

A Comparative Study of Mercury Contamination in the Tagus Estuary (Portugal) and Major French Estuaries (Gironde, Loire, Rhône)

G. Figueres, J. M. Martin, M. Meybeck and P. Seyler

Ecole Normale Supérieure, Laboratoire de Géologie 46, rue d'Ulm—75230 Paris Cedex 05

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Concentrations of mercury were determined for the waters, suspended matter and sediments of the Tagus and of major French estuaries.

The Tagus estuary is one of the most contaminated by mercury derived from the outfalls of a chloralkali plant and from other industrial sources. In deposited sediments the median level, $1.0 \mu\text{g Hg g}^{-1}$, is twenty times higher than the natural background and Hg contents depend on the sediment grain-size, age and the distance from waste-outfalls. Suspended matter is more regularly and highly contaminated (median value: $4.5 \mu\text{g Hg g}^{-1}$). In the French estuaries Hg levels in the suspended material decrease with salinity due to dilution and/or remobilization processes. In June 1982, in the Loire estuary, high values of Hg are observed in the middle estuary and attributed to urban and industrial sources.

In the Tagus estuary, the general distribution of total dissolved Hg confirms the contamination: it increases seaward from 10 ng l^{-1} in the river to 80 ng l^{-1} in the estuary outlet. The dissolved Hg is almost totally organic in the river, inorganic in the middle estuary due to inorganic Hg effluents and again organic in the lower estuary. This variation is related to the dissolved organic carbon values. The dissolved Hg levels in the Loire Estuary ($5\text{--}300 \text{ ng l}^{-1}$) are much higher than in the Gironde estuary ($3\text{--}6 \text{ ng l}^{-1}$) and of the same order as those observed in the Tagus estuary.

Introduction

The release of mercury into the environment has long been recognized as a major threat to aquatic fauna and human health. Since the Minamata Bay disaster, many studies in European and North American estuaries have been carried out. Most of them concern the surficial sediments: a few have considered the suspended matter (Cranston & Buckley, 1972; Bothner & Carpenter, 1972; Lindberg *et al.*, 1975; Martin *et al.*, 1978) or the dissolved mercury (Cranston & Buckley, 1972; Fitzgerald & Lyons, 1973; Lindberg *et al.*, 1975; Windom & Taylor, 1979). Some studies have reconstituted the history of mercury pollution (Böthner *et al.*, 1980; Smith & Loring, 1981; Zingde & Desai, 1981).