[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG43]Coastal Ecosystems - 2. Coral reefs, seagrass and macroalgal beds, and mangroves

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Coastal marine ecosystems are complex open system interacting with surrounding watersheds, outer ocean, and the atmosphere, providing a wealth of various ecosystem services to human life. Simultaneously, they are also influenced strongly and often negatively by human activities. This session, together with a companion session dedicated for the water cycle and land-ocean interactions [A-CG##], aims to provide a platform for interdisciplinary discussion covering various aspects of frontiers in coastal ecosystem sciences. This session particularly focuses shallow-water benthic communities ranging from temperate to tropical regions, such as coral reefs, seagrass and macroalgal beds, tidal wetlands, and mangroves. All these communities are characterized by intrinsically high primary production, active material cycling, and biodiversity hot spots. However, increasing human demand for coastal marine resources and industrial development concentrating on coastal regions incur the risk of rapid degradation and diminishment. Comprehensive assessment and monitoring of ecosystem functions and development of effective means for conservation and restoration are urgently needed for such communities. This session is dedicated to organizing and promoting such research and management activities by sharing state-of-the-art science and technology among ecologists, geologists, geochemists, biogeographers, etc. Field-based observational, experimental, and modeling studies concerning the following topics are especially welcome: ecosystem functions; elemental cycling; community connectivity; environmental changes such as global warming, ocean acidification, and sea-level rise; ecosystem services such as carbon sequestration, nutrient regulation, and fisheries production; regional- or global-scale comparison; long-term ecological researches.

[ACG43-P05]Tempo-spatial variations in the concentration of dissolved inorganic carbon (DIC) exported in mangrove-dominated river in Ishigaki Island

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Mangrove forests established in blackish water region of tropical or subtropical area are characterized by high soil organic carbon content and high net ecosystem production. High productivity of mangrove trees and low rate of organic matter decomposition are regarded as major factors explaining the high net ecosystem production. In the mangrove area affected by tidal change, however, carbon dioxide (CO_2, the product from organic matter decomposition) should be transferred to the out of the system not only by gas-phase emission from the sediment surface but also by outflow as dissolved inorganic carbon (DIC) to the river. Our limited knowledge about DIC efflux would be one of the reasons for uncertainty in considering the carbon cycling in the mangrove ecosystem or carbon transportation to the adjacent sea. Recently, some

studies have been conducted focusing on the DIC efflux from the mangrove area to the sea. However, the information about the tempo-spatial variations in the DIC concentration in subtropical mangrove area is limited and the mechanisms of DIC production and transportation to rivers are not fully understood. Then, we aimed to clarify the tempo-spatial variations in the DIC concentration and factors affecting the variation in the subtropical mangrove forest by measuring the DIC concentration in some points within a mangrove forest and examining the relationships between DIC concentration with tidal change and seasons.

This study was conducted in the mangrove forest around the Fukido River, Ishigaki Island. In March and August 2016, river water was sampled with one hour interval for 24 hours on six points of river within the mangrove area and one point on the mouth of river. In addition, fresh water and sea water samples were also collected from the upper rivers located on the out of mangrove area and adjacent sea, respectively. Water sampling was also conducted in January 2015 (one point of river) and August 2015 (one point of river and mouth of river). Salinity and pH were measured using electrodes. DIC concentration was determined by open-flow system using infra-red gas analyzer after gasification of DIC to the CO_2 by adding the phosphoric acid to the sample.

Salinity and pH increased during the high tide, whereas DIC increased during the ebb tide in all sampling points within the mangrove area. Salinity and pH showed positive correlation with water level at each point, suggesting the inflow of seawater by high tide because sea water had higher salinity and pH than fresh water. DIC concentration also should be affected by the mixing of sea water. Then, the DIC concentrations based on the mixing ratio were calculated using the simple two component mixing model based on the salinity and DIC concentration of fresh water and sea water and they were compared to the observed DIC values. Observed DIC was higher than estimated DIC during the ebb tide and it reached to two-hold of estimated values in maximum (the difference was 1.6 mmol C L^{-1} for this case). These results suggest that great amount of DIC should be transported to the river water in the mangrove area but we have to consider DIC outflow as a flux by considering the water volume.

Differences in observed and estimated DIC concentration differed even in the same sampling points depending on the sampling period; they tended to be smaller when there was much precipitation before the sampling or tidal change was small (middle tide or neap tide). In addition to the seasonal changes in the factors directly affecting the microbial decomposition (e.g., temperature), temporal changes in hydrological regime (influx of freshwater from the upper rivers or inflow of seawater by tide) would be important in estimating the long-term DIC efflux.

DIC concentration was spatially different even in the points with similar distance from the mouth of river. In addition to the difference in the water volume, DIC production rate (decomposition rate) or transportation rate to the river water maybe differed among the small water sheds within the mangrove area. As future perspectives, clarifying the decomposition activity in the mangrove sediment and its regulation factors and detail mechanisms of DIC transportation from the sediment to the river water are needed.