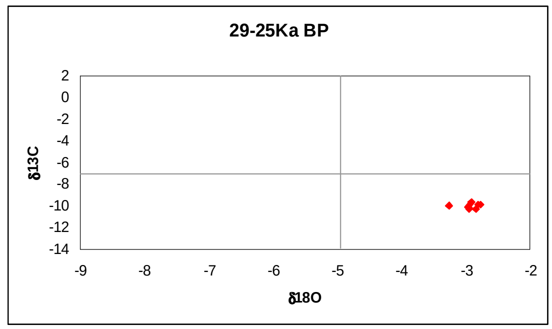

Late 74-59Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O


59-50Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

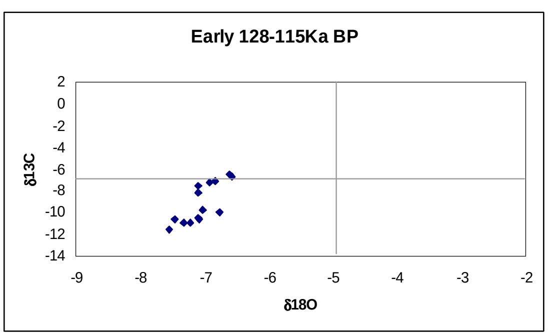


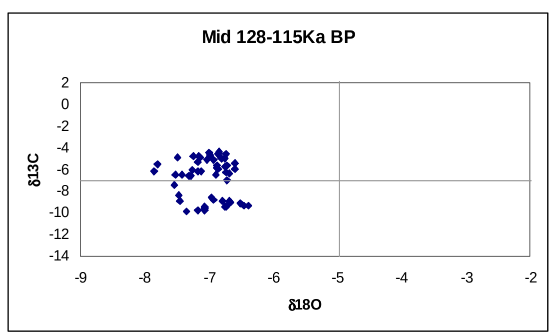


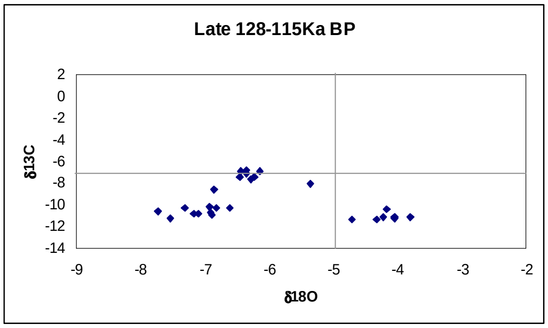


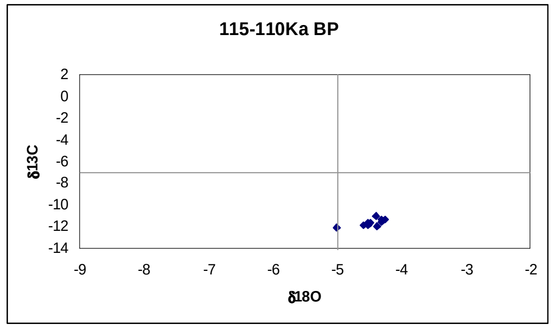


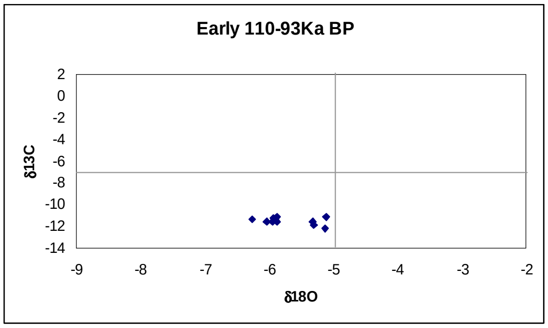
Scatter plots of $\delta^{18}O$ to $\delta^{13}C$ from Peqiin Cave speleothem record.

