

Methane seepage and possibility of hydrate-bearing layers around Kuroshima Knoll, SW Ryukyu

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A reconnaissance survey expedition of Kuroshima Knoll, located south of Ishigaki Island, southwest Ryukyu Islands, was carried out for the first time in 1996. During the expedition dead Calyptogena shells were identified on the summit plane of the knoll. Several advanced reconnaissance survey expeditions afterwards for the geological study in this area by 2001 revealed an active eruption of methane, which suggested a methane hydrate layer beneath the knoll. In this study, we carried out a mapping of the bottom sediment on the top flat plane of Kuroshima Knoll from the video images obtained by JAMSTEC submersibles and ROVs since 2002 in order to create a complete geological route map. The result shows that the whole area of the summit plane of the knoll with the water depth of around 640m was covered by dead Calyptogena community and calcareous rocks. Live Bathymodiolus community was located densely around 24deg. 07min. 48sec.N, 124deg. 11min. 33sec.E. Bubble eruption was located at 35 sites. The area of the suggested methane seepage was estimated to be 40,000 square meters.

Next, the vertical profile of the sea water temperature with its seasonal variability around the knoll was examined in order to verify if methane hydrate exists stably beneath the seafloor of the knoll by use of the JODC data catalogue. It is, however, hard to expect a methane hydrate layer underneath the knoll considering the water temperature at the seafloor in this area. Examination of the vertical profiles of the sea water temperature along the whole Ryukyu Arc also shows that a possible methane hydrate layer is confined to the area with more than 700m in water depth in the fore-arc area.

Keywords: methane hydrate, Kuroshima Knoll