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Title: The distribution of $\delta^{13}\text{C}$ -DIC across the N. Atlantic: determining the processes that control its distribution and evaluating its utility as a paleo-nutrient proxy.

I'm planning to submit a proposal to measure the $\delta^{13}\text{C}$ of dissolved inorganic carbon on the GEOTRACES cruise in the N. Atlantic. There would be three major objectives. First, to determine the spatial distribution of $\delta^{13}\text{C}$ -DIC through the water column and improve our understanding of how respiration, carbonate dissolution, mixing and preformed $\delta^{13}\text{C}$ of intermediate and deep water masses affect the distribution of $\delta^{13}\text{C}$ in the ocean. Second, to compare distributions of $\delta^{13}\text{C}$ and trace metals (e.g., Cadmium) and their relationships to nutrient distributions to evaluate their application as paleo-nutrient proxies. Third, to calculate the rates of organic carbon export rates, using the measured air-sea $\delta^{13}\text{C}$ disequilibrium and estimates of air-sea CO_2 gas exchange rates, and its impact on the $\delta^{13}\text{C}$ distribution in the surface ocean and preformed $\delta^{13}\text{C}$ of newly formed deep water.

These specific objectives address two of the GEOTRACE objectives.

To determine global ocean distributions of selected trace elements and isotopes – including their concentration, chemical speciation and physical form – and to evaluate the sources, sinks, and internal cycling of these species to characterize more completely the physical, chemical and biological processes regulating their distributions.

To understand the processes that control the concentrations of geochemical species used for proxies of the past environment, both in the water column and in the substrates that reflect the water column.

My lab has measured $\delta^{13}\text{C}$ -DIC during both the WOCE and CLIVAR programs. Relevant to the proposed Geotrace cruise, we measured $\delta^{13}\text{C}$ -DIC during the A16N, A22N and A20N CLIVAR cruises in 2003 which will provide cross over points for comparison to $\delta^{13}\text{C}$ measurements on the Geotrace cruise. Additionally, I have a collaborative project with Arne Kortzinger (U. Kiel) in which they are collecting monthly $\delta^{13}\text{C}$ -DIC samples for us at a time series station near the Cape Verde Is. to estimate the impact of seasonality in dust delivery on OC export rates.