

**US GEOTRACES North Atlantic Section:
The fractional solubility of aerosol iron in seawater**

PI: Ana M. Aguilar-Islas

Summary: The US GEOTRACES North Atlantic Section cruise will survey the distribution of trace metals and isotopes in a basin where there is an enhanced influence from atmospheric deposition. I propose to participate in this expedition to collect and slowly leach ambient aerosols (and source materials) with large volumes of ambient surface seawater (and with other leaching solutions) in order to determine the range of fractional solubility of aerosol iron (Fe) in the North Atlantic, and to provide insight into the processes that cause this variability. The proposed work will address the guiding mission of GEOTRACES: “to identify processes and quantify fluxes that control the distributions of key trace elements and isotopes in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions”. Iron is a key trace element in the GEOTRACES program, and the proposed study will investigate the fractional solubility of aerosol Fe using a novel field approach. Results will improve our understanding of how aerosol deposition affects the surface distribution of Fe in the North Atlantic. Information obtained from this work will also help establish how changing environmental conditions (e.g. increased dust flux) may affect the distribution and speciation of Fe.

The role of iron as a limiting nutrient in many oceanic regions has been established, and atmospheric deposition has been recognized as a major source of iron in the global ocean. The fraction of iron that dissolves in seawater after its atmospheric deposition is thought to be available to phytoplankton, and thus an important parameter not only for the marine biogeochemical cycle of iron, but also for the global carbon cycle. Our estimate of this parameter is still uncertain, and the processes that control aerosol Fe dissolution in seawater are poorly understood. The GEOTRACES North Atlantic section cruise will traverse over surface waters with significantly different chemical and biological characteristics, and where atmospheric deposition includes aerosols from natural and anthropogenic sources. Thus, this cruise offers an ideal setting for investigating aerosol Fe dissolution relative to surface seawater properties and aerosol origin. Results from this project will complement the core GEOTRACES survey of the distribution of trace metals and isotopes in the North Atlantic.