

# Dead Sea Water Sources during Periods of Extreme Aridity: Insights from U Isotopes

Jennifer Olson<sup>1</sup>, Yael Kiro<sup>2</sup>, Steve Goldstein<sup>1,2</sup>

<sup>1</sup>Columbia College, Columbia University, New York, NY

<sup>2</sup>Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY

The Dead Sea is a hypersaline lake whose watershed spans the Mediterranean and Saharan-Arabian climate systems. Between 2010 and 2011, the ICDP-Dead Sea Deep Drilling Project recovered a sediment core that records ~200 ka of climate history in the region. The last interglacial (MIS 5e) included periods of extreme aridity in this region. This study aimed to characterize water sources into the lake during such critically dry periods. Geochemical analyses of aragonite, detritus, and halite samples were carried out through a halite-rich interval during MIS 5e that represents a large drop in lake level, when discharge was less than half of modern levels. Uranium isotope activity ratios indicate a completely different hydrological regime during the driest periods in the Dead Sea, which is reflected by a major decrease of  $^{234}\text{U}/^{238}\text{U}$  from 1.5, typical to the modern day and glacial high-stands of the lake, to ~1. The decrease toward secular equilibrium happened gradually through the arid interval. Possible explanations include more southern sources coming into the lake, more flood events, addition dissolution of old salt (i.e. in secular equilibrium) by saline springs, and possibly shutdown of the Jordan River during extremely arid conditions. Further research will yield important information to prepare for future warming in the Middle East, a region where water access and droughts greatly affect socio-economic and political stability.