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八郎潟堆積物の対照的なリン鉛直分布 - 水移動効果を考慮して
Contrasting vertical phosphorus profiles in sediment of Hachirogata ; considering water flow effect

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Coastal shallow lake sediment play an important role in the lake eutrophication process, it should be considered important sinks and sources of phosphorus. The accumulation and regeneration of sediment nutrients would be affected by some hydrological process. Lake Hachirogata is a shallow eutrophic lake located in north of Akita City. It used to be the second largest brackish water lake in Japan before the land reclamation project finished in 1977. A salt water barrier has been constructed at the outlet of the regulating reservoir through which water is discharged intermittently out to the Japan Sea. There probably exists the water flow from lake water into sediment due to the lower altitude of the farmland than lake water level after the land reclamation project. We would like to research on the sediment phosphorus accumulation and its activities base on the sediment phosphorus profiles, in consideration of the water flow effects. In order to better understand the possible change on lake phosphorus cycle by land reclamation.

Two core sediment samples were collected by piston core sampler (7-8 cm diameter), in east and west part of the lake (core HL-1 represents the core samples near river mouth area, core HL-2 represents the core samples which was collected near land reclamation area) during the investigations in September 2013. Samples were sliced at 1cm interval then centrifuged for extracting pore water soon after sampling, pore water nutrient and chlorine ion were determined in the laboratory with a spectrophotometer. The advanced SEDEX methods was used in sediment phosphorus fractionation.

Our results shows different pore water Cl^- and nutrient patterns between two locations. In HL-1 core, it shows an increasing trend of Cl^- from around 50mg/L at surface to around 500mg/L at bottom, however in HL-2 this profile shows relatively a constant range around 40mg/L. Both the DTP and DTN concentrations from the HL-1 core showed an increasing trend towards bottom, and they shows relatively constant and low in the HL-2 core, respectively. In sediment P fractionations, Iron bounded P comprise the main phosphorus species in HL-2 core, which comprises 42-72% of total phosphorus. this value is 15-28% in HL-1. Based on the dating information calculated by ^{210}Pb, it shows a larger sediment accumulation rate in HL-2 than HL-1 but with higher phosphorus burial trend in HL-1.

The sediment pore water profile shows significant change after the land reclamation project. Due to the enclosing of the sluice gate decades before, the changing from saline environment to freshwater could reflected by gradually decreasing trend of Cl^- profile towards current in HL-1. The pore water DTN DTP molar ratio shows large variations in HL-1 core. In HL-2, the low Cl^- and DTP in HL-2 provides an evidence that the diluting and transporting pore water phosphorus by water flow from lake into the sediment. On the other hand, it shows high sedimentation accumulation rate and sediment P accumulation rate in HL-2 core site, both at about 3.5 times of the HL-1 core. The supplying of relatively oxic lake water in into pore water may inhibit the iron bounded phosphorus releasing from sediment, decrease and average the mineralization process in sediment, this change in sediment could also be reflected by high phosphorus content, high phosphorus activities in HL-2 core. The increasing in sediment nutrient may be resulted from filtration by water flow into sediment, enhancing the sediment accumulation. Large mobile phosphorus trapped in sediment may increase the phosphorus releasing risk and intensify the algal bloom in Lake Hachirogata. Due to the high sediment phosphorus content and high activities in core HL-2, it would also be a considerable pollutant resources brought by water flow into coastal groundwater. The detailed results on sediment phosphorus property would be described in the presentation.

キーワード: Lake Hachirogata, sediment, pore water, phosphorus fractionation, water flow, land reclamation
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