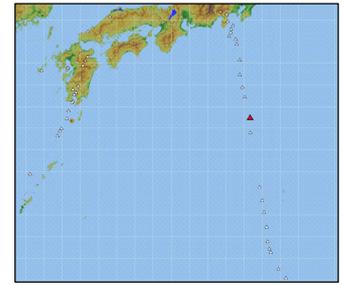


## 68. Izu-Torishima

Latitude: 30°29'02" N, Longitude: 140°18'11" E, Elevation: 394 m (Ioyama)  
(Elevation Point)



Izu-Torishima taken from southeast side on August 12, 2002. Courtesy of the Maritime Safety Agency.

### Summary

Izu-Torishima is a roughly circular somma-type volcanic island 2.7 km in diameter. A submarine volcano called the Torishima caldera is located below the sea on the north side of the island. Izu-Torishima is located on the southern rim of this submarine caldera.

Izu-Torishima has been very active during the Quaternary period, with multiple strata of basalt lava flow and pyroclastic material forming the main portion of the island. This was followed by an explosive eruption of dacitic magma, forming a 1.5 km diameter caldera at the summit. After this, basalt and andesite magma activity formed two central cones. Their SiO<sub>2</sub> content is between 46.8 and 74.8 wt %.

In 1902, strong explosive eruptions occurred in the sea to the south of the island, at its summit, and on the northern coast. A large explosion crater was formed on the western side of Komochiyama, a cone located in the center of the caldera. All 125 residents living along Chitoseura, north-northeast of the island, were killed.

In 1939 the Ioyama central cone was formed on the northern side of Komochiyama, with lava flows to Chitoseura and Hyogoura in the northern part of the island. No explosive eruption has occurred, and no fatalities have been caused. No eruptions have occurred since then, but records exist of high levels of seismic activity and discolored water along the coast. Since the weather observation station was closed as a result of an earthquake swarm in November, 1965, the island has been deserted.

Eruptive activity occurred at Ioyama in 1998 and 2002.

