Heavy metals in the surficial Aegean sediments along the Turkish coasts

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A suite of 46 surface sediment samples from the eastern Aegean Sea, along the turkish coasts has been subjected to petrographic and chemical analyses, together with land geology, in order to study the main controls on heavy metal dispersal and provenance.

The sediments are mixtures of the varying proportions of terrigenous and biogenous components of variable grain-size composition, whereby the petrology of the terrigenic constituents corresponds closely with the land geology (ERGIN *et al.*, 1990). The mud or muddy sediments commonly dominate near the mouths of the main rivers and the protected areas of relatively low energy conditions. The carbonate contents of the sediments (1-70% $CaCO_3$) normally reflect the amounts of the biogenic material of shell/skeletal remains present, although contributions also occur from terrigenous carbonates, especially off the southern coasts of study area. Biogenic carbonates are mostly confined to areas around islands and peninsulas where the benthonic productivity is seemingly high. In general, the organic carbon contents of sediments are found to be relatively high (0.6-1.9%) at most of the inshore stations located near or at the major river mouths indicating significant contributions from the land-based sources. Otherwise, the majority of the C_{org}-levels in the sediments (0.3-0.7%) can be accounted for the normal marine production of organic matter in the Aegean Sea.

The heavy metal data (Fe : 0.59-5.74% ; Mn : 103-2625 ppm ; Co : 2-41 ppm ; Cr : 9-312 ppm ; Cu : 3-77 ppm ; Ni : 11-406 ppm ; Zn : 19-162 ppm) show a considerable measure of similarity in composition to the average sediments/sedimentary rocks worldwide (TUREKIAN and WEDEPOHL, 1961 ; EMELYANOV, 1972 ; HIRST, 1974 ; SMITH and CRONAN, 1975 ; SHAW and BUSH, 1978 ; VOUTSINOU-TALIADOURI and SATSMADJIS, 1982 ; BODUR and ERGIN, 1988 ; EVANS *et al.*, 1988; ERGIN *et al.*, 1991; YUCESOY and ERGIN, 1991. Exceptions to regional trends reflect : unusual geology in the source areas ; postdepositional mobility of the metal within sediment ; and maybe to some extent, anthropogenic effects. The latter appears to be significant off the Meriç river mouth and inner Izmir Bay, where the concentrations of Cu and Zn are somewhat higher than the average abundance. The levels of Fe off the mouths of Menderes and Gediz rivers are rather high, presumably resulted from the metamorphic rocks of Menderes Massif and related ore deposits. Exceptionally high Mn, and to lesser degree, Co concentrations in the sediments around the Marmaris peninsula maybe due to a combination of substantially input from the terrigenous sources together with diagenetic enrichment in sediment. The distribution of the Cr and Ni concentrations is largely controlled by a contribution from ultramafic rocks and related economic chromite deposits on land. From the relationships among the geochemical variables, it is concluded that the great portions of the metals studied are associated with the Fe, Mn, clay, and to lesser extent, organic fractions of the sediments.

Overall, the distribution of the heavy metals in the surface sediments of eastern Aegean Sea can largely be explained in terms of variations in depositional environment and provenance.

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