Iron fertilization and the Trichodesmium response on the West Florida shelf

Lenes, Jason M., Brian P. Darrow, Christopher Cattrall, Cynthia A. Heil, Michael Callahan, Gabriel A. Vargo, Robert H. Byrne, Joseph M. Prospero, David E. Bates, Kent A. Fanning, John J. Walsh

Limnol. Oceanogr., 46(6), 2001, 1261-1277 | DOI: 10.4319/lo.2001.46.6.1261

ABSTRACT: Prior laboratory studies of *Trichodesmium* have shown a high iron requirement that is consistent with the biochemical demand for iron in the enzyme nitrogenase. Summer delivery of iron, in the form of Saharan dust, may provide an explanation for *Trichodesmium* blooms observed in offshore waters of the West Florida shelf over the last 50 yr. During ecology and oceanography of harmful algal blooms (ECOHAB) field studies, background iron levels (0.1-0.5 nmol kg^{-1}) were found at the surface during periods of minimal dust delivery (May 2000 and October 1999). In contrast, total dissolved iron concentrations on the order of ~16 nmol kg^{-1} were measured at the West Florida shelf-break after a July 1999 Saharan dust event that was identified by advanced very high resolution radiometer (AVHRR) imagery, ground-based radiometers, air mass analysis, and aerosol samples (dust and non-sea-salt nitrate) collected throughout South Florida. The *Trichodesmium* response following this July dust event was a 100-fold increase over background biomass, reaching a surface stock of ~20 colonies L^{-1}. Surface dissolved concentrations of both inorganic and organic phosphorus decreased below detectable limits during this bloom. Dissolved organic nitrogen concentrations associated with the bloom (15-20 μM) were 3-4-fold greater than background and much larger than ambient NO_3^- concentrations (<0.5 μmol kg^{-1}). If all dissolved organic nitrogen (DON) is converted to urea and ammonium, this organic nitrogen could have supported the red tide of >20 μg chl L^{-1} of the toxic dinoflagellate, *Gymnodinium breve*, found along the West Florida coast during October 1999.

Article Links

Download Full-text PDF

Return to Table of Contents

Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for $10 per article. All L&O articles are moved into Open Access after three years.

Association for the Sciences of Limnology and Oceanography © 2013