

## **Preliminary Attempts of an Integrated Estuarine Environment Impact Assessment for Tokyo Bay, Japan**

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Marine Environmental Laboratory, vertical one Dimensional-Multi Box ( MEL1D-MB ) model was developed for an integrated estuarine environment impact assessment. The MEL1D-MB model is composed with a set of connected boxes along a bay that has a set of arbitrary placed vertical cell. Physical process is formulated by Navier-Stokes Equation considering effect of buoyancy, water temperature and salinity. It gives scalar exchange rate for components of ecological model. Because of its simplicity and robustness of the MEL1D-MB model, it is possible to use the model for a tool of an integrated long-term change of water quality in a bay.

In this study, preliminary attempts for assessment of environmental impact on Tokyo bay in Japan were carried out with the MEL1D-MB model. The Tokyo bay was divided into five boxes from inner part to outer part along the bay. Four meters height vertical cells were placed in each box. Residence times of salinity, nutrient and phytoplankton at each box were proposed as indices of integrated environment impact. The discussion is in two folds.

At first, the characteristics of the bay were determined by the proposed indices. There are unique distributions of residence times for each component respectively. The residence time of salinity was 5.8–17.5 days in the inner bay and 1.0–6.5 days in the outer bay. Nevertheless, the residence time of phytoplankton was 3.3–6.5 days in the inner bay and 0.5–1.4 days in the outer bay. Moreover, the residence time for each zone has not only spatial distribution but also seasonal changes. The characteristics of the seasonal change differ among the different boxes and the different indices.

In second, the effects of geographical alteration by human activity, such as dredging and reclamation, were assessed by the proposed indices. Especially, the effect spreading pass of environmental impacts driven by the activities were discussed. As a result, the capability of proposed indices to assess the area and strength of the impacts were well confirmed quantitatively.