Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)


ACG35-P01 Room:Poster Time:April 28 18:15-19:30

# Spatiotemporal distribution of organic matter buried in estuarine seagrass meadows

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Blue Carbon, captured and sequestrated by marine organisms, has attracted attention as one of the major sink of atmospheric carbon dioxide. One of the important process for carbon sequestration is burial of organic carbon into sediments. The burial rate of organic carbon is higher in estuaries and seagrass meadows than open oceans. A large amount of terrestrial carbon flows into shallow coastal systems, consequently being buried in the sediment. Also nutrient inflows elevate autochthonous organic matter production in the systems. Therefore, various organic matter compositions, having different origin and bioavailability, are mixed in shallow waters. In this study, we investigate the quality and quantity of organic matter buried in an estuarine seagrass meadow using elemental and isotopic techniques and $^{14}$C dating.

Our study site, the Furen Lagoon, is located at the high latitude in Japan. The Furen lagoon is eutrophic due to riverine inflows. Seagrass meadows occupy 67 % of the total area of the lagoon. We collected core samples (about 2 m) in the lagoon along the salinity gradient. TOC (total organic carbon) and TN (total nitrogen), as well as carbon and nitrogen isotopic signatures were analyzed along the depth. Also $\Delta$ $^{14}$C was analyzed for dating. In the low salinity zone, $\delta^{13}$C was low and C/N ratio was high, indicating that terrestrial organic matter was dominant. These signatures were relatively stable with sediment depth, showing that terrestrial organic matter would have been buried for thousands years. Within the seagrass meadow, $\delta^{13}$C and $\delta^{15}$N were relatively high, indicating that the contribution of autochthonous organic matter (phytoplankton and seagrass) to TOC would increase in the presence of vegetation. $\delta^{13}$C fluctuated with sediment depth in the seagrass meadow, showing that the contribution of terrestrial organic matter fluctuated temporally. These results suggest that the lagoon can be the long-term sink of carbon due to autochthonous production and deposition of terrestrial organic carbon.

Keywords: carbon sequestration, blue carbon, estuary, seagrass meadows, stable isotope, 14C dating

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ACG35-P02 Room:Poster Time:April 28 18:15-19:30

# Influences of submarine ground water discharge (SGD) on biogeochemical properties in coastal sea

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Submarine groundwater discharge (SGD) often influences on biogeochemical properties in coastal seas. We have estimated the flux of SGD using seepage meter and compared it with 222Rn, chlorophyll and nutrients concentrations at a fixed point in Obama Bay for a month

Keywords: submarine groundwater discharge, costal ecosystem, land-ocean interaction

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ACG35-P03 Room:Poster Time:April 28 18:15-19:30

# Development of simultaneous monitoring method of submarine groundwater discharge and primary production in coastal seas

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In recent years, a number of studies have shown that submarine groundwater discharge is an alternative nutrient pathway and can drive primary production in coastal seas. However, very little is known about quantitative relationship between input of groundwater and response of primary production, because both processes are temporally variable. Recent technological advances (i.e., automation) have increased our ability to assess submarine groundwater discharge in coastal ecosystems using natural tracers such as radon-222 ($^{222}$Rn). Simultaneous monitoring of $^{222}$Rn with indicators of primary production such as $pCO_2$ and/or chlorophyll-a would allow us to grasp the nexus of both processes. Therefore, automated radon and $CO_2$ gas analyzer were connected in series and a closed air loop was established with gas equilibration devices to examine the nexus between submarine groundwater discharge and primary production. In this presentation, we will report the results of simultaneous monitoring of $^{222}$Rn and $pCO_2$ with other parameters in several coastal environments.

Keywords: simultaneous monitoring, submarine groundwater discharge, primary production, coastal seas

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# Local scale assessment of submarine groundwater discharge in coastal seas (Beppu, Obama and Otuchi Bay)

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Submarine groundwater discharge (SGD) is important as a major pathway for freshwater and nutrients loads from land to ocean. Various natural tracers of SGD have been applied to quantify local to regional SGD fluxes. Radon-222 ($^{222}$Rn) is a naturally occurring radioactive gas that is typically 2-3 orders of magnitude higher in groundwater than surface waters. Therefore, it is a powerful tracer of groundwater inputs to oceans. We have applied the continuous $^{222}$Rn monitoring survey to three local scale coasts (Beppu Bay, Obama Bay and Otsuchi Bay), which have large amounts of groundwater resources in each watershed. As a result, spatial distributions of $^{222}$Rn and other parameters displayed not only influence of submarine groundwater discharge but also possibility of submarine hotspring discharge.

Keywords: submarine groundwater discharge, 222Rn, land-ocean interaction

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# Stable isotope compositions of dissolved inorganic carbon and water under the seabed of the coastal zone

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Groundwater often discharges from the seabed of the coastal zone. Such groundwater is called " submarine groundwater discharge (SGD) ". Mostly, SGD is the water which not fresh water but sea water and fresh water mixed. Although it is assumed that mixture has occurred under the seabed, there is almost no information about the behavior of water and dissolved component under the seabed such as the mixed process, zone of influence of sea water, and the behavior of the dissolved component from the land area. In order to clarify the behavior of water and dissolved component under the seabed of the coastal zone, we conducted the sampling of the water under the seabed of Obama Bay, Fukui prefecture. The stable carbon isotope ratio of dissolved inorganic carbon (DIC) was lower than that of sea water, and higher than that of groundwater which sampled from well near the seashore. The results show that not only mixture of water but mixture of DIC has occurred under the seabed. In the future, in order to comprehend the extent of the impact of sea water, it is necessary to research vertical distribution of the stable isotope composition under the seabed.

Keywords: submarine groundwater discharge, water stable isotope, carbon stable isotope, dissolved inorganic carbon