**Japan Geoscience Union Meeting 2011**
(May 22-27 2011 at Makuhari, Chiba, Japan)


ACG035-P01 Room:Convention Hall Time:May 27 09:00-10:45

# Monitoring method for eelgrass bed mapping using ASTER data

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In recent years, the seaweed bed with biological productivity and habitat function is brought to international attention. From such a background the long-term monitor to aim at environmental preservation is necessary. An easy and inexpensive monitoring method including the citizenry participation is requested. However, monitoring in the seaweed bed is needed diving operation in general. Therefore, this monitoring method is that an economical load is large and it is a limit within the range of the search. The problem includes cannot help the large area evaluation using limited results in narrow region.

Meantime, some approaches of change and formation in coastal line are executed by using satellite image of high resolution that became possible to buy comparatively at a low price in recent years. And these monitoring methodologies are paid to attention, because a large area, economical, long-term continuance possibility is high.

In this study, for Mitsukuchi bay, Hiroshima prefecture, the possibility of seaweed bed distribution monitor by the satellite image was examined by existing classification technique methods of maximum likelihood etc, compared with seaweed place distribution measurement data that has been obtained up to now with the supersonic wave measurement device. In this meeting, it reports on the analytical result and detailed contents.

Keywords: ASTER, Eelgrass bed, Remote sensing, Monitoring method

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ACG035-P02 Room:Convention Hall Time:May 27 09:00-10:45

# Effect of groundwater discharge and seawater on nutrient component of tidal river

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Nutrient condition in water environment controls the ecosystem. Ground water discharge to the oceans is significant as nutrient supply (Slomp et al, 2004 etc). This situation is similar to the nutrient condition in rivers. In coastal urban area, land fill has generally been conducted in offshore and tidal flat. Groundwater gradient is generally declined by these constructions of new lands, and submarine groundwater discharge tends to stop in coastal areas. On the other hand, groundwater would discharge to rivers in a terrestrial area. In this research, we aimed to confirm effects of groundwater on nutrient supply to tidal river. The study area is located on the river mouth area of Asahi River in Seto Inland Sea watershed, western Japan. We collected water samples at one station of the river mouth area for the analysis of $^{222}$Rn and nutrient elements at five times on each tide level. In addition, groundwater near the river sampling station, bottom sea water in Seto Inland Sea, upstream river water and tidal river water at 5 points from the station to the 4km upstream area were collected.

The result of the hourly changes in $^{222}$Rn and nutrient concentrations at the river mouth station in each times shown, the $^{222}$Rn concentration was highest at the low tide level, and it was twice of that at the low concentration of $^{222}$Rn. On the other hand, the relationship between $^{222}$Rn and nutrient suggests the P, Si and $NO_3$-N discharge by groundwater to the tidal river. Especially, the phosphorus concentration was high in the tidal river. This would be supplied by the diffusion from river bed sediment as well as by groundwater discharge. Based on these results, we estimated the TP discharge by groundwater to be about 30%-60% of the tidal river nitrogen input to the study area.

Keywords: nutrient, groundwater discharge, $^{222}$Rn, tidal river

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ACG035-P03 Room:Convention Hall Time:May 27 09:00-10:45

# The water budget of a closed lagoon sporadically open to the sea: Lake Oikamanai, Hokkaido

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A closed lagoon, Lake Oikamanai, on the coast of southeastern Hokkaido tends to open sporadically to the Pacific Ocean. The sporadic opening is due to the overflow of the lake water breaking the gravelly sand bar. For several days after the opening, the lake level fluctuates daily in response to the ocean tide. Meanwhile, the drift sand and gravel close the lake again by constructing the bar. Many kinds of birds and water plants are seen in the marsh around the lake, and extraordinarily large corbiculae (Corbicula japonica) live in the lake. In this study, the water budget of lake was estimated before and after the opening. The temporal change of water volume was calculated by using the accurate bathymetry. As a result, more than 96 % of the lake water was drained by the opening, and during the closed periods, the river inflow dominated the water budget of the lake. Our future's works are to estimate groundwater input from around the lake and groundwater output to the sea.

Keywords: closed lagoon, water budget, snowmelt runoff, rainfall runoff, open frequency

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ACG035-P04 Room:Convention Hall Time:May 27 09:00-10:45

# Seafloor environmental changes effected by the construction of artificial lake in Kojima Bay, Okayama

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Kojima Bay is an estuary located at the southern coastal area in Okayama Prefecture. Its topographic has been varied by the effect of deposition processes in natural and reclamations. In addition, artificial lake called Kojima Lake was formed by dikes construction at the eastern part of the bay in 1959 AD. In order to examine the impacts of the formation of Kojima Lake to the seafloor environment, we collected 4 core samples in the bay and lake and analyzed sedimentary structures by soft-X ray radiographs, grain size and 210Pb dating.

Three cores were mainly composed of mud sediments and one core in Kojima Lake divided three sections by sedimentary structures; bioturbated section in the lower of core, sharply-defined laminated section in the middle and bioturbated section in the surface. Results of 210Pb dating showed that the ages of boundary between these sections were 1960 and 1980 AD, respectively. On the other hand, core collected in the mouth bay showed two sections which were a sand section in the lower of core and a mud section in the surface. These core results imply the seafloor environmental variations accompanied with the construction of Kojima Lake in 1959 AD as the following. Before the construction of the lake, benthic activities were very active in the interior of the bay. However, hydrodynamic condition became a stagnant and benthic activities were very little after 1960s. And it was probably that improvements of water quality slightly restored benthic activities after 1980s.

Keywords: sediment, grain size, Pb210 dating, artificial lake, Kojima Bay

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ACG035-P05 Room:Convention Hall Time:May 27 09:00-10:45

# The nutrient load from a drainage basin of different land cover

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The nutrient load from a drainage basin by rainfall or snowmelt is a key factor to affect the ecosystem in rivers, lakes and on the coast. In this study, we investigated the nutrient loading processes in the Saromabetsu river basin, facing a brackish lake, Lake Saroma. We separated river water into new and old waters for the runoff event of the 2009 typhoon by using three chemical tracers, O18, D and SiO2. As a result, it was found that the peak discharge in the typhoon runoff event is occupied by the same amount of new and old waters. By calculating the nutrient concentration of new and old waters, we considered how the farmland affects the river water quality. In order to examine the farmland effect, during non rainfalls, we sampled river water and measured discharge at 10 points along the main and tributaries' channels. The simultaneous soil moisture measurement on the basin slope suggests that the new water is transported by the unsaturated throughflow in the surface soil layer. The old water was supplied probably by the piston groundwater flow, because the O18 and D values did not then change. The separation of new and old waters suggested that the throughflow has the NO3-N concentration of 1.3mg/L. Meanwhile, the NO3-N concentration of the soil water was nearly 0 mg/L in forest and 2 ? 8 mg/L in grassland. So the river water pollution could occur mainly by the throughflow generated at farmland. The NO3-N concentration of the river water during non rainfalls was correlated with the rate of the farmland area in the drainage basin upstream of the sampling points.

Keywords: nutrient load, ecosystem, typhoon runoff event, unsaturated throughflow, piston groundwater flow

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ACG035-P06 Room:Convention Hall Time:May 27 09:00-10:45

# 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