

【Grant-in-Aid for Scientific Research (S)】
Integrated Disciplines (Complex Systems)



Title of Project : Advanced Interdisciplinary Research on Coastal Areas based on Shallow Seafloor Geomorphology: Development of a Paradigm through 3D Seafloor Mapping

Hironobu Kan
(Kyushu University, Graduate School of Integrated Sciences for Global Society, Professor)

Research Project Number : 16H06309 Researcher Number : 20294390

Research Area : Geography

Keyword : seafloor investigation, geomorphology, coral reef, mapping, environment

【Purpose and Background of the Research】

Coastal zones have always had a close relationship with the human society since the beginning of human civilization. However, there is very little scientific knowledge on coastal areas despite their closeness to human settlements. The coastal seafloor at depths shallower than ~130 m was subjected to alternating subaerial erosion and sedimentation during Quaternary sea-level change. However, the coastal seafloor is rarely discussed in conventional geomorphology.

A wideband multibeam echosounder (MBES: R2Sonic 2022) was introduced to our laboratory through a JSPS Grant-in-Aid for Scientific Research (A) in 2010 to observe high-resolution (1 to 2 m grid size) bathymetry of seafloor from 1 to 400 m depth. Snippet/TruePix options were also embedded in the system to observe backscatter data in 2013. We conducted MBES surveys in Kume, Ishigaki, Kikai and Okinawa Islands in the Ryukyus to develop seafloor geomorphology.

【Research Methods】

In this research, we are planning to introduce a POS/MV to improve accuracy of our bathymetric surveys. We are also planning to create high-resolution coastal map from photography using SfM software. New perspectives and new field of research will be developed through collaborative field research in geomorphology, geology, sedimentology, marine environment, disaster prevention, biology, nature conservation, culture, anthropology, and archaeology.

【Expected Research Achievements and Scientific Significance】

We discovered submerged tropical karst features and abundant living corals in Nagura Bay on Ishigaki Island in the southern Ryukyu Islands, Japan (Kan *et al.* 2015). As reported by the Ministry of Environment, Nagura Bay is believed to be influenced by the influx of a terrestrial red soil and nutrient load induced by land-use change

and less coral coverage. Our discoveries suggest that scientific exploration and research are urgently needed in the coastal areas because these areas are prone to development and also easily affected by land development. We expect to make many discoveries during the period of this study and to create a paradigm by improving the evaluation of the coastal seafloor.

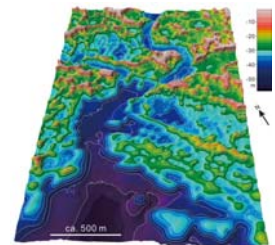


Figure 1 Submerged karst in Nagura Bay

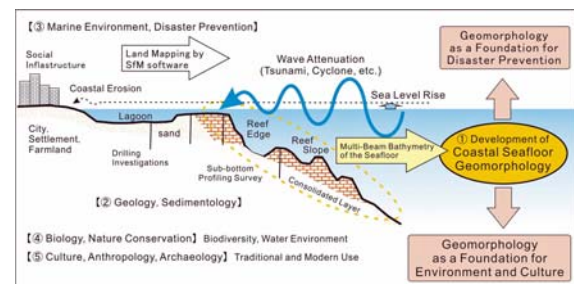


Figure 2 Conceptual diagram of this study

【Publications Relevant to the Project】

- Kan, H., Urata, K., Nagao, M., *et al.* (2015) Submerged karst landforms observed by multibeam bathymetric survey in Nagura Bay, Ishigaki Island, southwestern Japan. *Geomorphology*, 229, 112-124.
- Ono, R., Katagiri, C., Kan, H., Nagao, M., *et al.* (2016) Discovery of Iron Grapnel Anchors in Early Modern Ryukyu and Management of Underwater Cultural Heritages in Okinawa, Japan. *International Journal of Nautical Archaeology*, 45, 75-91.

【Term of Project】 FY2016-2020

【Budget Allocation】 126,600 Thousand Yen

【Homepage Address and Other Contact

Information】 <http://www.scs.kyushu-u.ac.jp/kan>