

## Microbial communities in submarine mud volcanoes: their origin and interaction with the microbial communities of the overlying seawater

\*Tatsuhiko Hoshino<sup>1</sup>, Tomohiro Toki<sup>2</sup>, Takuroh Noguchi<sup>3</sup>, Juichiro Ashi<sup>4</sup>, Masafumi MURAYAMA<sup>3</sup>, Akira Ijiri<sup>5</sup>

1. Japan Agency for Marine-Earth Science and Technology, 2. Faculty of Science, University of the Ryukyus, 3. Research and Education Faculty, Kochi University, 4. Atmosphere and Ocean Research Institute, The University of Tokyo, 5. Graduate School of Maritime Sciences, Kobe University

Dozens of mud volcanoes are known to be widely distributed off Tanegashima Island. We have been investigating these for the past ten years. Submarine mud volcanoes are known to transport muddy sediments and gaseous compounds such as methane vertically from deep below the seafloor to the seafloor and then to the hydrosphere. We are investigating this vertical transport to test the hypothesis that microbial circulation occurs, whereby microorganisms buried deep beneath the seabed diffuse back to the seabed surface and into the ocean.

During the KH-15-2 research cruise in 2015, sediments top from mud volcanoes #1 and #14 and the seawater directly above them were sampled. Microbiological analysis showed that *Caldatribacteria*, which is ubiquitous in anaerobic sediments throughout the world, was present in all sediments and in the seawater overlying them. The peak abundance of *Caldatribacteria* in seawater coincided with the peak methane concentration, confirming that microorganisms inhabiting submarine mud volcanoes are spreading into seawater as a result of mud volcano activity.

In order to confirm the constancy of this phenomenon and to evaluate it quantitatively, sediment and seawater samples were taken at Mud Volcano #2 and Mud Volcano #3 during the KH-19-5 research cruise in 2019. At mud volcano #3, five Niskin samplings were carried out around the summit to obtain a three-dimensional picture of how microorganisms spread from the mud volcano. The microbial community structure in the mud volcano sediments was similar to that of the mud volcano group studied in 2015, confirming the existence of a mud volcano-specific microbial community structure and the dominance of *Caldatribacteria*. On the other hand, in contrast to the previous study, there were few microbial communities in seawater in common with the submarine community. The cause of this discrepancy is still unanswered but may be related to the activity level of the mud volcanoes. We hope to share our new microbiological data on KH-19-5 to deepen the understanding of microbial dispersal and its origin in mud volcanoes.

Keywords: Mud volcano, Microbial community, Sediment