

## Geochemistry of Particulate Matter in the Northeast Atlantic Margin

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Suspended matter was collected during Phase I and Phase II of the OMEX project in the northern Biscay and Iberian margins of the Atlantic Ocean. The northern Biscay margin is characterised by a wide continental plateau with little terrestrial input and by intensive vertical mixing at the shelf break with enhanced primary production. In contrast, the Iberian margin is characterised by a narrow shelf with strong continental input and by seasonal upwelling with high primary production. The objective was to characterise the suspended matter by its composition in order to evaluate the sources, biogeochemical behaviour and fate of particulate material in the two contrasting European margin environments.

Three methods were used to sample the suspended matter: continuous centrifugation of surface waters, in situ filtration of large volumes of water at various depths using Stand Alone Pumps (SAPs), and sediment traps. The chemical composition of the particulate matter collected was determined for major (Si, Al, Fe, Ca, POC/PN), minor (Mg, Na, K, Mn) and trace elements (Cr, Co, Ni, Cu, Zn, Cd, Pb). Particulate material obtained by centrifugation allows the determination of the composition of suspended matter collected in the euphotic zone. SAP samples permit the assessment of the vertical evolution of suspended matter composition in the water column. These compositions are compared with those of the settling material intercepted by the sediment traps, associated with vertical fluxes driven by large particles such as faecal pellets, marine snow and other aggregates. A few samples of the upper layer of sediments

were also analysed, in order to evaluate the importance of early diagenetic processes and also to identify possible resuspension events in the water column.

Our results show that surface suspended matter is organic-rich and is considerably enriched in trace metals. This observation confirms the biological removal of many trace elements and the important role of plankton in the biogeochemical cycling of these constituents in the ocean. Vertical profiles of particulate composition show the rapid remineralisation of the particulate trace metals due to respiration of organic matter, mainly within the upper 500 meters of the water column.

Analyses of sediment trap material indicate the important contribution of the calcium carbonate component to the total mass flux in the northern Gulf of Biscay, supporting the frequent observation of the coccolithophore blooms in the area. Fluxes recorded by the lower traps in both margin environments reflect, to a large extent, lateral transport downslope of lithogenic material, probably originated from the resuspension of sediments at the benthic boundary layer on the shelf. Regression analyses of various particulate elements indicate a significant correlation between Si, Fe, K, Mn, Co and Ni with respect to Al. The Fe/Al ratio is that typically observed for atmospheric dusts and continental soils. The relatively constant Si/Al and K/Al ratios suggest that the lithogenic material is represented by clays dominated by illitic minerals. These elemental ratios are compared with those found in the terrestrial material and deep sea clays.