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Heavy Metals in Rosetta Estuary of the Nile and Adjacent Sea Water

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Abstract

Edfina Barrage separates partially the Rosetta branch of the Nile from its estuary, which discharges into the Mediterranean Sea. The study area covers this Rosetta estuary and the adjacent seawater to investigate the distribution of suspended matter (SM), as well as dissolved and particulate iron and manganese in this estuary and to illustrate its effect on the distribution of these parameters in the inshore marine area.

The amounts of SM showed an obvious increase with depth, giving highest and lowest averages in January and July following maximum and minimum discharges. The marked increase in the annual mean SM value in the estuary reflects the direct effect of the Nile discharge.

The values of iron forms increased mostly in the bottom waters, particularly for particulate iron (PFe). This coincided with sedimentation of the floccules containing iron, increase in SM with adsorbed iron and release of iron from SM. However, the increase in surface iron possibly reflects the turnover of iron within the aquatic biosphere. In the estuary, the maximal seasonal averages of iron forms in April might reflect the release of this metal during detrital decomposition by bacteria and the concentration of this metal by plankton abundant in spring. In the inshore water, however, these maxima in October reflect the minor effect of phytoplankton uptake and water circulation increasing suspended sediment transport. The highest regional averages of iron forms in the estuary were found at a location directly influenced by pollutants.

Contrary to particulate manganese (PMn), the values of dissolved manganese (DMn) decreased with depth. Contrary to dissolved iron (DFe), the mean values of surface DMn were higher than the corresponding means of this form in the bottom water, suggesting that surface sources of DMn exceeded the bottom sources. In the estuary, the maximum and minimum seasonal averages of DMn and PMn in April suggest that desorption process was the possible factor affected transition of Mn between its phases. The minimum and maximum regional averages of DMn and PMn appeared at a location in the estuary affected by pollution mainly from land – based sources.