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375-2: A CLAY MINERAL ANALYSIS OF SAMPLES FROM HOMININ SITES AND PALEOLAKES DRILLING PROJECT WTK CORE FROM THE TURKANA BASIN: A GLIMPSE INTO THE EAST AFRICAN PLEISTOCENE

Wednesday, 25 October 2017
09:00 AM - 06:30 PM
Washington State Convention Center - Halls 4EF

To further our understanding of the relationship between environmental change and hominin evolution, at an important archeological and paleontological locality, XRD bulk analysis was completed on 1,183 core samples from a drilling core collected in West Turkana, Kenya. The core itself covers about 1.354 -1.85 Ma. Most minerals present are detrital feldspars, mica, and quartz. The authigenic minerals present are mostly carbonates, zeolites, and sulfur bearing minerals such as gypsum and pyrite. The few metal oxides present may be derived from paleosols in the core. This particular study is focused almost entirely on the data gathered from the XRD analysis of clay samples. We analyzed 70 samples from the submicron fraction for clay mineralogy. Both oriented and randomly oriented analyses were completed in order to characterize the clay minerals present.

There do not seem to be any discernable trends in the clay fraction analyses. The clays are a mix of illite, smectite, and interstratified illite/smectite. The clays have varying amounts of illite, ranging from 10 percent illite to 75 percent illite. Illitization of smectite most commonly occurs through burial diagenesis, when K^+ becomes readily available from dissolution of K-feldspar and muscovite. Hydrothermal activity and microbial reduction of Fe within clays also play important roles in conversion of smectite to illite. Clay fraction analyses indicate that most of these clays are dioctahedral clay minerals that are likely aluminum rich and the weathering products of volcanoclastic and other materials in the surrounding watershed. The abundance of dioctahedral clays suggests that they were formed in the surrounding highlands and were washed into a freshwater system as detritus in fluvial deposits. Very few trioctahedral phases have been identified in the 70 samples chosen, which suggests that the basin waters were not evaporated to highly saline conditions for any significant time. The low abundance of trioctahedral clays could also be evidence that this area has not always been home to hydrologically closed lake systems such as the modern Lake Turkana. This data will be used in an ongoing effort to construct a high resolution mineralogical record for integration with biological and other records of environmental and climatic change during the Plio-Pleistocene.

Authors

David M. Davis
Georgia State University

Craig S. Feibel
Rutgers University

Nathan M. Rabideaux
Georgia State University

Andrew S. Cohen
University of Arizona

Daniel M. Deocampo
Georgia State University

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