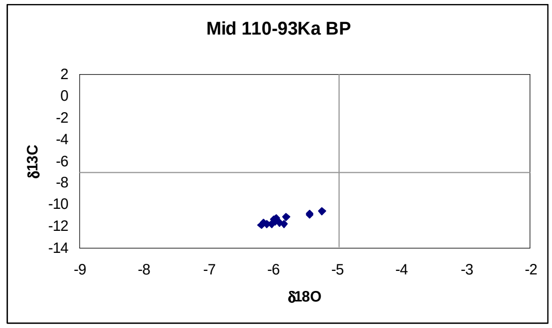


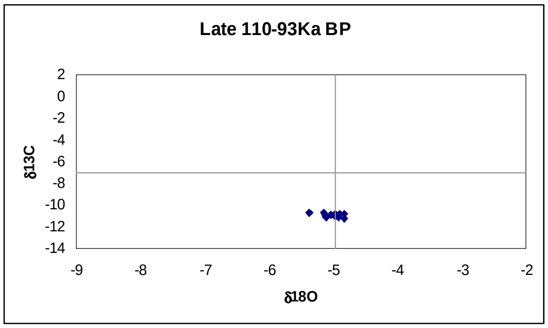


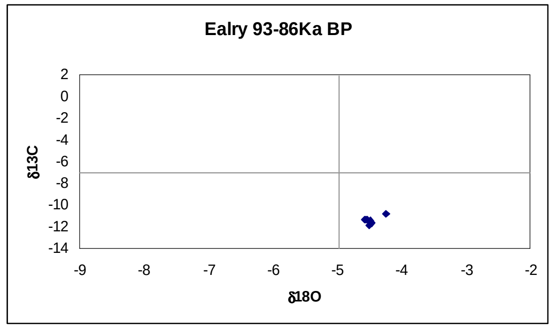

Late 128-115Ka BP
δ13C
δ18O

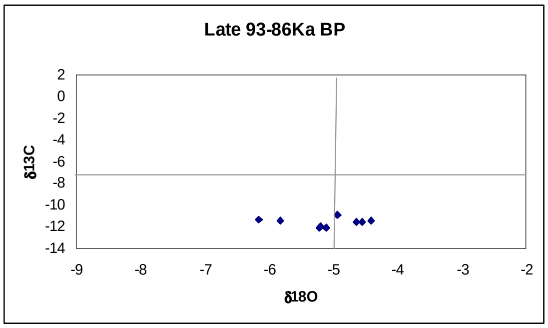

115-110Ka BP
δ13C
δ18O

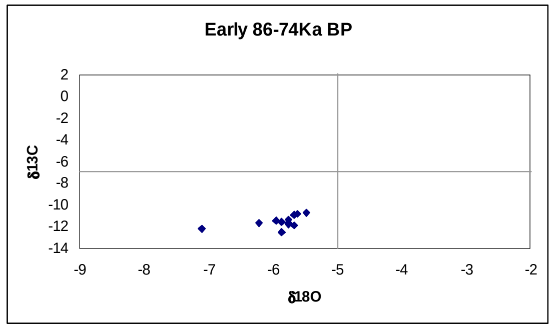

Early 110-93Ka BP
δ13C
δ18O

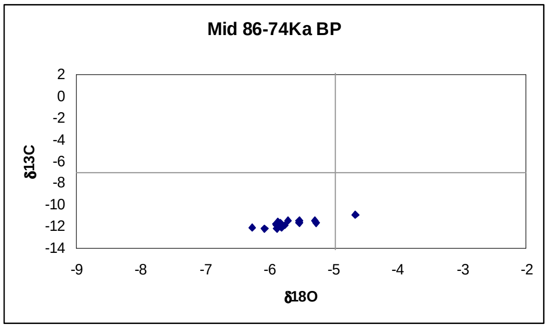

Mid 110-93Ka BP
δ13C
δ18O

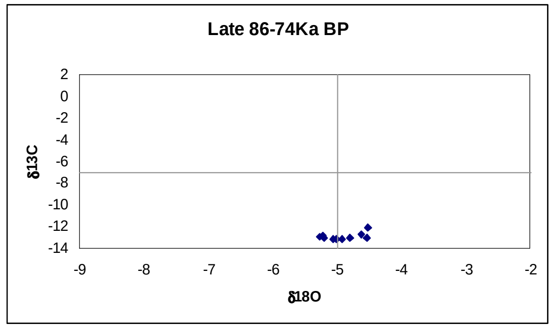

Late 110-93Ka BP
δ13C
δ18O

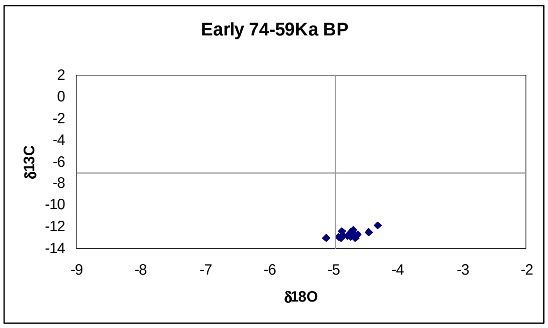

Ealry 93-86Ka BP
δ13C
δ18O

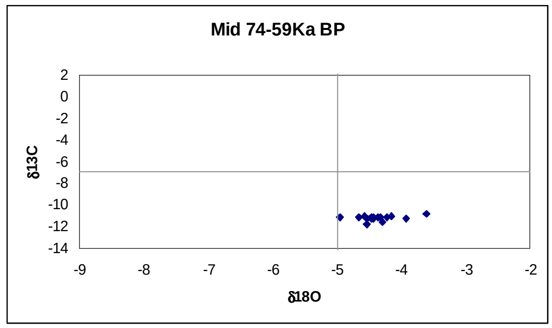

Late 93-86Ka BP
δ13C
δ18O

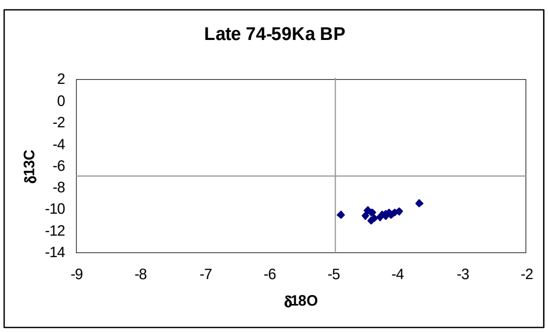

Early 86-74Ka BP
δ13C
δ18O

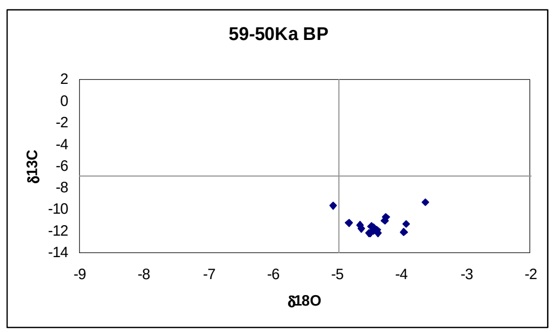

