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# Preliminary study on the atmospheric contribution of metals to surface sea water at Lampedusa (Central Mediterranean Sea).

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Atmospheric deposition is an important pathway by which bioactive trace metals are delivered to the surface ocean. Although trace metals in the sea are normally present at low concentrations, they may have a considerable biological effect on the biota. Some trace metals, such as Fe, Co or Mo, may influence the productivity and species composition of phytoplankton, while others may have a toxic effect (e.g. Pb and Cu). These processes are in particular important in the Mediterranean, an oligotrophic basin where complex interactions among ocean stratification, nutrients availability, and radiation play a central role in regulating the ecosystem response to long-term occurring changes.
Here we report preliminary results on metal in surface sea water, aerosol (PM10) and deposition chemical composition in samples collected at the island of Lampedusa (35.52°N, 12.63°E), in the central Mediterranean Sea, with the aim of investigating the role of atmospheric deposition on metal concentration in surface sea water.
Aerosol and deposition are collected on the roof of the station for climate studies maintained by ENEA at Lampedusa. Surface sea water was collected near the Lampedusa oceanic observatory (35.49°N, 12.47°E) dedicated to the investigation of air-sea interaction located at south west of the Island. PM10 and deposition measurements are part of a long-term effort, while sea water samples were collected in the period May-June 2017, as part of the PAMELA (Photosynthetic Actinic Radiation Modulation Experiment at Lampedusa) campaign.
Al, As, Ba, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, V, Zn are determined in surface sea water samples by pre-concentration of about 500 mL of sea water on a column filled with Chelex 100. This ionic exchange resin has a higher affinity for bi-and poly-valent metals than for Na and other monovalent ions. The metals are than eluted by the Chelex 100 with 2.5 mL of $HNO_3$ 1M. This method also allows to avoid the interference from Na and Cl high concentrations present in this matrix.
Metals are determined by means of an Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES, Varian 720-ES) equipped with an ultrasonic nebulizer (U5000 ATC, Cetac Technologies Inc.).
The seawater samples were collected in a well stratified-low nutrient regime. Contributions from natural as well as anthropogenic sources can be identified. The most abundant metals in sea water are Zn, Fe, V and Cu with mean values of 1.01, 0.073, 0.065 and 0.063 ug/L respectively.
The concentration of metals and their enrichment factors determined at this remote site can constitute a reference to understand the source of metals in different marine ecosystems (e.g. costal water). Indeed, coastal marine waters are usually enriched in nutrients and trace metals compared with the open ocean. This enrichment is due to the direct influence of rivers, submarine groundwater discharge, atmospheric dust deposition, natural weathering, or discharging from anthropogenic sources along the coast. The release of heavy metals from anthropogenic activities is usually the major cause for their concentration increase, that may affect their natural geochemical cycles.