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Sediment phosphorus content and its potential release in the coastal area of Seto Inland Sea Japan

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Eutrophication is an important world-wide problem and became a heated debate recent years. In many costal sea areas around the world, Such as Tokyo bay and Baltic Sea, the Phosphorus (P) plays a key role in this process; the Kojima bay is located in Okayama prefecture and is an important water flow to the Seto inland sea .the P load to the Seto inland sea appears to have important effect to the eutrophication in this area. Kojima Lake is formed by enclosing the dike in 1959, so research of the effect of P formation to the environment is important and interesting. Our studies is mainly focused on the effect of phosphorus in sediment and the overlying water samples in Kojima bay and Kojima Lake

Surface and core sediment samples were collected both in Kojima bay and Kojima Lake in this study. the surface sediment samples were collected by box sampler, the core samples in Kojima lake were taken by piston core sampler while the cores in Kojima bay is taken by diver .using acrylic tubes(7-8 cm diameter) . Pore water samples were also extracted by centrifuge and the nutrient in pore water, near bottom and surface water samples were determined in the laboratory with a spectrophotometer (Bltec Swaat autoanalyser). We use the ^{210}Pb activity and ^{137}Cs activity to determine the sedimentation and dating data of the core samples. In this study, a Six step extraction method of P in sediment was used to describe the chemical species of P. by divided the P into active forms (loosely sorbed P, Redox sensitive P) and immobile forms (Oxide metal bound P, apatite P and residue P),

The sediment phosphorus content in surface sediment samples are higher in the lake samples(average 27micro mol/g in 7 sites) than in the bay samples(average 14micro mol/g in 20 sites), while the higher pore water samples and water samples both showed higher in bay samples than in lake, It may indicate that the higher stabilization form of Phosphorus in Kojima Lake surface sediment with lower possibility of transportation in releasing to pore water and overlying water. P fractionation results shows that redox sensitive P forms is the critical P forms leading the variation of phosphorus which related to the iron content in sediment, dissolved Iron and Manganese showed the lower content in lake water volume. The core samples showed that phosphorus content showed decreasing after it was deposited with the increasing of P content in pore water, The redox sensitive phosphorus content decrease sharply with the increasing of loosely sorbed phosphorus, pore water phosphorus and salinity at the down core, This represents the releasing of phosphorus content form sediment after the sediment deposited with the low oxygen condition and higher salinity in the deep layer of the sediment. The relatively high Salinity with pH in Kojima bay will inhibit phosphate adsorption onto Fe oxides/hydroxides. Also, the concentration of Fe oxides/hydroxides is reduced in sulfide environments by the formation of solid Fe sulfides and if sulfate-reduction rates are controlled by sulfate concentrations. This may be able to be one of the main reasons for the variations of phosphorus content in coastal bay and lake sediment. The relatively high concentrations of dissolved P associated with riverine inputs in Kojima Bay are to some extent buffered by the relatively high concentrations of suspended sediments resulting from tidal flows. Phosphorus may be released during transport to the sea due to decreases in the active phosphorus forms, increases in salinity and release from bottom sediments as a result of low oxygen conditions.

Keywords: Sediment, Kojima Bay, Phosphorus, Fractionation, Release