

Effects of Isahaya Reclamation Work on the Sediment Eutrophication in Isahaya Bay

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It has been 4 years since Isahaya Bay divided by the dike into the sea and freshwater reservoir. According to occur the poor crop of “nori” (Rhodophyceae) around the north part of Ariake Sea, it is supposed that the tidal flat which was located in Isahaya Bay played an important role in purifying sea water in Ariake Sea : such as decomposition organic matters, denitrification and adsorption of phosphate. On the other hand, the Ministry of Agriculture, Forestry and Fisheries of Japan had stated the causality between recent fishery crops failures and Isahaya reclamation works can not be proved, since the concentrations of chemical oxygen demand (COD), total phosphorus (TP) and total nitrogen (TN) in sea water have not increased in Isahaya Bay.

In this study, our objectives were to study the horizontal distribution of bottom sediment and current level of eutrophication of sediments in Isahaya Bay. Measurements of the sediment thickness were conducted using an echo sounder equipped with a Global Positioning System. This sounder emits two different sound waves (200kHz and 50kHz) to the bottom sediment, and the difference in the reflection depths detects as a thickness of sludge or ooze on the hard bottom. Surface sediment samples were also collected from 18 sites at which the sediment thickness was measured. Total organic carbon (TOC), TP and ignition loss of the sediments were analyzed. To evaluate the effects of organic and inorganic matters derived from reservoir on bottom sediment in the bay, the spatial distribution of the freshwater discharged from the reservoir was also studied.

The accumulation of the sludge was not obvious around the north drainage gate in the reservoir, though the thickness ranged 20 to 60cm were detected at the middle and south parts of the reservoir. In the north part of the bay (sea area), the sludge was thick at the front of the dike (more than 50cm), and then getting thinner nearby the bay mouth. Around the north part of the bay, the accumulation of sludge ranged 50 to 100cm at 1 and 3km from the dike. TOC contents of the surface sediment samples were higher in the sea area than those in the reservoir, especially the highest in front of the dike. On the other hand, TP content of the sediment was the highest at the reservoir and then gradually decreased toward the bay mouth.

In the present study, it was cleared that both accumulations of sludge and organic matter contents in the sediments were higher in the sea area of Isahaya Bay than those in the reservoir. Two causes were suspected; 1) the sediments in the reservoir have been continuously washed out and reaccumulated in Isahaya Bay. 2) high concentrations of inorganic nutrients loading from reservoir have stimulated the growth of marine phytoplankton, and then the phytoplankton have settled on the bottom sediment in the bay.