

Litho- and biofacies of carbonates on the western slope of the Miyako-sone, Ryukyu Arc

Hideaki Machiyama^{1*}, Kohsaku Arai², Hiroki Matsuda³, Yasufumi Iryu⁴, Shun Chiyonobu⁵, Keiichi Sasaki⁶, Marc Humblet⁷

¹Kochi/JAMSTEC, ²GSJ/AIST, ³Kumamoto University, ⁴Nagoya University, ⁵Tohoku University, ⁶Kanazawa Gakuin University, ⁷The University of Tokyo

JAMSTEC's R/V Natsushima NT09-17 Cruise, including bathymetric and ROV (Remotely Operated Vehicle) diving surveys, were conducted on the western slope of the Miyako-sone (s.l.; shallow submarine bank), which is located in the southern part of the Ryukyu Arc. ROV survey was carried out on the following lines: 1) from the northern slope (520 m water depth) to a terrace (317 m water depth) and 2) from the western slope (390 m water depth) to the shallowest terrace around the Juho-sone (121 m water depth) in the northwestern margin of the Miyako-sone.

ROV surveys revealed the occurrence of carbonate sediments and rocks on the seafloor. Results of the ROV surveys and the litho- and biofacies of carbonate samples are summarized as follows.

1) Terraces and gentle slopes are covered with coarse-grained carbonate sand, which consists mainly of foraminifers accompanied by bryozoans and other bioclasts. Current ripples and sand waves are common on the seafloor, which are formed by strong tidal currents and/or Kuroshio Current.

2) Limestone occurred below 400 m water depth is coarse- to very coarse-grained, sandy bioclastic limestone, which consists mainly of foraminifers, bryozoans, molluscs, and terrigenous grains. This sandy limestone is lithologically similar to the upper part of the Chinen Formation on Okinawa-jima.

3) Reddish brown-colored limestone at 390 m water depth consists of foraminifers, bryozoans, molluscs, and terrigenous grains, and accompanies by apparent cobble-sized sandy mudstone. This limestone may be equivalent to the "Reddish Limestone" in the basal lithological unit of the Ryukyu Group (Ryukyu Limestone) on Okinawa-jima.

4) Multicolored (mainly pale yellow and grayish white), well-cemented bioclastic limestone crops out around 350 m water depth. The fabric of this limestone indicates that it may have been exposed subaerially and subject to meteoric diagenesis.

5) Bioclastic limestone at 320 m water depth consists mainly of foraminifers, pelecypods, and bryozoans, accompanied by shallow-water skeletal grains, such as coralline algae and larger benthic foraminifers.

6) Bioclast-foraminiferal limestone crops out at 200-180m water depth, whereas bioclastic limestone at 150-130 m water depth contains rhodoliths and larger benthic foraminifers.

7) Limestone exposed above 140 m water depth is undulated and ragged surface likely due to meteoric diagenesis with a thin veneer of carbonate sands. Rhodolith (macroïd) pavement extends around 120 m water depth.

The late Miocene to early Pleistocene Shimajiri Group does not crop out in this area and may extend at greater water depths. The occurrence of subaerially exposed limestone around 350m water depth suggests that the subsidence of the western slope of the Miyako-sone might take place within the last 1.5 million years.