

Effect of tidal variation on sediment nutrient releasing from Osaka Bay.

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Understanding the nutrient discharge into the coastal area is important in environmental managing and eutrophication control. Nutrient releasing from coastal sediments has been considered to be a major resource contributing to coastal nutrient cycle, particularly in the tidal river mouth area. Due to the complicated physical/chemical mechanisms, it is difficult to quantify the nutrient releasing rate in these areas. Our objective is to clarify the processes of nutrients across the sediment-water interface affected by tidal pumping, internal diffusion flux, and flood events, based on onsite monitoring, lab experiments, and hydrological model simulations.

Several cores and surface sediment have been taken in September 2016 for laboratory incubation experiments. Sediment samples were used for incubation experiments with/without an additional pressure variation of 2 meters. Surface water and bottom water were also taken along the transaction line from the river mouth to open bay. Water samples were analyzed for nutrient contents and then releasing flux were calculated.

Results show that nutrient contents are higher in bottom water during falling tide while in surface water are higher during rising tide, represents the nutrient transport are mainly in surface layer with river discharge in falling tide with high sediment releasing flux. In rising tide, tidal movements prohibit the transporting of nutrient during and decrease the sediment releasing flux. Core pore water profile shows decreasing trend upwards in Nitrate, ammonium, and phosphate. It indicates a strong releasing pattern of nutrient from sediment. Incubation results show high releasing flux similar to the diffusion flux calculated from pore water concentrations. The tidal pumping can double the ammonium and phosphate releasing flux in one week periods.

Keywords: sediment, nutrient releasing , tidal pumping, sewage treatment plant