Fast Estimation of Environmental Chemical Concentrations in Tokyo Bay

- Simple risk assessment model for Tokyo Bay (Windows edition), (Charge-free distribution) -

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The AIST-RAMTB makes it possible to calculate the spatial distribution of chemical concentrations in Tokyo Bay by feeding in data on chemicals, such as inflow from rivers and dissolution from ship hulls. Further, the risk to marine organisms can be readily calculated based on chemical concentrations.

One of the crucial contaminants in a coastal sea area is tributyltin (TBT). TBT is lethal to marine organisms and has been widely used in anti-fouling paints for protecting ship hulls and fishing nets from unwanted growth of biological organisms such as barnacles and algae. However, the impacts of TBT to the coastal ecosystem have been reduced internationally since the mid-1980s. The International Maritime Organization (IMO) decided to ban paints containing TBT from January 1, 2003, and drafted a legal framework of constraints to eliminate TBT globally from ship hulls by January 1, 2008. Nevertheless, TBT remains a serious contaminant in coastal waters.

Given these circumstances, a risk evaluation of chemicals, such as TBT, in a specified sea area is very important in assessing impacts to the ecosystem. Conventional models for assessing chemical risks required a mainframe or a workstation, and complicated operations manageable to experts only. In contrast, the AIST-RAMTB model can be operated easily on a personal computer, without an expert, to assess the degree of contamination by chemicals, including those other than TBT, and impacts to the ecosystem in coastal sea areas.

Tokyo Bay is characterized by a constant stream of sea traffic; and it is surrounded by and an extensive, aggregated megalopolis that includes Tokyo and Yokohama, and the Keihin and Keiyo Industrial Belts. The socio-economic activities by a mammoth population of 26,480,360 (National Census of 2000) are discharging diverse materials in great quantities into the Bay. Moreover, the Bay provides a substantial amount of fishery resources, as well an area for marine recreation.

The Model, distributed free of charge, will offer valuable opportunities to the general public for assessing chemical risks in the area, which have hitherto been available only to simulation model specialists and to chemical risk evaluation experts. In this way, the significance of chemical risk assessment will be recognized by an increasing number of people and further research progress will be encouraged.

The CRM is planning to build models applicable to Osaka Bay and Ise Bay, and eventually, a spatio-temporal predictive model by integrating simulation results with atmospheric and fluvial models.

Example of predicted TBT concentration in Tokyo Bay