Sediment Fluxes on 100 YR Time Scale in Different Environments of the Adriatic Sea (Italy)

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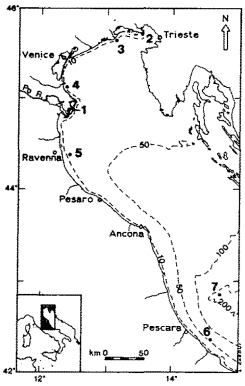
Seven cores from different environments of the Adriatic sea were studied in order to calculate accumulation rates and provide a description of the principal factors affecting present sedimentation and sedimentary processes. The data were also used to test the models used to calculate sediment chronologies from ^{210}Pb and ^{137}Cs profiles.



Core locations are shown in the figure. The sites cover a wide range of environments. They include a lagoon of the Po delta with no input from land, coastal sites from the Northern Adriatic influenced by high sediment supply, and coastal sites from the Middle Adriatic.

Cores were sectioned in slices 1-3 cm thick with the greatest detail in the upper levels. ^{210}Pb, ^{137}Cs, grain size, mineralogical composition and loss on ignition at 375 C (as an indication of the organic matter content) were determined.

The core collected in the lagoon, by divers, shows no evident traces of bioturbation and the sediment is fine grained. The excess ^{210}Pb profile indicates a regular accumulation in recent times although some downcore irregularities are probably due to the period when the lagoon was directly connected to the river. The depth distribution of silt and clay fractions suggests a progressive decreasing of the energy of the environment toward present.

Cores 2, 3 and 4 represent different prodeltaic environments. The first, influenced by the material delivered by the Isonzo River,

sites	depth m	sup.act. dpm/g	acc.rate g/cm^2/yr	invent, dpm/cm^2	Pb flux dpm/cm^2/yr	LOI %	OM flux mg/cm^2/yr
1 lagoon	1.5	4.35	0.11	12.6	0.4	8.31	9
2 Isonzo	6.5	3.30	6.62	>170	>5	4.50	298
3 Tagliamento	10.0	2.47	nd	>8	>0.2	2.40	nd
4 Adige	20.0	4.39	0.77	79.9	2.5	6.67	51
5 Porto Corsini	14.0	2.42	0.40	39.0	1.2	3.49	14
6 Ortona	65.0	4.50	0.45	63.1	2.0	2.40	11
7 MAD	251.0	4.25	0.04	7.3	0.2	2.75	1

is characterized by a very high accumulation rate. In this case the core was not long enough to include the whole excess ^{210}Pb profile. An accumulation rate of 10 cm/yr was calculated by BALDI et al. (1990) on the basis of the peak activity of the ^{137}Cs from Chernobyl. A profile of the short lived ^{7}Be in the first 4 centimeters accounts for a rate of 8.2 cm/yr or 6.6 g/cm^2/yr which substantially confirms the previous result. On the other hand, the excess ^{210}Pb activity at a depth of 100-105 cm (about 10 years) should be 28-30% lower than the superficial activity. Assuming a supported activity of 0.8 dpm/g, which is typical of these sediments, we can see that this prediction is confirmed. In this case the flux of organic matter is very high, due both to the high concentration in the sediment and to the high accumulation rate. Core 3, near the mouth of the Tagliamento River comes from a highly dynamic environment: the excess ^{210}Pb profile is very irregular and incomplete. It is interrupted, at a depth of 7-8 cm, perhaps due to an erosive event. In this case the ^{210}Pb data are not adequate for the calculation of the accumulation rate.

The site 4 is characterized by a fairly regular profile, although there are some fluctuations in activity above 22 cm depth. In this case both the CF-CS and the CRS models (ROBBINS, 1978; APPLEBY & OLDFIELD, 1978) give the same average accumulation rate.

The core taken offshore from Porto Corsini, south of the delta (site 5), represents a sediment strongly influenced by the water dynamics during the winter season. This creates an irregular, discontinuous. ^{210}Pb profile. The mean accumulation rate calculated using the CRS model (Table) has a value similar to that determined for other cores in this area (FRIGNANI & LANGONE, 1989). The accumulation rate determined (using the CF-CS model) from the regression of the log-normal activities vs. depth gives a significantly higher value, and this is perhaps an effect of the mixing of the surficial sediments.

The ^{210}Pb activity profile of core 6, taken from a coastal zone of the Middle Adriatic, is fairly regular. Accumulation rates calculated with all the usual models give similar results. The same is true also for core 7, taken from the Meso Adriatic Depression. In this last case the profile has intervals with different slopes, which could be due to periods characterized by different accumulation rates.

Where available the ^{137}Cs data substantially confirm the rates obtained from the ^{210}Pb profiles as for core 1, 2 and 4.

Organic matter fluxes mainly depend on the accumulation rates: the minimum value is found for the Meso Adriatic depression, far offshore, which shows the lowest rate while the maximum occurs in the Isonzo prodelta where the accumulation rate is very high. At site 1 the organic matter content (estimated on the basis of the total organic carbon: 3.57%) is far higher than in the other cores, but the flux is not very high because of the low accumulation rate.

In conclusion the study sites show very different accumulation rates (from 0.04 to 6.62 g/cm^{2}yr). In particular the prodelta areas are of the greatest interest for the establishment of the transport mechanisms and mass balances. Because of this it is needed to study the prodelta areas in greater detail.

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