



Availability of iron and major nutrients for phytoplankton in the north-east Atlantic Ocean

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ABSTRACT: Because of recent findings that Fe is a limiting factor for phytoplankton activity even at relatively high dissolved iron (DFe) concentrations, the potential importance of Fe limitation was revisited in the northeast Atlantic Ocean (39-45° N, 17-21° W). We report data gathered during deck incubation experiments performed at three stations in February-March 2001 with surface seawater containing DFe concentrations of ~0.40 nmol L⁻¹. At all stations, Fe addition enhanced phytoplankton growth. Fe limitation was moderate and occurred simultaneously with limitation by major nutrients. This was clearly demonstrated for diatoms that were colimited by orthosilicic acid. Micro-, nano-, and picoplankton benefited from Fe enrichment. Experiments performed with the trihydroxamate siderophore desferrioxamine mesylate B (DFOB) indicated that Fe reserves exist within the cells, especially within the larger cells. This reserve could result from luxurious storage of Fe by colimited cells during episodic atmospheric deposition of Saharan dust. Simulating concentrations of dust resulting from aerosol deposition in well-stratified surface waters, we determined that the solubility of Saharan dust was very low (<0.1% w/w) but the amount of DFe released in seawater was sufficient to relieve the Fe limitation of the ambient phytoplankton community.

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