mchaudhary, nrabideaux, ddeocampo

We analyze core material from East African Rift basins to understand environmental change over the past few million years, and how that change is associated with human evolution and cultural adaptations. We conducted XRD bulk powder & oriented clay analysis, as well as XRF analysis on HSPDP-WTK core samples to identify mineralogical trends and attempt to resolve a paleoenvironmental signal from sediments associated with hydrothermal alteration. XRD analysis identified mixed-layered illite-smectite (I/S) throughout the core. The illite-smectite reaction most commonly occurs during burial diagenesis, which causes dissolution of smectite and precipitation of illite within mixed-layer I/S. Mixed-layer I/S associated with hydrothermal systems produces varying degrees of illitization down-core. I/S produced through burial diagenesis increases with greater depth. Another indicator of high temperature hydrothermal alteration was the presence of authigenic albite as albitization of primary feldspars occurs at temperatures $\geq 100^0$C. Both randomly-oriented powder and oriented clay analyses were performed to identify bulk & clay mineralogy. XRF analysis was employed to determine the elemental constituents of unaltered and altered material. XRD bulk analysis showed that the mineralogy is composed of mostly Mg-calcite, anorthite, and quartz above the faulted section, and oriented clay analysis indicated a low degree of illitization, suggesting little to no alteration. Within the most faulted interval bulk analysis indicated significant hydrothermal alteration, with mineral components of albite and calcite, and mixed-layered I/S with ~30-50% illite. In the deepest sections of the core, analysis revealed that quartz was the primary component along with associated pyrite, zircon, and olivine, and clay analysis revealed I/S with up to ~70% illite. Hydrothermal alteration associated with tectonic activity in the West Turkana basin is indicated by the presence of mixed-layer I/S proximal to fault breccias within the core and what is likely the precipitation of authigenic quartz below the fault breccias. Coupled mineralogical and geochemical analysis aid in the identification of hydrothermally altered versus unaltered sediments, which can subsequently be used to resolve paleoenvironmental information.