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Experimental Approaches for Modeling of the Behaviour of Trace Metals and Radionuclides in Coastal Zones: Application to Cadmium and Cobalt in French Estuaries

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Most man-made trace metals and radionuclides appear to behave in a non-conservative way during estuarine mixing. Both physical transport and physico-chemical processes determine distributions and contaminant concentrations within such zones, but the latter ultimately condition the chemical speciation of the elements which in turn affects their geochemical reactivity and therefore their transfer between water, biota and sediments.

Geochemical models constitute a useful tool to understand these physico-chemical processes and thus describe the dynamic of elements in such complex systems as estuaries. Developing these models requires knowledge of both major transformations playing a role in contaminant particle/water partitioning and key environment factors controlling such mechanisms. This information has been obtained using field measurements and laboratory studies. The latter allow to verify model assumption and simplification validity and to independently assess parameters which are not directly measurable.

This approach has been used in various French river estuaries for studying cadmium, caesium and cobalt behaviour. Performance and validation of the developed model will be given mainly through comparison between calculated and observed distribution coefficients.