### Submarine Topographic Map

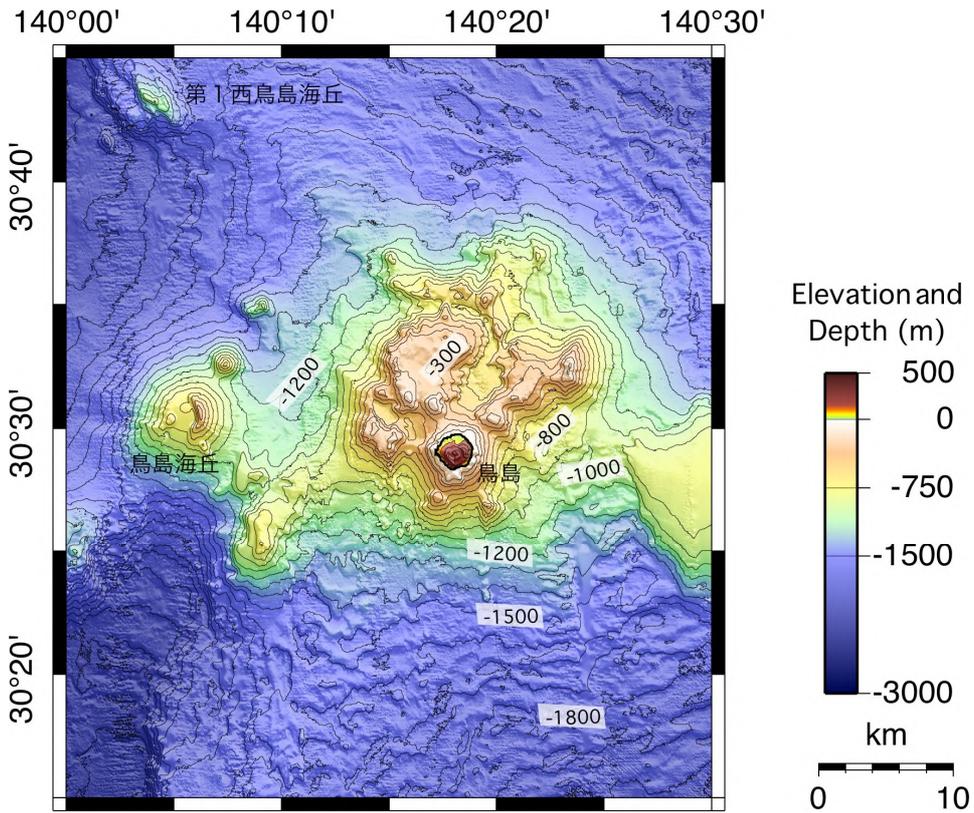


Figure 68-1 Submarine topographic map of the Izu-Torishima area (Japan Coast Guard).

### Geological Map

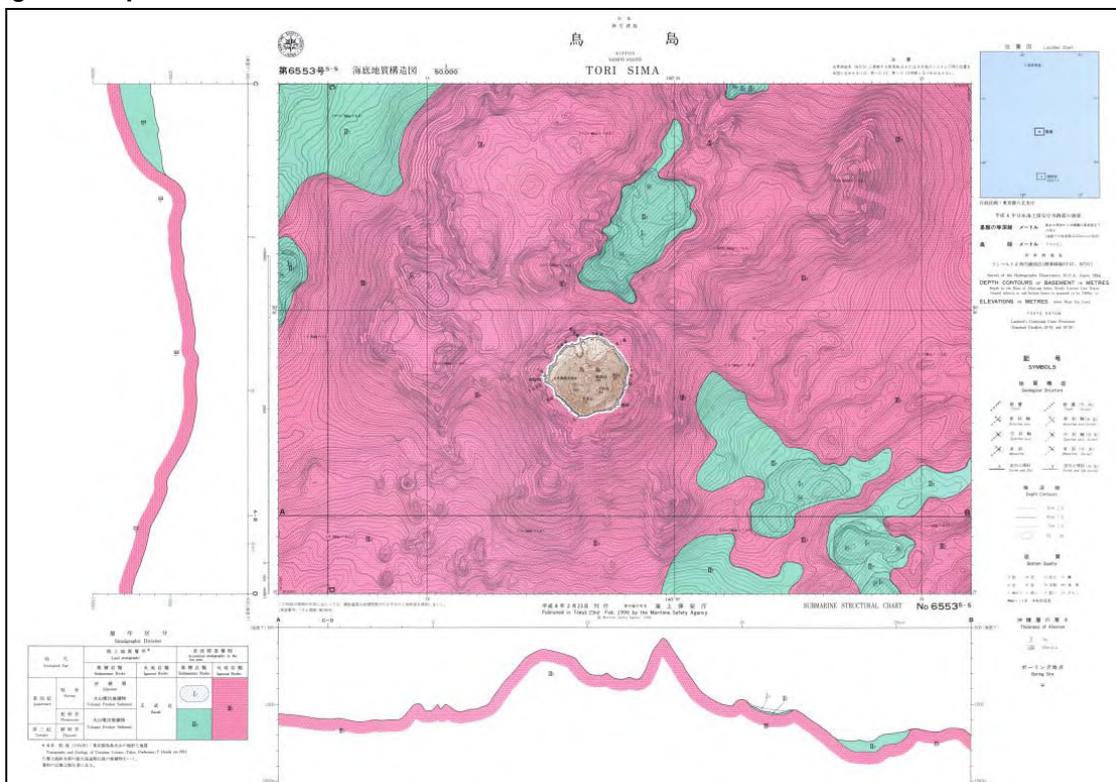


Figure 68-2 Submarine tectonic diagram of the Izu-Torishima area (Maritime Safety Agency, 1996).

## Chronology of Eruptions

### ▪ Historical Activity

Few details are known about the eruption history before the 1902 eruption.

