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Influence of Meteorological Conditions and the Rhone River Discharge on the Distribution of Iron, Manganese and Copper in the Gulf of Lion

Mohamed A. EL-SAYED

National Institute of Oceanography and Fisheries, Alexandria (Egypt)

The Gulf of Lion, extending from the Gulf of Marselia to the Spanish fronteers, receives fresh water principally from the Rhone River. The spreading of the river water in the gulf dpends on the meteorological and climatological conditions in the area. One of the most important characteristics of the meteorology of the area is the presence of a strong NW wind "Mistral"which drives away the surface water in the coastal area giving rise to the advection of the bottom or subsurface water (Minas, 1986). This upwelling brings to the surface deep water of differing chemical composition and may result in the limitation of the surface spreading of the panache of the Rhone (Aminot, 1986).

In the period from 14 to 26 September, 1984, 28 surface water samples were taken from the Gulf and the Rhone Delta. Besides two samples were taken at the river-sea connection and a vertical profile was performed in the open Mediterranean water (Fig. 1). The unfilterd water samples were analyzed, under clean laboratory conditions, for their Fe, Mn and Cu content. Filtered samples of particularly turbid water were also analyzed.

Salinity measurements (Aminot et al. 1986) showed that the dispersion of the Rhone river water extends in a SSW direction represented by the stations 11, 35, 46, 47, 49 and 50. The relation between salinity and Fe, Mn and Cu along the axis of dispersion shows a massive elimination of the three elements during the first stages of mixing (84, 44 and 83.0 per cent for Fe, Mn and Cu respectively). The perfect agreement between the metals and turbidity indicates that suspended matter is the main vector in the transport of these elements in the Rhone water. Data of the filtered samples show that at station R1 (salinity less than 1) dissolvec (0.45 um) Fe represents less than 1% of the total while dissolved Mn and Cu represented 37 and 38% of the total metal.

In the Gulf, according to hydrological characteristics and trace metals distrbution, illustrated here by iron, three sectors are identified (Fig. 2):

1- the southern near coastal zone (st. 1, 2, 3): not affected by upwelling and characterized by intermediat salinity (38.07-38.10), high water temperature (18 c) and relatively low Fe concentration (4. 66 ug/l) but showed marked S-N increase;

2- the eastern and northern zone (st. 4-9): highly influenced by water advection which lead to a marked temperature decrease (14), a significant salinity and turbidity increase and the highest Fe concentrations (31. 75 ug/l).

3- the central part of the Gulf and the open Mediterranean water: characterized by moderate salinity (38.1) excepting st. 52, very low turbidity and the lowest Fe concentration (0. 92 ug/l).

Data of the vertical profile indicate a marked enrichement of the surface water in Fe, Mn and Cu as has been previously observed by Kremling (1981).

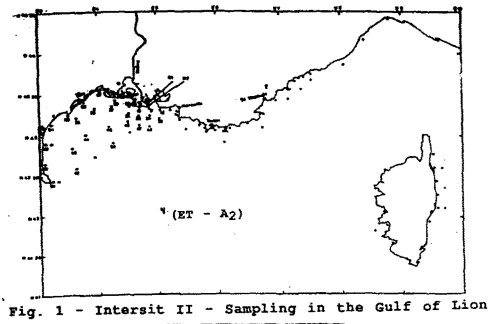

Fig. 1 - Intersit II - Sampling in the Gulf of Lion

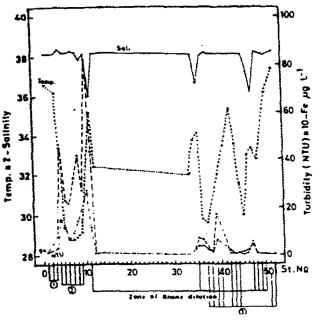

Fig. 2 - Geographic Distribution of Salinity, Temperature, Turbidity and Iron in the Gulf of Lion

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