

Dilution of riverine input contaminants in the Seto Inland Sea

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Many kinds of chemical substances, such as pharmaceuticals, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs), have been detected in coastal oceans and pose potential ecological risks to aquatic organisms. Riverine input is an important source of these contaminants in the marine environments. It is therefore necessary to clarify the dilution features of riverine input contaminants in the coastal oceans. Based on a hydrodynamic model, which can reproduce monthly distributions of temperature, salinity and currents in the Seto Inland Sea (SIS), Japan, the dilution features of riverine input contaminants in the sea and its controlling factors were studied. The dilution factors, defined as ratio of contaminants concentration in rivers and ocean, were used to elucidate the dilution features of ocean. The average dilution factors of riverine input conservative contaminants were around 53 in the SIS. They were high in winter and low in summer, which was opposite to the seasonal variation of river discharges. The high dilution factors occurred in Bungo Channel and Iyo-Nada, while low dilution factors occur in Osaka Bay, Bisan Strait and Harima-Nada. In the vertical, the contaminant exhibited a well-mixed structure in winter but a well-stratified one in summer. When considering non-conservative contaminants that decay continuously with time, the dilution factors become higher than those of conservative contaminants. With the decreasing of half-life period of contaminants, the average dilution factors in the ocean increased following an exponential function. Besides, the vertical stratification of contaminants was strengthened with decreasing of half-life period, especially for Hiroshima Bay and Osaka Bay where were dominated by rivers water.

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