Spatial and seasonal variation of water quality in Batan Bay, Philippines

*Toshihiro Miyajima[1], Ryan Basina[2], Charissa M. Ferrera[3], Naoko Morimoto[1], Yasmin H. Primavera Tirol[2], Maria Lourdes San Diego-McGlone[3], Masami Hamaguchi[4]

1. Marine Biogeochemistry Group, Division of Ocean-Earth System Science, Atmosphere and Ocean Research Institute, The University of Tokyo, 2. Aklan State University New Washington, 3. Marine Science Institute, University of the Philippines Diliman, 4. National Research Institute of Fisheries and Environment of Inland Sea, Japan Fisheries Research and Education Agency

Batan Bay and Tinago Lake are shallow embayments connected to each other, located on the north of Panay Island, central Philippines (11.53˚ –11.67˚N, 122.38˚ –122.52˚E). Although they had been originally surrounded by dense mangrove forest till the middle of the last century, mangroves have been mostly cleared and converted into fish and shrimp ponds. Recently, shelves and rafts for cultivating oysters and green mussels have become widespread in the shallow areas of the embayments (see Figure as an example). Replantation of mangroves is also ongoing in limited areas of Batan Bay. We are conducting researches there focusing on ecosystem services of mangroves and seagrass meadows, especially in relation to carbon sequestration and aquaculture production. In this presentation, we report preliminary survey results on environmental conditions that may influence growth and survival of cultivated bivalves, such as freshwater inputs and potential food resources. The survey was conducted in both dry season (February 2019) and rainy season (November 2019). Although the salinity gradient across the bay due to freshwater input was evident in both seasons, the oxygen isotope ratio of seawater indicated that evaporation overwhelmed in inner bay sites in the dry season. Concentrations of chlorophyll and suspended particulate organic matter (POM), i.e. potential food source for bivalves, were high in the inner bay area. Carbon stable isotope ratio (δ^{13}C) of dissolved organic carbon (DIC) and POM showed spatial gradient from the bay mouth (high) to inner sites (low), indicating the influence of riverine DIC and POM inputs. However, the δ^{13}C of oysters (adductor muscle) was consistently higher than POM and showed no clear spatial gradient. The δ^{13}C of oysters was relatively higher for individuals collected from inside or edge of seagrass meadows than those collected in open areas. These results suggest that oysters assimilate only a specific fraction of POM relatively enriched in ^{13}C (i.e. marine-origin POM) and that seagrass meadows support growth of oysters by providing additional food source (e.g. attached microalgae that are abundant on seagrass blades).

Keywords: Oyster aquaculture, Seagrass meadows, Suspended particulate organic matter