2015 GSA Annual Meeting in Baltimore, Maryland, USA (1-4 November 2015)

Paper No. 171-9
Presentation Time: 3:55 PM

AUTHIGENIC MINERALS AS PALEOSALINITY INDICATOR FROM LAKE MAGADI, KENYA: BASED ON XRD ANALYSIS OF HSPDP-MAG CORE MATERIAL

RABIDEAUX, Nathan, Geosciences, Georgia State University, Atlanta, GA 30307, DEOCAMPO, Daniel M., Geosciences, Georgia State University, 24 Peachtree Center Avenue Northeast, Atlanta, GA 30303, LOWENSTEIN, Tim K., Department of Geological Sciences and Environmental Studies, Binghamton University, Binghamton, NY 13902, RENAUT, Robin W., Dept. of Geological Sciences, University of Saskatchewan, 114 Science Place, Saskatoon, SK S7N 5E2, Canada, OWEN, R. Bernhart, Dept. of Geography, Hong Kong Baptist University, Kowloon Tong, Hong Kong, MUIRURI, Veronica M., Geography, Hong Kong Baptist University, Kowloon Tong, Hong Kong, Hong Kong and COHEN, Andrew S., Department of Geosciences, University of Arizona, Tucson, AZ 85721, nmrabideaux@gmail.com

Drill cores were collected at Lake Magadi in the South Kenya Rift as part of the Hominin Sites and Paleolakes Drilling Project. The main objective is to reconstruct paleoenvironmental conditions in the basin during the last ~800 kyr, and to understand environmental and climate change related to hominin evolution and stone tool technology during that time. Most of the sediments in the Lake Magadi cores are authigenic minerals, which are useful indicators of paleolake salinity and geochemistry. Analysis of core material has revealed intervals of authigenic quartz, carbonates, feldspars, and zeolites, as well as authigenic clay minerals. Zeolites are a common authigenic silicate mineral found in sedimentary rocks, and primarily form from alteration of volcanic glass in saline, alkaline waters. Prominent zeolites present include erionite, phillipsite, mordenite, clinoptilolite, and analcime. Erionite in Lake Magadi sediments formed from direct alteration of trachyte glass in H_2O, while other zeolite species formed from precursor zeolites. Analcime also

formed from Na-Al-Si gel interacting with lake brine. Authigenic feldspars formed through alteration of precursor feldspars and or zeolites, as K-enrichment produced sanidine and Na-enrichment formed albite. Authigenic carbonates formed in less-saline, alkaline waters, with calcite having formed at the lake margin or in fresher water, while Mg-calcite formed more in the central basin and or with increasing salinity. Dolomite was likely produced through secondary processes: Mg-replacement of Ca in other carbonate minerals. Authigenic clay minerals in the core include smectite, illite, and illite-smectite, with Mg-enrichment being an indicator of increasing salinity. Lake Magadi began as a primarily freshwater lake, which is indicated by carbonate deposits and the lack of prominent zeolitic alteration, as well as freshwater diatom taxa. A sharp transition to more saline, alkaline waters is marked by the onset of pronounced zeolitic facies and Mg-enrichment of carbonates. Lake Magadi became increasingly saline and alkaline due to regional tectonic and or climatic forcing. These data provide insight into the landscape and geochemical histories of the basin, which will aid in our understanding of hominin evolution in this region during that time.