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Vertical and spatial variations of sediment phosphorus in an artifical lake and bay of Seto Inland Sea

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The Kojima bay is located in Okayama prefecture and is an important water flow to the Seto inland sea .the Phosphorus (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. Our studies are mainly focused on the vertical distribution of P forms and the relation to physical and chemical properties of estuary sediment material so as to better understand the potential release and burial of P.

The field observations of this study were taken in 2009. Surface and core sediment samples were taken in both in Kojima bay and Kojima lake, The nutrients in surface water samples, near bottom water samples and pore water samples were determined by auto analyzer . ^{137}CS and ^{210}Pb activity were determined to calculate the dating data of different depth and also the sedimentation accumulation rate (SAR rate). The P reserves were characterized by a sequential extraction procedure. In addition several environmental variables were determined.

The reactive P form takes dominated part in the sites with higher SAR value and also in the Kojima lake surface sediment (40%-71% in Kojima lake compared to the 15%-53% in Kojima bay). It decreased generally with the sediment depth, indicating that the release form Fe compounds and degradation of Organic P with the depth increasing. The immobile P forms dominated (Kojima bay surface sediment 34%-72% Kojima bay core sample 59%-76%) at the sites with the lower SAR value .while in the high SAR value area this value is lower (Kojima lake core samples 23%-80% Kojima lake surface sediment 28%-53%) in the Kojima bay. Its concentration did not change appreciably with the sediment depth. But it changes to be dominating P forms in the deeper layers where the reactive P forms decreases.

Both in lake and bay sediment the loosely sorbed P content is at low level. The bay has lower HCl-iP content and higher content of NaOH-iP compare to the lake cores. This may because the high discharge flow in bay takes out the fine materials which contain the authigenic apatite P forms and it is easier for lake environment to sink for P at this form. And the large water discharge prevent the transform of the NaBD-iP to NaOH-iP as while as it is more oxic conditions than Lake. The Res-P forms which means the refractory organic P represents the P incorporated in the refractory humic material .this form of P did not show marked vertical variation in the whole profile and also no obvious different in all surface sediment samples .

The content of reactive P and TP in the Kojima lake water sample and pore water samples appears to be lower than that in Kojima bay , this may indicates that the release of sediment P to pore water and overlying water is lower than that of P in Kojima bay ,and it appears adverse with the higher value of the efflux of P in sediment cores in Kojima lake .One possible explanation for this may be that the P resources of Kojima lake and Kojima bay is different ,and the Kojima bay receives much more resources form other rivers with large water flows such as Ashahi river, So the exchange of nutrients through surface sediment and pore water and overlying water are more strong than that of Kojima lake samples . With the strong water flow the nutrient is moving to the Seto inland sea while the transfer of Nutrient in Kojima lake is not so easy compare to the Bay ,So bigger part of the P content is trapped and the vertical and location diversion is obvious in core samples in Kojima lake .In Kojima bay , the higher river discharge shows some choose function to the sedimentation process and some part of the sediment resources especially active exchange part of P is removed by water flow and left with more stable forms .So the sediment in Kojima bay is more uniform and low diversion changes with depth and location.

Keywords: sediment, phosphorus, fractionation, artifical lake, sedimentation rate