ATMOSPHERIC DEPOSITION FLUXES OF ALUMINIUM, IRON AND TRACE METALS IN A COASTAL STATION ON THE NW-ALBORAN SEA, (W-MEDITERRANEAN)

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The input of trace metals from the atmosphere to the water column plays a key role in ocean biogeochemical processes and is particularly important in a semi-enclosed sea like the Mediterranean. The atmospheric deposition over the whole Mediterranean is poorly constrained and hinders a clear assessment of the extent to which atmospheric elements of various anthropogenic and natural origins affect its biogeochemistry. Available data show poor spatial representation, as most of the deposition data refer to the northwestern zone. The Alboran Sea, in particular, is a very interesting case study as regards the atmospheric input because the atmospheric chemistry is dominated by antagonistic influences of natural (mainly from the Sahara) and human activity due to the relative proximity of land-based sources and densely populated shores. The biogeochemical impact of desert dust also remains a matter of discussion regarding its contribution for different major and minor elements to terrestrial and marine systems and especially its potential fertilizing role by supplying micronutrients as iron.

Atmospheric fluxes of eight trace metals (Cd, Cr, Cu, Ni, Mn, Pb, V and Zn) with Al as a crustal reference and Fe for its potential role in marine productivity, were measured by ICP-MS. In order to evaluate the presence of these elements in their differently bio-available forms, contents in the soluble and non-soluble fractions were determined. Sampling presented for this study was performed from October 2012 to March 2013 during the peak of the raining season (autumn and winter months) in Malaga (southeast of Spain, 36° 43′ 40″ N; 4° 28′ 8″ W) in an open bulk deposition collector placed 10 m above the ground. PCA analysis and the following Varimax rotation were conducted in order to obtain some information about the sources. The Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model was used to calculate the backward trajectories of air masses reaching the study region.

The atmospheric deposition fluxes were marked by the meteorological conditions, the industrial activity and the external influence of other emissions on a regional scale, principally African dust intrusions. Three intense African dust episodes, one from October, other from November and another one from March, had occurred during this campaign affecting the PM levels suspended and deposited in the south of Spain.