Year	Phenomenon	Activity Sequence, Damages, etc.
1902 (Meiji 35)	Phreatic eruption	August 7 to 24. Tephra fall. The eruption activity occurred at the western foot of Komochiyama, in Hyogoura, and undersea approximately 2.5 km southwest of Torishima. A large eruption occurred, with an explosion in early August (between August 7 and 9). The eruption continued until the end of the month. The central cone was destroyed by the explosion. A large crater (approximately 800 m along its largest axis, and 300 m along its narrowest axis) was formed in the center of the island. Explosions also occurred at sea, approximately 1km southwest of the island, and on the northwest coast of the island. The latter formed Hyogoura. All 125 residents of the island were killed.
1939 (Showa 14)	Moderate: Magmatic eruption	August to December. Tephra fall, lava flow. The eruptive activity occurred at Ioyama. On August 18, an eruption occurred on the southeast edge of the crater formed in 1902. It produced a volcanic plume, rumbling, formed a pyroclastic cone, and emitted a lava flow. The pyroclastic cone formation and lava flow discharge continued until the end of December. All residents and navy weather station personnel were evacuated. The eruptions produced approximately 100,000,000m <sup>3</sup> of ejecta. Magma eruption volume = 0.025 km <sup>3</sup> DRE. (VEI 3)
1947 (Showa 22)		* A weather station was established in June, and began volcanic observation from September.
1949 (Showa 24)	Crustal deformation	July to October. Crustal uplift on the crater floor.
1952 (Showa 27)	Earthquakes	April 29 to May 3.
1956 to 1958 (Showa 31 to 33)	Crustal deformation	Crustal uplift on the crater floor.
1959 (Showa 34)	Earthquakes	July 21. Earthquake swarm (1 felt earthquake).
1961 (Showa 36)	Earthquakes	January to April.
1962 (Showa 37)	Earthquakes	April to June.
1963 (Showa 38)	Earthquakes	April 9 to 15.
1965 (Showa 40)	Earthquakes	November. * The weather station was closed on November 16. The island has remained deserted since then.
1998 (Heisei 10)	Phreatic eruption?	A small pit crater, approximately 35 m in diameter, was formed on the southwest rim of the Ioyama crater. Based on analysis of aerial images, a small eruption is considered to have occurred between February and October of the same year. No pyroclastic material have been found in aerial photographs.
2002 (Heisei 14)	Phreatic eruption → phreatomagmatic eruption → magmatic eruption	The eruptive activity occurred at Ioyama. On August 8, a fishing boat in the area observed a relatively large white volcanic plume. In the early morning of August 10, another recreational fishing boat confirmed repeated fire columns from the summit. On August 11 a white volcanic plume (200 to 300 m high) was confirmed to be emitted from the summit area of Ioyama. On August 12 a gray-white volcanic plume (approximately 600 m high) was emitted continuously from the summit crater of Ioyama. On the following day, August 13, the volcanic plume extended to approximately 1,200 to 1,500 m in height. Remote camera images confirmed that the volcanic plume had already disappeared by August 19, and aerial observation on August 21 found only a fume of approximately 10 m.

\* Reference documents have been appended with reference to the Active Volcano Database of Japan, AIST (Kudo and Hoshizumi, 2006 onwards) for volcanic periods, areas of activity, eruption types, and eruption events.

