2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)

Paper No. 292-5
Presentation Time: 9:15 AM

ILLITIZATION OF SMECTITE DUE TO FAULT RELATED HYDROTHERMAL ALTERATION IN HSPDP WEST TURKANA CORE AS REVEALED BY CLAY MINERALOGY: IMPLICATIONS FOR CORE INTERPRETATION

RABIDEAUX, Nathan M.[1], DEOCAMPO, Daniel M.[1], FEIBEL, Craig S.[2], BECK, Catherine C.[3] and NIELSON, Dennis L.[4], (1)Geosciences, Georgia State University, 24 Peachtree Center Avenue Northeast, Atlanta, GA 30303, (2)Earth and Planetary Sciences, Rutgers University, 610 Taylor Road, Piscataway, NJ 08854, (3)Geosciences Dept., Hamilton College, 198 College Hill Rd, Clinton, NY 13323, (4)DOSECC Exploration Services, DES, 2075 S. Pioneer Rd, Salt Lake City, UT 84104, nrabideaux1@student.gsu.edu

Mixed-layered illite-smectite (I/S) was identified using X-ray diffraction (XRD) on samples from the West Turkana-Kaito (WTK) Core recovered during the Hominin Sites and Paleolakes Drilling Project (HSPDP). The illitization of smectite has been studied for decades. The most commonly accepted process driving this reaction occurs during diagenesis of siliciclastic clay minerals at depth due to pressure and temperature, which causes dissolution of hydrous smectite and the reprecipitation of relatively anhydrous illite within interstratified I/S layers. In more recent studies more attention has been given to biogenic and hydrothermal alteration processes. The mixed-layered I/S in the basal section of the WTK core is most likely formed though hydrothermal alteration associated with fault breccias in the lower section of the ~200 m core. We conducted both random orientation bulk mineralogical powder analysis and oriented clay mineralogy analysis via XRD on ~0.01µm size fraction sediments; percent illite contributions estimated using *Moore and Reynolds*' (1989) Δº2Θ technique. XRD powder analysis (bulk) revealed that near the top of the fault breccia zone the mineralogy is composed of mostly magnesium-calcite, anorthite, and α-quartz (or tridymite). The oriented analysis (clay) indicated the clay mineralogy was primarily interstratified smectite and I/S with ~50% illite. Within the fault breccia zone bulk analysis indicated the primary mineral components of albite and orthoclase, while clay analysis revealed mixed-layer I/S containing ~20-30% interstratified illite. However, in the most basal sections of the core bulk mineralogical analysis revealed that α-quartz was the primary component along with calcite, albite, and pyrite, while clay analysis indicated smectite and interstratified I/S with ~30-40% illite contribution. The presence of interstratified I/S within the fault breccias and what is likely α-quartz formed from diagenetically altered diatomites throughout the breccias indicate hydrothermal alteration associated with tectonic activity in the West Turkana basin.