

Deep-sea hydrothermal plumes: an important source of stabilised dissolved iron to the oceans

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Iron (Fe) is an essential micronutrient for oceanic phytoplankton, yet the debate over its sources and sinks persists. Dissolved Fe(II) in hydrothermal vent fluids is enriched ca. 10^6 -fold over open ocean values, however, as the vent-fluids enter the base of the water column abundant polymetallic particulate phases are formed: predominantly Fe-rich sulfides and Fe oxyhydroxides.

Nevertheless, we have shown 2.5 km down plume from the nearest vent site, high concentrations of dissolved Fe (20 nM) were still present. This increased stabilisation is suggested to be due to the presence of Fe colloids and organic Fe complexes and with the use of Competitive Ligand Exchange - Cathodic Stripping Voltammetry (CLE-CSV), a fraction of stabilised dissolved Fe complexes have been detected. This stabilised Fe fraction, 2.9 to 5.6 times greater than open ocean dissolved Fe concentrations (0.7 nM), is predicted to be sufficient to provide 10 – 20% of the global deep-ocean dissolved Fe budget.

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