Late Quaternary evolution of sediment composition of the Adriatic Sea

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The Adriatic sea is an elongated semienclosed basin that includes three distinct morphologic domains. The northern Adriatic is a shallow and low gradient continental shelf. The central Adriatic has a narrower and steeper shelf and small basin, the Mid Adriatic deep (MAD) that reaches depth of 250 m. The southern Adriatic is a deep basin (1200 m).

Modern sediment supply is negligible from the eastern side, small in the north, maximum from the western side. Sediments carried from the Po river and from the other italian rivers flowing across the Apennines are actually trapped near the coastline and partially dispersed southwards by the cyclonic gyre typical of the sea (Orlic *et al.*, 1992). During the last Glacial Epoch sea level was about 120m lower than the present day and sea was limited to the MAD. Open marine conditions were stable in the southern Adriatic. From the last glacial maximum (about 18,000 years BP) the basin underwent major changes following sea-level rise, which occurred between 16,500 and 5,000 years BP (Trincardi *et al.*, 1996).

The evolution of sediment composition in the central and southern Adriatic sea during Late Quaternary is evaluated using data from 7 cores (Fig. 1): core AD76/1 (51m) is the more northern one, it is located in the sediment belt parallel to the coastline and recovered only Holocene sediments; cores PAL94/9 (104m), PAL94/8 (150m), PAL94/66 (214m), IN68/22 (129m), IN68/21 (252m) are located in the central area across the MAD: the shallow depth cores mostly sampled holocenic sediments, whereas the deeper ones record a more or less continous sequence from at least 14,000 years BP (Calanchi *et al.*, 1996a). The southern Adriatic sea is represented by core IN68/5 (1030m).

Sediments are a mixture, in variable proportions, of siliciclastic material and carbonates (detritic and biogenic calcite and dolomite) with local enrichment in diagenetic phases (e.g. 0.93% MnO at the top of core PAL94/8). Relatively homogeneous compositions characterize AD76/1, IN68/22, and the largest portion of PAL94/9, all cores with expanded holocenic sections. Systematic variations occur instead in cores from the MAD (PAL94/8, PAL94/66, IN68/21): sharp compositional changes start to appear from about 12,300 years BP, so that holocenic sediments are different from the older ones. Al_2O_3, K_2O, CaO, but particularly Cr, Ni and Sr are the elements more involved (Calanchi *et al.*, 1996b). Similar changes do not occur in the south Adriatic core IN68/5, where chemical composition remains rather uniform.

Provenance and compositional indexes suggest that, following sea-level rise, in the central Adriatic Sea deposition of sediments probably enriched in ultramafic component (indicated by the high values of Cr, Ni, Cr/Al and Ni/Al) occurred and, at the same time, there was also a variation in type and amount of the carbonatic fraction deposited (indicated by CaO and Ca/Al and Sr/Ca). Most of these parameters record the highest values at the center of the MAD and display a gradual decrease towards the italian coastlines; moreover sediments deposited in this area during the last glacial epoch are comparable to holocenic sediments of northern or southern areas (Fig. 1). Actually the MAD underwent major physiographic changes following sea-level rise which could have favoured sediment transport and deposition from eastern source areas, preferred to other possible sources for the absence of similar anomalies in south Adriatic IN68/5 core and for the occurrence of sedimentary rocks enriched in ultramafic debris in the croatian area (Prohic and Juracic, 1989). These same parameters also suggest that, at least from about 5,000 years BP, the time of maximum marine expansion, sediment composition remained rather constant. Among other indexes, particularly interesting is the Zr/Rb ratio (a grain size proxy) which enabled the identification of coarse grained depositional events in cores PAL94/8, PAL94/9 and less clearly in PAL94/66, related to an erosive episode during the Younger Dryas event.

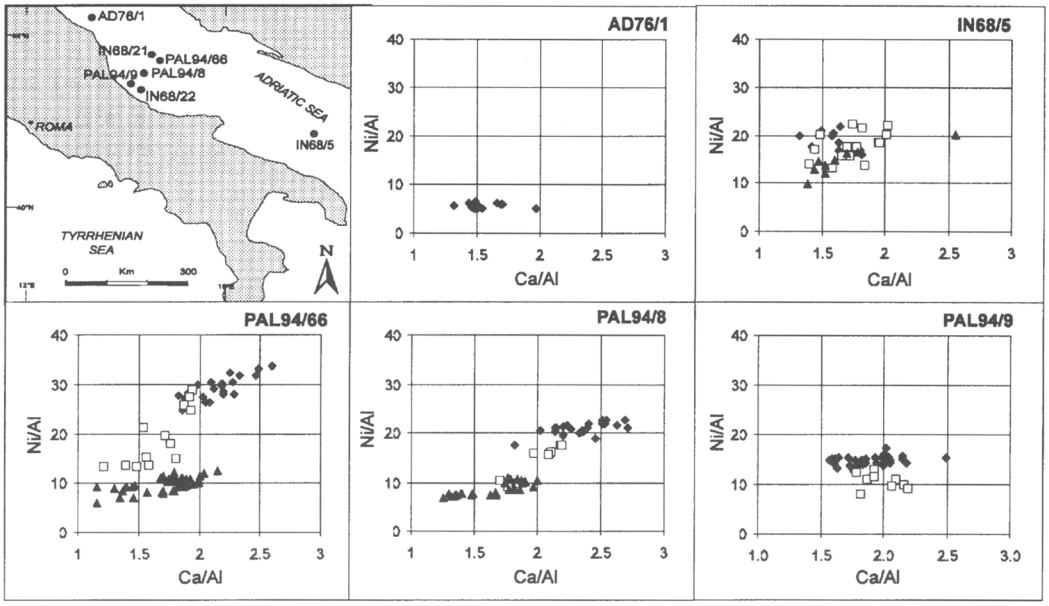

FIG. 1. Core location and selected diagrams displaying the different evolution of sediment composition during Late Quaternary in the Adriatic Sea. (Triangles: Full Glacial sediments; open squares: Late Glacial sediments; diamonds: Holocene sediments).

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