Intermediate water source variations in the tropical Atlantic from the last glacial maximum to present

KATHARINA PAHNKE[1]*, STEVEN L. GOLDSTEIN[2] AND SIDNEY R. HEMMING[2]

[1]Department of Geology and Geophysics, University of Hawaii, Honolulu, HI 96822, USA (*correspondence: kpahnke@hawaii.edu)
[2]Lamont-Doherty Earth Observatory of Columbia University, Palisades, New York, NY 10964, USA (steveg@ldeo.columbia.edu, sidney@ldeo.columbia.edu)

Intermediate water masses are an integral part of the global meridional overturning circulation and play an important role in redistributing heat and nutrients to the global ocean. Antarctic Intermediate Water (AAIW) formed in the Southern Ocean, is the most dominant of intermediate water masses in volume and spatial extent, and recent changes in AAIW properties suggest a swift response of AAIW to global warming [1].

Here we present neodymium isotope ratios ($^{143}Nd/^{144}Nd$, expressed in ε_{Nd} notation) measured on a mid-depth sediment core from the tropical northwest Atlantic (MD99-2198) that suggest changes in the contribution of AAIW to the mid-depth water column in the North Atlantic over the past 25, 000 years [2]. In particular, ε_{Nd} reached values of up to -9 to -8 during meltwater event Heinrich-1 (H1) and the Younger Dryas (YD). These shifts towards more positive ε_{Nd} compared to LGM and Holocene values indicate an increased northward extent of southern sourced AAIW at these times. These results are consistent with radiocarbon evidence from the North Atlantic that suggests increased incursions of old, southern-sourced intermediate water into the North Atlantic during H1 and the YD [3, 4]. Moreover, the observed changes in the source of intermediate waters in the tropical North Atlantic are in line with abrupt benthic $\delta^{13}C$ changes in the southwest Pacific [5]. The close correspondence between intermediate water changes close to the formation region of AAIW and a site in the tropical Atlantic that today lies close to the northernmost extent of AAIW, suggests a common mechanism for the observed mid-depth changes. That is, most likely variations in the northward extent of AAIW in response to climate and ocean changes in the Southern Hemisphere.

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Study of gold nanoparticle interactions with humic acid using small angle neutron scattering

V.L. PALLEM[1,2], H.A. STRETZ[1]*, M.J. M. WELLS[2,3] AND S. KLINE[4]

[1]Department of Chemical Engineering, Tennessee Technological University, Cookeville, Tennessee 38505 (*correspondence: HStretz@tntech.edu)
[2]Center for the Management, Utilization and Protection of Water Resources, Tennessee Technological University, Cookeville, Tennessee 38505
[3]Department of Chemistry, Tennessee Technological University, Cookeville, Tennessee 38505
[4]NIST Center for Neutron Research, Gaithersburg, MD 20889

Gold nanoparticles (GNPs) present a wide range of applications in diagnostic imaging, cancer therapy, and semiconductor and sensor technologies. However, the release of gold nanoparticles into the environment has implications for their interactions with environmental entities such as humic acids (HA). Small angle neutron scattering (SANS) offers a unique and very specific window for measuring structural changes taking place at the GNP/HA interface. The current study investigates the interactions of citrate-coated gold nanoparticles (CT-GNPs) with humic acid with the application of SANS. The SANS results suggest that the core size of CT-GNPs (0.6 wt %) did not change significantly in the presence of HA (1.8 mg/mL), therefore the HA may not be having significant interactions with CT-GNPs.