

Geology and biology of the Shinkai Seep Field in the Southern Mariana Forearc

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The Shinkai Seep Field (SSF), located in the inner trench slope of the southern Mariana Trench, ~80 km northeast of the Challenger Deep, is a serpentinite-hosted ecosystem mainly consisted of vesicomid clams. Although vesicomid clams are among the dominant invertebrates of chemosynthesis-based communities found principally at methane cold seeps derived from sediment diagenesis (such as at the Japan Trench, Nakai Trough, and Sagami Trough) and high-temperature hydrothermal vents (such as at the Galapagos Rift and Okinawa Trough), there have been no live examples from a serpentinite-hosted hydrothermal system including serpentinite mud volcanoes.

The SSF was serendipitously discovered by a Shinkai 6500 dive to map the mantle peridotite in the southern Mariana forearc, during YK10-12 cruise of R/V Yokosuka in September 2010. Although the dive was successful in collecting mantle peridotites and vesicomid clams, no water and sediments were collected. TN273 cruise of R/V Thomas G. Thompson in January 2012 performed Deep-towed IMI-30 sonar backscatter imaging. The result indicates that the SSF is associated with a small, low backscatter feature that may be a small mound. Such low backscatter features can be widespread in the mapped area.

In order to understand the SSF, YK13-08 cruise had the following objectives:

- (1) Finding and locating active fluid venting in the SSF. If successful, sampling the vent fluid and associated sediment for chemical and microbiological study.
- (2) Finding seep fields other than the SSF in the southern Mariana forearc, using the low backscatter feature on IMI-30 image as a guide.
- (3) Comprehensive understanding of the geology of the SSF. It is important to understand the geological background of the SSF including tectonic development of the southern Mariana forearc.

During YK13-08 cruise, Shinkai dives 1362, 1365 and 1366 successfully revisited the SSF, obtaining core samples for investigation of faunal composition, microbial and geochemical analyses in sediments, Niskin and pressure-tight water samples for geochemical analyses, and discovering chimneys. Shinkai dives 1363 and 1364 investigated the landward slope of the southern Mariana Trench ~7 km west of the SSF, revealing that the mapped slope is entirely consisted of serpentinitized harzburgites. New seep fields were not discovered during the cruise, indicating that not all low backscatter features on IMI-30 image correspond to seep fields. In this talk, we will show the preliminary results of YK13-08 cruise and discuss the geology and biology of the SSF.

Keywords: chemosynthetic community, serpentinite, Shinkai Seep Field