

Volcanic history of the Oomurodashi, northern Izu-Bonin Arc

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Oomurodashi is a bathymetric high located ~20 km south of Izu-Oshima. Using the 200 m bathymetric contour to define its outline, the diameter of Oomurodashi is ~20 km, similar in size to the Hachijyojima Volcano. Previous dredge surveys conducted on Oomurodashi had recovered fresh pumice clasts (Hamuro et al., 1983, Bull. ERI), but since then it has been ignored, largely because it has a vast flat-topped summit at 100 - 150 meters below sea level (mbsl), and has been regarded as inactive.

However, during cruise NT07-15 of R/V Natsushima in 2007, we conducted a dive survey using the remotely-operated vehicle (ROV) Hyper-Dolphin of the small crater, Oomuro Hole, located in the center of the flat-topped summit of the Oomurodashi. The heat flow measurement conducted on the floor of Oomuro Hole recorded an extremely high value of 4,200 mW/m². Furthermore, ROV observations revealed that the southwestern wall of Oomuro Hole consists of fresh rhyolitic lava flows.

These findings suggest that Oomurodashi is in fact an active silicic submarine volcano. To confirm this hypothesis, we conducted detailed geological and geophysical surveys of Oomurodashi in July-August 2012, again using the R/V Natsushima and ROV Hyper-Dolphin (cruise NT12-19). In addition to further ROV surveys, we carried out single-channel seismic (SCS) surveys across Oomurodashi in order to examine the shallow crustal structures beneath the current edifice.

The ROV surveys revealed numerous active hydrothermal vents on the floor of Oomuro Hole. The maximum water temperature measured at the hydrothermal vents reached 194C, almost equivalent to the boiling temperature of water at the ~200 mbsl water depths of the floor of Oomuro Hole. We also conducted comprehensive heat flow measurements across the floor of Oomuro Hole, with very high heat flows up to 29,000 mW/m² being detected. ROV observations revealed that the area surrounding Oomuro Hole on the flat-topped summit of Oomurodashi is covered by extensive fresh rhyolitic lava and pumice clasts with minimum biogenetic or manganese cover, suggesting recent eruption(s). Furthermore, the SCS surveys revealed the presence of a buried caldera-like structure, ~8 km in diameter, beneath the flat-topped summit of Oomurodashi.

These findings strongly indicate that Oomurodashi is an active silicic submarine volcano, with recent shallow-sea eruption(s) occurring from Oomuro Hole. Since Oomurodashi is situated in a shallow-sea environment, in close proximity to the inhabited northern Izu Islands, further volcanological surveys are essential to understand the detailed volcanic history and potential hazards of this volcano.