Hydrogen isotope response to changing rainfall and salinity in Australian mangroves

S. NEMIAH LADD[1]* AND JULIAN P. SACHS[1]

[1]University of Washington, School of Oceanography
*snladd@uw.edu

Salinity has recently been shown to strongly and systematically influence H (-1.5 ‰/PSU) and C (+0.2 isotope fractionation in mangrove leaf lipids. The paired measurement of both isotopes thus has the potential to yield quantitative reconstructions of salinity and water δD from mangrove lipids preserved in sediment.

Existing calibrations are from single samples of one species along a subtropical estuary. Large uncertainties remain regarding the isotopic signals associated with different mangrove species, the season of lipid formation, and the residence time of different lipids within a leaf. To address these we conducted weekly sampling of the mangroves *Rhizophora stylosa*, *Avicennia marina*, and *Aegiceras corniculatum* in Mobbs Bay, New South Wales, Australia, from September 2012 through July 2013. We measured δD values of rain, surface water, xylem water, leaf water, leaf wax *n*-alkanes, and the triterpenoids taraxerol (*R. stylosa*), stigmastanol (*A. corniculatum*), β-amyrin and stigmasterol (*A. marina*). Our sampling period encompassed the dry and wet seasons, and included a large rain event that decreased surface salinity by 32 PSU and surface water δD by 30‰. Lipid δD values of *n*-alkanes and triterpenoids decreased in response to these changes with a lag time of 2-4 weeks. Our results also indicate greater net fractionation in the production of both acetogenic and isoprenoid lipids in salt secreting mangroves (*A. corniculatum* and *A. marina*), as compared to *R. stylosa*. Additionally, we present new calibrations of the H isotopic response of mangrove lipids to changing salinity and water δD values.