Mid 86-74Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

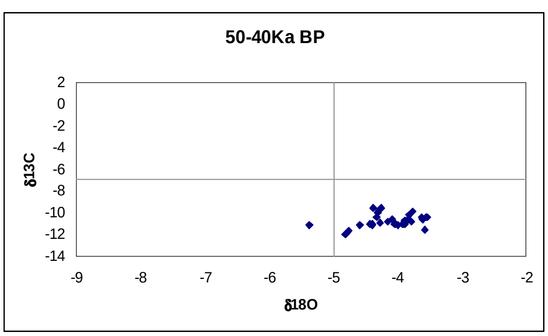

Late 86-74Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

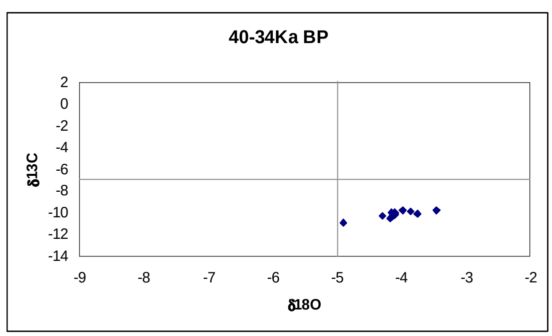

Early 74-59Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O


Mid 74-59Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O


Late 74-59Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O


59-50Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O


50-40Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O


40-34Ka BP
δ13C
2
0
-2
-4
-6
-8
-10
-12
-14
-9 -8 -7 -6 -5 -4 -3 -2
δ18O

Scatter plots of $\delta^{18}O$ to $\delta^{13}C$ from Ma’ale Efrayim Cave speleothem record.