LAKE CARPENTER: A GEOCHEMICAL RECORD OF AN APTIAN–ALBIAN LAKE SYSTEM

AISHA AL-SUWAIDI[1], MARINA SUAREZ[2], ELIZABETH MONTGOMERY[2], MARK PAIGE[2], CELINA SUAREZ[3] AND JAMES KIRKLAND[4]

[1]Petroleum Geoscience Dept., Petroleum Institute, PO Box 2533, Abu Dhabi, UAE, aalsuwaidi@pi.ac.ae

[2] Dept. of Geological Sciences, The University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, USA, marina.suarez@utsa.edu, marquise.paige@utsa.edu

[3] Dept. of Geosciences, 340 N. Campus Drive, 216 Gearhart Hall, University of Arkansas, Fayetteville, AR 72701, USA, casuarez@uark.edu.

[4]Utah Geological Survey, 1594 W. North Temple, Suite 3110PO Box 146100, Salt Lake City, UT 84114-6100, USA, jameskirkland@utah.gov.

Lacustrine sediments from the Aptian-Albian Ruby Ranch Member of the Cedar Mountain Formation dubbed "Lake Carpenter,", near Moab, Utah, reveal a complex history associated with changing climatic conditions, and biomass availability as well as recording global carbon perturbations. Organic and carbonate carbon isotopes, RockEval, handheld XRF, XRD, clumped isotopes as well as detailed petrographic analysis was conducted to reconstruct the paleoclimatic and environmental conditions recorded in the sediments. The age of the succession is constrained by single crystal zircon ages of ~111.04 (-1.28/+6.75) MA and 113.33(-5.81/+2.69) MA at the base of the succession. Carbon isotope values of sedimentary organic carbon range from -21.1 to -32.3‰. Isotope values of carbonates range from -12.0 to +8.8‰ for δ^{13}Ccarb and from -8.9 to +1.8‰ for δ^{18}Ocarb. The carbon isotopic values covary, signifying a hydrologically-closed lake system. XRD analysis a reveal authigenic mixed calcite-dolomite system, with increasing amounts of dolomite up-section, supporting a closed-system and increasingly arid conditions. The lake system records a complex series of events likely associated with changing weather patterns in a greenhouse world with a gradual shift from humid conditions with high biomass production to a more arid system as the lake evolves and eventually dries out.

Carbon isotope data from the succession can be compared with biostratigraphically well constrained time equivalent marine successions, suggesting that although this is a lacustrine succession, the introduction of isotopically light carbon in to the atmosphere in the Early Albian is preserved in organic matter in the lake.