Geophysical Research Abstracts
Vol. 16, EGU2014-2198, 2014
EGU General Assembly 2014

Interannual and sub-decadal variability in hydrography and nutrient concentrations in the Cariaco Basin

Mary Scranton (1), Gordon Taylor (1), Frank Muller-Karger (2), Laura Lorenzoni (2), Enrique Montes (2), Kent Fanning (2), Robert Thunell (3), Claudia Benitez-Nelson (3), Yrene Astor (4), and Ramon Varela (4)

(1) Stony Brook University, School of Marine and Atmospheric Sciences, Stony Brook NY USA (mary.scranton@stonybrook.edu, 631-632-8735), (2) College of Marine Science, University of South Florida, St. Petersburg, FL USA, (3) Department of Earth and Ocean Sciences, University of South Carolina, Columbia, SC USA, (4) Estación de Investigaciones Marinas de Margarita, Fundación de la Salle de Ciencias Naturales, Punta de Piedras, Nueva Esparta, Venezuela

The Cariaco Basin is a deep (1400 m) permanently anoxic depression on the Venezuelan continental margin. First studied in the mid-1950s, it is the site of one of the longest time series of biogeochemical data in the ocean and for the past 18 years has been intensively studied by US and Venezuelan scientists through the CARIACO Ocean Times Series program. Although the basin's geochemistry was originally thought to be in steady state, data from CARIACO have demonstrated both long term trends and short term variability in hydrography and nutrients at all depths. These trends are influenced by a number of factors including changes in the position of the ITCZ, the exchange of water between the Caribbean and the Cariaco Basin, and by changes in terrestrial influence. The long term trends include warming of surface waters by more than 1oC in 18 years, increases in surface fCO_2 (2.95 +/- 0.43 micro-atmospheres kg-1 y-1) and nDIC (1.89 +/- 0.45 micromole kg-1 y-1), decreases in pH (0.0025 +/- 0.0004 y-1), and shifts in plankton community structure. Short-term variability includes fluctuations in the depth and salinity of Subtropical Underwater and depth of the oxic/anoxic interface, changes in the depth and frequency of intrusions of oxygen-containing water into mid-depths, and episodic transport of terrestrial material into the basin after earthquakes or high precipitation events. Our results show that at least the upper 300-400 m of the water column is periodically (but not continuously) ventilated by water from the open Caribbean. Nutrient concentrations in the deep basin have increased steadily with time in a proportion reflective of the elemental ratios in the settling organic matter, although N:P ratios in the water column (for dissolved ammonium and phosphate in the sulfidic zone the ratio is approximately 16:1) differ from ratios for the accumulating nutrients (11:1) and the settling flux (approximately 5:1 to 12.5:1). This difference is likely due to long-term changes in the source material for remineralization, either because of sizeable ecosystem changes, changes in the relative importance of the terrestrial input of inorganic P or scavenging of P by mineral precipitation near the oxic/anoxic interface.