### Recent Volcanic Activity ▪ 2002 Volcanic Activity

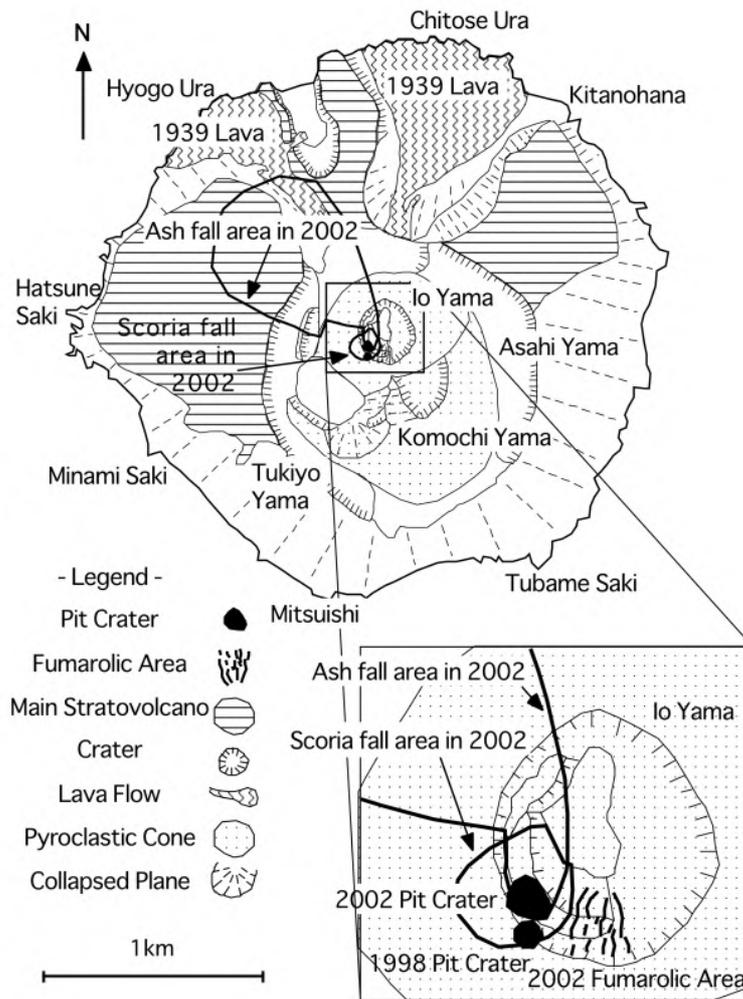


Figure 68-3 Geological map of the Izu-Torishima volcano (created based on aerial photographs by the Maritime Safety Agency Hydrographic and Oceanographic Department) (After Ito et al., 2003).

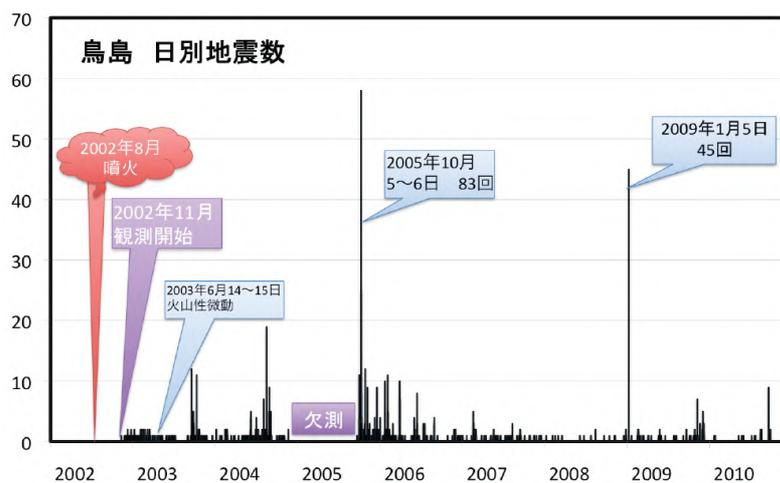


Figure 68-4 Number of earthquakes per day on Izu-Torishima (2002 to 2010) (Kyushu University, 2010).  
The level of seismic activity was high in some years, like 2005 and 2009.

