

Sources and fluxes of suspended particulate matter in shallow coastal waters  
(Gulf of Trieste, Northern Adriatic) A. particulate organic matter

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Organic matter in coastal recent sediments is derived from organic matter synthesized by marine organisms (mostly phytoplankton) and that from terrigenous origin, and successively transported to the sea floor as sedimented particulate organic matter (POM), leading to the sedimentary organic matter with different composition to that in the sea surface. A striking characteristic of shallow coastal areas is that the euphotic zone is present down to the sea bottom and hence the production and degradation of POM occurs simultaneously. Macroaggregates or marine snow are frequent phenomenon in the northern Adriatic during summer and may represent the major role in the downward flux. The aim of the present work was to study the origin and temporal variation of chemical composition of sedimented POM in the S part of the Gulf of Trieste in 1991 using traps deployed at depths of 10 and 20 m. Special attention was paid to the sedimentation of macroaggregates in summer of 1991.

The annual variation pattern, depicted in Fig. 1, of particulate carbohydrate sedimentation rates showed the highest values in the mid of August at the depth of 10 m and also at the end of August at the depth of 20 m due to the slower sedimentation rate of macroaggregates in the stratified water column since the macroaggregates are prevalently composed of carbohydrates. A different pattern was observed for particulate protein sedimentation rates, more in phase with sedimented phytoplankton blooms (from chlorophyll a values), showing the highest values during the May, August and October blooms (Fig. 1). The indication of the origin of sedimented POC, estimated by  $\delta^{13}\text{C}$ . POC values (Fig. 1), showed the sedimented POC of purely phytoplanktonic origin ( $\delta^{13}\text{C}.\text{POC} < 20\text{‰}$ ) at the depth of 10 m in August in the period of the highest sedimentation rates of macroaggregates of diatomaceous origin. The lowest  $\delta^{13}\text{C}$  values of sedimented POC observed in June indicated the influence of the terrigenous POC sedimentation originated from enhanced local river (especially Isonzo) discharges. The  $\delta^{13}\text{C}$ . POC variations in deeper trap in the period August-September was, on the other hand, more the consequence of surficial sedimentary organic carbon resuspension, having  $\delta^{13}\text{C}$  values  $-22.4\text{‰}$ . Resuspension is an important contributor to the bottom layer sedimentation especially in the period of sea water density stratification (June-October, Fig. 1).

In conclusion, the sedimentation of POM in the central part of the Gulf of Trieste in 1991 was determined by the late spring new phytoplanktonic production and allochthonous riverine input, summer sea water density stratification and bottom sediment resuspension and, in lesser extent, the autumn phytoplanktonic regenerated bloom.

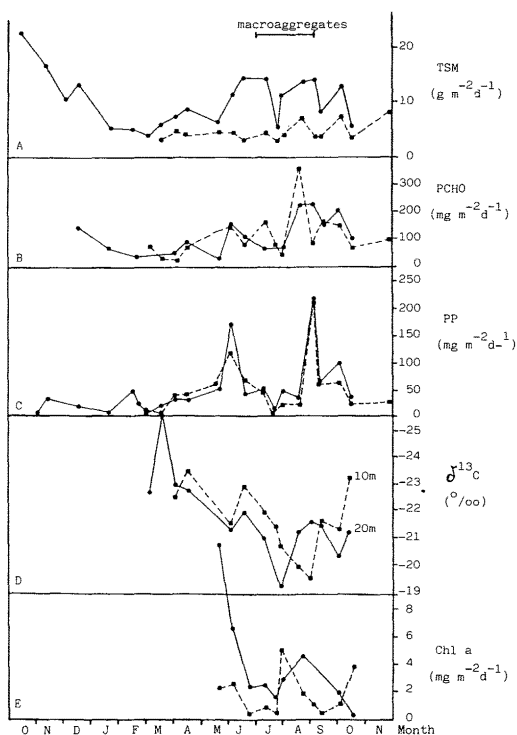


Fig. 1. Sedimentation rate of total suspended matter (TSM, A), particulate carbohydrates (PCHO, B), particulate proteins (PP, C),  $^{13}\text{C}$  isotopic composition of sedimented particulate organic carbon (D) and sedimentation rate of chlorophyll a (Chl a, E) at the depth of 10m and 20m at sampling point F in the Gulf of Trieste from October 1990 to November 1991. Horizontal line at top indicates occurrence of macroaggregates.