



Heavy metal contamination and bioproductivity record in box-core sediments from the Mediterranean Sea

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Preliminary results of geochemical investigations (stable isotopes and trace metals) performed on Mediterranean sediments aim at elucidating spatial and temporal variations of bioproductivity and reconstructing the evolutionary record of the anthropogenic impact. The analysed samples come from box-cores collected during the oceanographic cruises Bansic01, Ansic02, Ansic03, and Ansic04 - on board the R/V Urania - along three coast-offshore transects delimiting the central part of the Strait of Sicily, in front of the towns of Sciacca, Gela, and Pozzallo, and one transect in the Ionian Sea in front of Priolo town. Based on ^{210}Pb method, our samples correspond to a maximum age of 200 years and average sedimentation rates of 0.17 and 0.40 cm y^{-1} in the Sciacca and Pozzallo area, respectively.

Values of TOC and Ba_{bio} suggest an enhanced surface productivity nearshore, probably linked to important upwelling processes especially active in the Sciacca area. Carbon isotope records ($\delta^{13}\text{C}$) for a planktonic foraminiferal species (*Globigerinoides ruber*) through box-cores in the Sciacca transect show a variable surface productivity which is also indicated by biomass distribution maps in the Strait of Sicily relative to the years 1997-2000.

Depth profiles of “pseudo-total” As, Pb, Zn, and total Hg concentrations display a clear upward increase that is correlated to the development of productive activities

and urban discharge increment in the second half of the 20th century. In spite of the average total Hg concentration reported in literature for Mediterranean off-shore sediments ($100 \mu\text{g kg}^{-1}$; Baldi et al., 1983) is two times higher than the natural world-wide background (Hans Nelson et al., 1975), the analysed samples of the Strait of Sicily show generally low concentrations, with most samples in the range between 10 and $50 \mu\text{g kg}^{-1}$. Consistently with results of previous investigations on surface dissolved gaseous mercury levels (Gårdfeldt et al., 2003), a site in the Sciacca transect shows high total Hg concentrations inferred to derive from a natural source linked to geothermal and submarine volcanic activity. Anthropogenic Hg accumulation rates are generally depending on distance from the Sicilian coast but appear to be also controlled by the dominant current flow direction. The highest Hg concentrations ($18\text{--}1670 \mu\text{g kg}^{-1}$) have been measured in the Ionian Sea due to the intensive industrial development since the 1950 in the coastal zone between the Augusta and Siracusa towns.

A useful approach to determine the quality of sediments is to compare the levels of metals in the analysed sediments with ERL (Effect Range-Low) values (Long et al., 1995), USEPA index (Ligero et al., 2002), and guidelines indicated by the D.M. n° 367/2003 (Gazzetta Ufficiale, 2004). Although dramatic enrichments of heavy metals are not evident, some values are equal to or exceed these indices.

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