International Council for the
Exploration of the Sea

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Consultative Committee



# REPORT ON MINI-SYMPOSIUM ON

# TRANSPORT PROCESSES IN ESTUARIES AND NEAR-SHORE ZONES

Five papers were presented, see programme in Annex 1. The paper by Dr. Pearce discussed the conditions in several coastal areas along the east coast of the USA and there-by identified a number of problems where research is required and thus pinpointed why we are especially interested in the near-shore zone. It was, among other things, demonstrated that in some areas the environmental contamination is limited to very much the coast. A major problem is how much of the material flux to the coastal zone from land is retained in the near-shore zone respectively how much of it is transferred to the open sea and on what time scales.

These questions were considered in the following paper by Dr. Duinker, for the southern North Sea. He showed that a large amount of the suspended matter was retained in the near-shore zone and with it a large amount of metals. The importance of the size distribution and composition of the suspended matter was shown, the smaller size fraction being transferred off-shore with a relatively higher portion of metals than the large size fraction. Correct information on the amounts can only be obtained by studying both the suspended and dissolved fractions.

This was also demonstrated in the subsequent paper presented by Dr. Jefferies. The concentration distributions of $^{137}Cs$ in the Irish Sea were shown from observations over an 8 year period. The successive spreading from the scource was shown, the concentrations however remaining 1-2 orders of magnitude larger very close to the source than in the southern entrance of the Irish Sea. Residence times of water in various parts of the Irish Sea were calculated on the basis of these observations. The distribution of plutonium in the sediments was used to show the deposition areas in the Irish Sea. The Cs observations were used to obtain an estimate of the amount of plutonium leaving the area which together with the amount in the sediments and the known input gave a rough budget, which however did not account for all the input.

The following paper presented by Dr. Yeats gave an account of a series of box models which had been developed for the Gulf of St. Lawerence area in order to study the budgets and fluxes of various metals. Physical oceanography observations were used to define boxes and flow rates. Fluxes of material into the area from rivers were known and the atmospheric input was estimated. It was clearly shown that very large parts (up to 95%) of suspended matter and certain metals are retained in the coastal zone. Estimates were given of the supply from the coastal zone to the pelagic sediments, giving results in reasonable agreement with observations for some metals. About 30% of the supply was estimated as atmospheric input to the open ocean.

The last paper, presented by Dr. Peters, reviewed processes in a sequence of estuaries with different tidal ranges, fresh water run-off and morphology. The importance of the stratification and vertical mixing for the residence time of waters in the estuaries was shown and the retainment of suspended matter by various processes in the estuarine zone was discussed. Large amounts of material suppplied by the fresh water run-off will be retained and not reach the open ocean. The importance of events of large fresh water supply was discussed and it was shown how these can alter the conditions temporarily and also effectuate a pulse of large transfer of material further offshore.

Short discussions after each presentation and a general discussion after the last paper brought up several points of interest, including reliability of analytical techniques, the importance of the different morphological configurations of the areas discussed, making generalizations difficult, the importance of events of metrorological origin (streams) which are difficult to study at the time of the event. The papers dealt mainly with chemical aspects, including some physics, but not generally biological processes. These could be considered at a later similar occasion. The session was very useful showing that very active research in the area is going on making considerable progress andaddressing several practically important questions like that of retainment of material in the coastal zone and transfer to the open sea. It was felt that the subject should be considered again in a few years' time, perhaps in the form of a special meeting.

Annex 1

Program for Mini-Symposium on

"Transport Processes in Estuarine and Near-Shore Zones"

Tuesday, 7 October 1980
kl. 14:30 in Room no. 19

| TIME | TITLE |
|---|---|
| 14:30-15:00 | J.B. Pearce "States of estuaries and coastal waters between Cape Hatteras and Maine: A review" (E:56) |
| 15:00-15:30 | J.C. Duinker "Processes affecting the behaviour of contaminants during estuarine mixing and in coastal areas with particular reference for the southern North Sea" (E:34) |
| 15:30-16:00 | D.F. Jefferies, R.J. Pentreath, J.W. Talbat "Transport processes in the Irish Sea as indicated by the measurement of radionuclides released from windscale" (Gen:5) |
| 16:00-16:30 | Coffee |
| 16:30-17:00 | J.M. Bewers, D.A. Yeats "Transport of metals through the coastal zone" (Gen:4) |
| 17:00-17:30 | R. Wollast, J.J. Peters "Results on material transports in estuarine zones" (Gen:8) |
| 17:30-18:00 | General discussion: One point is feelings about an ICES special meeting or symposium in 3-4 years time on estuarine and coastal zone processes considered interdisciplinary. |