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# 270-3: CHEMOSTRATIGRAPHIC ANALYSIS USING LASER-INDUCED BREAKDOWN SPECTROSCOPY: MARS, BY WAY OF THE NEWARK BASIN

**Tuesday, 24 October 2017**
**09:00 AM - 06:30 PM**
*Washington State Convention Center - Halls 4EF*

Cyclical patterns of sediment are evident in images from various Mars missions and some have been attributed to orbitally paced variations in the ancient climate of that planet (1). Here we explore ground-truthing extraterrestrial applications of LIBS for chemostratigraphic analysis by examining lacustrine strata of the Newark Rift Basin. These Triassic-Jurassic deposits have been interpreted as recording lake level changes paced by Milankovitch climate forcing (2). The Newark Basin Coring Project (NBCP) collected over 6 km of cores spanning an estimated 32 Ma allowing in-depth study of this cyclicity. Previous studies of the NBCP cores used sedimentological analysis to classify sedimentary features into semi-quantitative depth ranks that were used to assess the dominant frequencies lake level changes recorded in the cores. Our study uses laser induced breakdown spectroscopy (LIBS) as an independent proxy for lacustrine cyclicity. The cores were sampled at 61 cm (2-ft, driller depth) intervals within a section of the Nursery core spanning a wide range of lithologies. Chemical composition data were analyzed using principle components analysis and compared to the previously analyzed depth rank data to assess the cyclicity and to further study the chemical variations that come along with these cycles. This new chemical data supports the earlier findings both visually and statistically. Further analysis will allow deeper insight into how the orbitally-paced lake-level cycles effected the chemical composition of the layers deposited. chemical composition of the layers deposited. Our agreement with past depth rank analyses in the Newark Basin is a step towards proof-of-concept for planetary applications of LIBS for chemostratigraphic analysis on Mars with the Curiosity rover and future missions.

1 Lewis et al. 2008 Science 322(5907):1532-1535. 2 Olsen & Kent 1996 Palaeogeo Palaeoclim Palaeoeco 122:1-26.

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