Calibration and integration of leaf wax δD and siliciclastic Sr-Nd isotopic compositions in the Dead Sea

Adi Torfstein[1] and Jessica Tierney[2]

[1] *Lamont assistant research professor, Geochemistry division, adi.torf@ldeo.columbia.edu*

[2] *NOAA postdoctoral fellow, Biology & paleo environment, tierney@ldeo.columbia.edu*

Prior Climate Center Proposals and Results.

Torfstein – Fall 2011 - award to study U-series disequilibrium in the Antarctic Peninsula. Sample collection across the Antarctic Peninsula was performed during the recent winter and will be processed together with additional samples from the British Antarctic Survey repository this spring.
Tierney – Fall 2011 – award to study leaf wax δD in sediments offshore from North Africa. Samples have been processed and measured and are currently being analyzed. Spring 2011 – award to conduct fieldwork in Bhutan – Tierney traveled to Bhutan in the Fall of 2011 and collected a few preliminary samples that have been processed; these will be used to leverage further funds; Fall 2010 – award to work on leaf wax isotopes in sediments from the Gulf of Aden; this work supported a summer intern in 2011 and was successfully used to leverage funding from NSF for a full proposal.

Abstract.

A recent drilling campaign of the Dead Sea yielded an unprecedented, long and continuous record of glacial-interglacial climate oscillations in the Levant over the last ~200 kyrs. The location of the Dead Sea at the boundary between the Sahara desert and moderate European climate zones is reflected by a sharp vegetation gradient that displays a transition from woodlands to extreme desert vegetation over only several tens of kilometers. The gradient and locus of this boundary however, have shifted dramatically in the past.

Here we propose to initiate a study of leaf wax δD patterns in the Dead Sea basin (DSB) in order to reconstruct and study the interplay between hydrological changes, vegetation type and distribution and sediment provenance in the Levant during the late Quaternary. We plan to study a preliminary sample set from across the DSB, and down core covering the last ~200 kyrs, and combine analyses of leaf wax δD and $\delta^{13}C$ with corresponding siliciclastic sediment Sr and Nd isotope compositions, in order to examine the correlation between leaf wax and sediment transport patterns. These results will be used to secure additional funding from external sources.

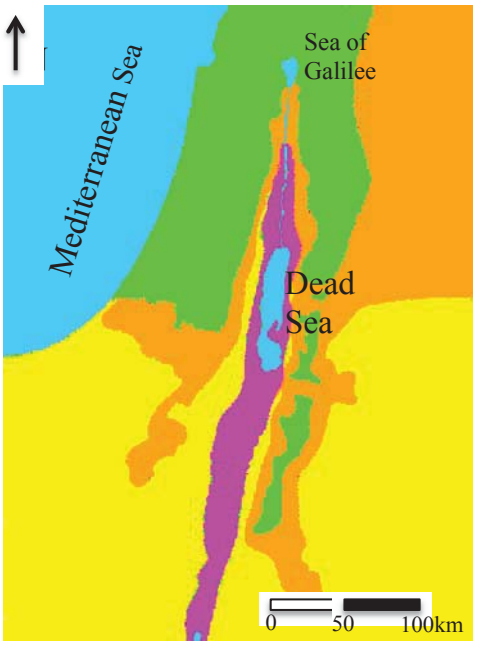

Figure 1. Location and vegetation map. The surface elevation of the Dead Sea water is at present 420 meters below sea level (mbsl), serving as the lowest point on Earth's surface. At ~340 g/l, it is also the most saline lake that exists today.
The Dead Sea basin displays a sharp vegetation gradient: from Mediterranean woodlands and shrublands (green), Irano-Turanian steppe vegetation (brown), Saharo Arabian, desertic vegetation (yellow), and Tropical Sudanian vegetation (purple) (*modified from: "Remarks on Flora and Vegetation in the Land of Israel", www.tau.ac.il/lifesci/botany/flora.htm*).