Chapter 5

Conclusion and Suggestion

Conclusion

The theme of this study is focused on the distribution and speciations of Fe, Cu and Pb in the Mae Klong River water and thier variation during the estuarine mixing. The term "speciation" of this study is actually classified by size. The classification of metal forms is determined by filtration of water samples through 0.45 um. filters, giving rise to dissolved and particulate species. This major phases can themselves be further subdivided, but in this study any classifications other than size classification will not be included.

In general, the study of estuarine mixing behaviour is actually looking at the exchange of trace elements between solid-solution interface. This exchange occurs as the result of changes of physico-chemical conditions of water caused by the mixing of river- and sea-water. The most important factors that will control the exchange processes are pH, E_h, ionic strength, the end member compositions and the proportions in which the source waters are mixed in various parts of the estuary. The solid-solution exchange processes is normally categorized according to an "adsorption" or "desorption" effect. The adsorption-desorption process is reversible. The extent to which this process will occur can be better understood, if one looks at this process in more details. The adsorption-desorption process included sorption, coprecipitation with Fe/Mn oxides and carbonates, complexation and flocculation with organic matter and heavy metal precipitates.

The estuarine mixing behaviour of Fe, Cu and Pb are non-conservative in both seasons. It is obvious that seasonal variation does have a strong influence in thier behaviours in terms of discharge, water qualities and human activities by changing the physico-chemical conditions of the Mae Klong River water.

The slight differences found in the mixing experiments between each season are probably because of the differences in type and amount of suspended particulate matter containing in each river-water end member used in each experiment.

Flocculation of iron is found during both seasons at low salinity (below 10 °/$_{oo}$). This process causes a removal of dissolved iron and subsequently leads to the removal of copper and lead by coprecipitation. However, flocculation may not be very effective in the presence of organic ligands, both natural and synthetic organic substances, containing in the river-water.

The introduction of additional river-water end member, particularly in dry season, causes the change in physico-chemical conditions of the Mae Klong River water, thus, causing the change in adsorption-desorption behaviour.

Copper, being preferentially sorbed and complexed over other metals, is effectively removed from the Mae Klong River water. However, in dry season at the salinity above 10 °/$_{oo}$, the addition of dissolved copper occurs. This is probably because of solubilization of copper from particulate phase by organic ligands introduced by those additional end members. The possiblility of desorption by other processes is less likely as pointed out by Duinker (1980). However, among the three metals studied, behaviour of copper is least affected by additional river-water end members.

Lead is effectively removed from the Mae Klong River water, possibly by coprecipitation of hydrous iron oxides during wet season, particularly at low salinity (below 6 °/$_{oo}$); desorption at salinity between 10 to 15 °/$_{oo}$ caused by the changes in physico-chemical conditions; and addition at high salinity (25 °/$_{oo}$) from interstitial water upon the resuspension of sediment.

In addition, the observed variability in the behaviour of these metals may, in fact, be due to the different in time scale. These processes described may be operating on different time scale, while the adsorption-desorption process in the estuary occur on a rather rapid time scale.

Because of rivers are the major mode of transport of substances, both in dissolved and in particulate forms, from continent into the coastal water and the oceans. Therefore, it will strongly influence and will have direct impacts on water qualities of the coastal water and the oceans. The methods of estimating flux of river have been proved to be in error as estuaries have strong ability in trapping most of the substances carried by rivers. Thus, before attempting the estimation of fluxes carried by river into the oceans, it is necessary that the elemental behaviour in estuaries is well understood.

Suggestion

Because of the short period of this study, it should be suggested that further researches should be continued in order to answer all the questions related to trace metal distribution and speciations in estuary and to estimate metal flux which flows from rivers to estuaries. The further studies which would be interested are the followings;

1. study on the extent of adsorption-desorption process during

estuarine mixing for a particular trace metal in laboratory and field investigation

2. determine the discharges into the Mae Klong River, both industrial and domestic wastes, so as those additional point source of metals are clearly indentified

3. during field investigation, samples of additional river-water end members should be collected in order to determine their properties and conditions which will affect the actual river-water end member

4. study on type and amount of organic substances present in the Mae Klong River.