琉球列島久米島東部における堡礁地形の高解像度マルチビームマッピング

High-resolution multibeam bathymetric mapping of barrier reef geomorphology of eastern Kume Island, the Ryukyus

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In contrast to the vast knowledge that has been accumulated regarding terrestrial landforms, few previous studies have dealt with shallow seafloor landforms. Since a broadband multibeam echosounder (Sonic 2022, R2 Sonic, LLC) and its accessory system were introduced to H. Kan's laboratory in 2010 using JSPS Grant-in-Aid for Scientific Research A, we have been conducting high-resolution multibeam bathymetric surveys around the Ryukyu Islands, southern Japan, and mapping the coral reef geomorphology with a horizontal grid size of 1–2 m.
Accurate descriptions of coral reef geomorphology improve our understanding of reef environments. Here, we introduce our mapping project, which covers of a total of 39 surveyed areas across five islands, and present an example illustrating the barrier reef and island shelf geomorphology of eastern Kume Island (1.8 x6.5 km bathymetric area, with a depth range of 0.4–161.3 m) combined with SCUBA and VTR observations.
The bathymetric area comprises two contrasting reef edge formations: a double reef in the western area, and a deep breakwater reef in the eastern area. The latter shows the high-energy window condition which is accompanied by spur and groove formation in the lagoon, formation of circular spits or bowl-shaped depressions behind the lagoon patch reefs, and traces of movement of coral boulders in the lagoon following typhoon storm surges. These observations enable us to understand and reconstruct the paleo-geomorphology and sedimentology in reefs associated with the Holocene high-energy window, and can also contribute to predictions of coastal environmental change associated with future sea level rise.
On the island shelf, we observed several reef terraces at depths between 80–95 m, and isolated patch reefs at 135 m depth. The discovery of these features may contribute to reconstructions of past sea level and reef growth in the northwestern Pacific.

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