

Dissolved trace metal distributions in the Mediterranean Sea: results from the recent MedBlack GEOTRACES expedition

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The Mediterranean Sea is an ideal natural setting to study the impact of atmospheric deposition on the marine biogeochemical cycling of trace metals and their isotopes due to its close proximity to the Sahara Desert and the resulting high dust input. Furthermore, the small size, semi-enclosed nature, and the relatively short residence time of water in the Mediterranean Sea (<100 yr) make it sensitive to climate change and anthropogenic perturbations. Anthropogenic influences are especially important in the Mediterranean Sea due to the large population of people living near the coast and due to the Mediterranean Sea being one of the world's busiest shipping routes.

The Mediterranean Sea is connected to the Atlantic Ocean through the Strait of Gibraltar. After entering the Mediterranean Sea, the salinity of Atlantic Water (AW) increases through evaporation and mixing with Mediterranean Water (MW). Altered AW eventually becomes dense enough to sink during brief winter cooling episodes, thereby initiating Mediterranean thermohaline circulation. Inflowing AW is balanced by evaporation and outflowing Mediterranean Outflow Water (MOW), which flows into the North Atlantic Ocean. The MOW is potentially enriched in dissolved trace metals and may therefore act as a source of dissolved trace metals to the North Atlantic Ocean.

We present a comprehensive dataset of dissolved trace metal concentrations from 54 full depth profiles collected from all the major basins of the Mediterranean Sea during the GEOTRACES (GA04N) expedition to the Mediterranean and Black Seas in 2013. All samples were processed shipboard. Trace metals measured include: Al, Sc, Ti, V, Mn, Ni, Zn, Ga, Y, Zr, Cd, La, and Pb. Assuming dissolved Al concentrations trace atmospheric deposition, progressive enrichment of dissolved Al along the west to east transect is interpreted as continuous atmospheric deposition as AW is transformed into MW. Similarly, the influence of atmospheric deposition and other marine processes on the distribution of other trace metals will be examined.