

Sub-Millennial Scale Paleoceanographic Reconstructions of the Last Glacial Cycle from ODP Site 942, Amazon Fan

Principal Investigator: Athanasios Koutavas (athan@ldeo.columbia.edu)
(NOAA-UCAR Postdoctoral Fellow on Climate and Global Change, Massachusetts Institute of Technology,
and Adjunct Associate Research Scientist, LDEO)

ABSTRACT. This proposal describes a pilot study to investigate the feasibility and potential for high-resolution (sub-millennial scale) paleoclimate reconstructions from ODP site 942A in the mouth of the Amazon River. Preliminary oxygen isotope ($\delta^{18}\text{O}$) data from this site (Figure 1) indicate an extraordinarily high sedimentation rate of $\sim 100\text{cm/ky}$, which may preserve climate signals at century-scale resolution, or finer. Our primary interest is in planktonic Mg/Ca and $\delta^{18}\text{O}$ ratios, as tracers of sea surface temperature (SST) and salinity variations. Salinity at this site is controlled primarily by outflow from the Amazon River, which is in turn controlled by rainfall and moisture balance in the Amazon Basin. Dominant influences on the basin's hydrology include the position of the Intertropical Convergence Zone (ITCZ), and the strength of the South American Monsoon (SAM). The ITCZ and SAM are sensitive to variations in tropical SSTs and their gradients (which affect trade wind strength), and land-ocean temperature contrast (which affects monsoon strength). Through a combined $\delta^{18}\text{O}$ and Mg/Ca approach we hope to probe some fundamental aspects of the complex mechanisms linking tropical Atlantic SST, South American rainfall, and Amazon outflow, with particular emphasis in understanding variability of the ITCZ, SAM, and the vegetation history of tropical South America.