

README

DFe was relatively high near the surface probably due to atmospheric sources, whereas below 500–700 m depth the concentrations were relatively low, < 0.4 nM, compared to typical concentrations of 0.6 nM at the same depths in the Atlantic Ocean. These relatively low concentrations are probably due to scavenging and ballasting by dust particles settling down through the water column. Especially in the Eastern Basin, and more prominent in its northern part, distinct patches with high DFe, up to 8.40 nM, were found between 200 and 3000 m depth. These patches were local, which indicates a point source and lateral transport from this source. Some of these patches coincided with sloping density lines indicating enforced along-frontal currents providing lateral transport of DFe. Sources are probably seamounts and mud volcanoes, which were found to exist at the same depths as the elevated DFe. It is conceivable that a large eddy keeps infusions of DFe isolated from mixing with other water masses. These infusions could originate from slopes or from downwards cascading materials out of canyons. Fe-binding dissolved organic ligands increase the solubility of Fe enabling high dissolved Fe concentrations, and hence longer residence time. These ligands had median total concentrations between $[Lt] = 0.77$ and $[Lt] = 1.74$ nEq of M Fe and conditional stability constants between $\log K' = 21.57$ and $\log K' = 22.13$ ($N = 156$). Median values of $[Lt]$ were higher in the upper 100 m and its median concentration increased from west to east. The $[Lt]$ concentrations did not relate to water mass or DFe concentration. The ligands were nearly saturated with Fe where DFe was elevated near the surface and completely saturated, ratio $[Lt]/DFe \leq 1$, in patches with high DFe at depth. The high DFe concentrations in these patches are extreme, if not even maximum, concentrations as any surplus Fe with respect to the ligands will tend to precipitate. Calculated inorganic Fe concentrations in the Mediterranean had minimum concentrations of 0.23 pM and below 100 m depth median concentrations that varied between 0.68 and 1.99 pM only. This suggests that the inorganic Fe concentration is the result of a steady state between binding by organic ligands and scavenging processes. Thus scavenging will not result in lower inorganic Fe concentrations and in this way the dissolved ligand concentration determines the concentration of DFe in the Mediterranean Sea.

64PE370, started 14 May 2013 departing from Lisbon (Portugal) and ended in Istanbul (Turkey) on 05 June 2013. A northern cruise (N), 64PE374, left Istanbul on 25 July 2013 and ended in Lisbon on 11 August 2013.

L and $\log K$ are measured quantities, whereas FeL, αFeL and Fe^{3+} were calculated.