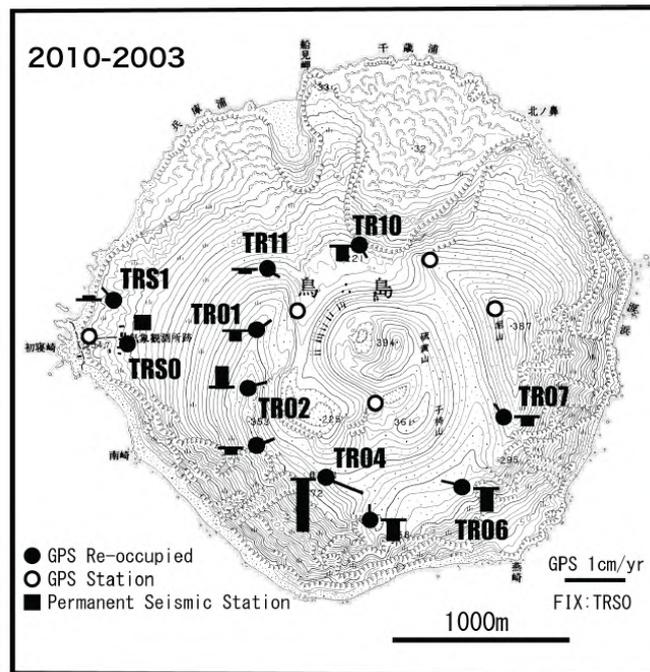


Figure 68-5 GPS measurement results for Izu-Torishima (solid lines indicate lateral displacement vectors, bar graphs indicate vertical displacement) (Kyushu University, 2010).

The island deflated by approximately 2 mm/year towards the central cone.

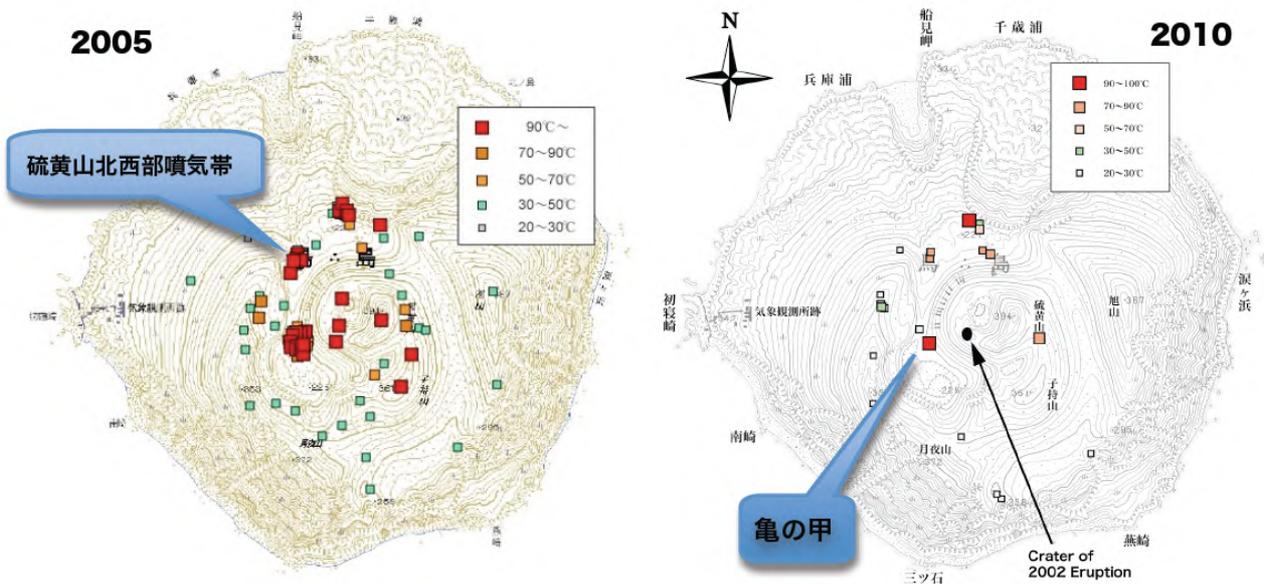


Figure 68-6 Distribution of ground temperatures at depth of 50 cm on Izu-Torishima (left: September, 2005; right: June, 2010) (Kyushu University, 2010).

Overall, ground temperature measurements from 2010 were lower than those of 2005.

The drop in ground temperature was particularly large for the fume area on the northwestern side of Ioyama.

Since the 2002 eruption, volcanic activity appears to have been gradually decreasing.

## Information on Disaster Prevention

① Hazard Map

None

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(Ito, K., and Matsushima, T.)