Property of soil perticles related to reef-building coral distribution in Amitori and Sakiyama bays, Iriomote Island.

*Takumi Shibayama[1], Shinya Shimokawa[2], Hiroyoshi Kohno[3], Akiyuki Ukai[4], Akira Mizutani[3], Kota Nakase[4], Tomokazu Murakami[2]

1.Graduate school of Life and Environmental Science, Tsukuba University , 2.National Research Institute for Earth Science and Disaster Prevention, 3.Okinawa Regional Research Center, Tokai University, 4.Penta-Ocean Construction. Co. Ltd.

Amitori and Sakiyama bays are located in the northwest in Iriomote Island, Okinawa, Japan. The both bays have various natural environment and no access roads, and their bay perimeters are uninhabited. Therefore, in the bays, abundant coral reef ecosystem remains in nature. Sakiyama bay has been designated as a natural environmental protection area in 1983, and the area was also expanded to Amitori Bay in 2015.
Various reef-building corals inhabit in the bays. The reef-building coral distributions are affected by various physical factors (Shimokawa et al. 2014). Soil particles from rivers is one of the physical factors and disturb photosynthesis of zooxanthella by getting sea water muddy. Also, soil particles accumulating on coral's body surface cause damages to their molluscous parts and their respiratory failures (Yamazato, 1991).
This study aims to clarify the property of soil particles in the bays and its relationship to the coral distribution. For the purpose, we analyze behavior of soil particles by numerical simulation using the method called particle tracking analysis in which the tracers regarded as soil particles are released in flow fields of the bays calculated by an ocean model (Murakami et al. 2013).
However, their observational confirmation is weak only by using this method. Therefore, to obtain the observational confirmation, we conducted SPSS (content of Suspended Particles in Sea Sediment) analysis for the bays and investigate the relationship between the SPSS values and the numbers of soil particles calculated by particle tracking analysis. SPSS is a method to estimate the amount of soil particles originated from land in ocean floor material by visibility of a mixture of the floor material and clear water (Omija, 2003), is used as an index of soil quantities influencing on coral distribution.
Field observations for SPSS were conducted in July 2013, October 2014 and August 2015. The SPSS values were high from the inner part to the middle part of east coast in Amitori Bay. In Sakiyama Bay, they were high in the northeast of the inner part of the bay, whereas they were low around the reef edge facing the open ocean. Then, the SPSS values and the numbers of soil particles calculated by particle tracking analysis show proportional relations in all periods in Amitori Bay. In the presentation, we will show the details of those results and their relationship to coral distributions in the bays.
References:

Shimokawa, S., T. Murakami, A. Ukai, H. Kohno, A. Mizutani and K. Nakase, 2014, Relationship between coral distributions and physical variables in Amitori Bay, Iriomote Island, Japan, J. Geophys. Res.-Oceans, 119, 8336-8356 (doi:10.1002/2014JC010307).
Yamazato, K, 1991, *Sango no seibutugaku* [Biology of Coral], University of Tokyo Press, pp.136-138
Murakami, T., A. Ukai, K. Noguchi, H. Kohno, A. Mizutani, S. Shimokawa, K. Nakase, J. Yoshino, 2013, Numerical analysis of sediment transport in Amitori Bay, Iriomote Island, Japan, J. Jpn. Soc. Civ. Eng. B3, 69, I_928-I_933
Omija T., 2003, Convenient measuring method of content of suspended particles in sea sediment, Okinawa Prefectural Institute of Health and Environment, 37, I_99-I_104