EGU2020-12712
https://doi.org/10.5194/egusphere-egu2020-12712
EGU General Assembly 2020

Changes in biogeochemistry recorded in the Lisan formation and the Dead Sea Basin

Alexandra Turchyn[1], Harold Bradbury[1], and Adi Torfstein[2]
[1]Cambridge, Earth Sciences, United Kingdom of Great Britain and Northern Ireland (avt25@cam.ac.uk)
[2]Interuniversity Institute for Marine Sciences, Eilat, Israel

Terrestrial climate archives provide a rich array of information on regional climate dynamics that often can link to global climate change. A range of new metal and coupled isotope proxies is helping to unlock the most information from terrestrial archives and this paleoclimate information. The Jordon-Arava valley, tectonically active since the early Neogene, is one of the world's largest pull-apart basins. Throughout the Pleistocene to the Holocene, the valley contained a series of lacustrine water bodies. As the valley is located on the boundary between the African-Arabian deserts and the Mediterranean regional climatic zone, studies of past conditions in these lacustrine bodies allows the reconstruction of changes in the regional hydrological cycle. Lacustrine sediments, such as those found in the Jordon-Arava valley, record paleoclimatic information similar to that found within marine sedimentary archives and often at much higher resolution, from millennial to even annual timescales. The Lisan Formation is a 40-80m thick Pleistocene marl, which was deposited in Lake Lisan, which existed over the last glacial cycle in the Jordan-Arava Valley. The Lisan Formation contains a significant quantity of annually-precipitated primary aragonite, which has not recrystallised to calcite, allowing for direct U-Th dating, which has led to an exceptional age model for the Lisan Formation.

Here we discuss the measurement of the sulfur and oxygen isotopic composition of gypsum in the Lisan formation, as well as the generation of sulfur nodules within the formation that are not found in the sediment cores of the Dead Sea. We use this data to explore how sediment diagenesis, relating to changes in biogeochemistry, changes as a function of climate change over the last glacial cycle. We then present the calcium isotopic composition of the gypsum and interbedded aragonite, and show how the aragonite calcium isotopic composition covaries with lake level, and thus offers profound insight into the regional hydrological cycle in the Jordon-Arava Valley.