

SUBMARINE GEOLOGY OF TORISHIMA SEAMOUNT CALDERA AND THE ADJACENT AREA, IZU-BONIN ISLANDS

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In 2002 December, our IFREE 2 group carried out a geological and geophysical research cruise in the northern part of the Izu-Bonin arc using R/V KAIREI. Torishima seamount and adjacent areas were one of the chief targets of this cruise. During this cruise we carried out Sea BEAM bathymetric and side-scan sonar surveys, single-channel seismic surveys, and dredge hauls around Torishima seamount. We here report the preliminary results of these surveys.

Torishima, which last erupted in August 2002, is an active volcano at the front of the Izu-Bonin arc. Torishima seamount is indented by a caldera about 8 km in diameter and Torishima Island is one of the caldera rim volcanoes on the south side of the caldera. The configuration of the caldera is not as well developed as other submarine calderas along the Izu-Bonin arc. A ~5 km wide zone of central cones lies on the western side of the caldera, but their shapes are not conical and the boundary between them and the western caldera rim is not clear. A flat caldera floor exists only in the southeast side of the caldera because a comparatively large central cone lies on the western side of the caldera floor. The flat caldera floor is covered by stratified and comparatively soft fine-grained sediments. Outcrops along the rim and inner walls of the caldera and central cone generally consist of coarse-grained fragmental or hard-rock outcrops. For the most part, scoriaceous and dense basaltic rock fragments were dredged from these surfaces. Basically, the upper part of the outer caldera slope is steep and shows coarse-grained fragmental or hard rock outcrop bottom features. The more gentle lower parts of the outer caldera slopes are comparatively smooth and are covered by soft, fine-grained sediments. The lower parts of the outer caldera slope locally display wavy and undulating bathymetric contours, and these likely reflect the presence of landslides deposits resulting from slope failures near the caldera rim.

Some bathymetric highs exist around Torishima caldera. In general, conical-shaped highs (i.e. Torishima knoll) show coarse grained fragmental or hard rock outcrop bottom features, and scoriaceous material was dredged from some of them. On the other hand, the summit of Dai-ichi Higashi Torishima knoll, which has a flat, triangular shape, is covered by soft and comparatively thick fine-grained stratified sediments.