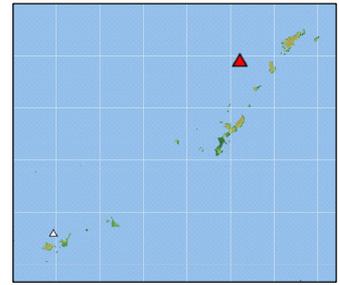


98. Io-Torishima

Latitude: 27°52'52" N, Longitude: 128°13'21" E, Elevation: 212 m (Hoi)
(Spot elevation measured by JMA)



Overview of Io-Torishima taken from south side on November 24, 2011, Courtesy of the Japan Coast Guard

Summary

Io-Torishima is composed of two joined andesite volcanoes. It measures 2.7 km southeast to northwest, and is 1 km wide. Iodake, the highest point of the island, is located on the northwest side. It is a lava dome with a crater approximately 500 m in diameter at its summit. Active fumaroles exist at several points on the crater wall. The volcano on the southeast side of the island is called Gusuku, which is a tuff ring with a 500 m diameter crater. Inside the crater is a flat lava dome, and weak fumaroles are located on the north crater wall. All explosions within the historical period occurred at the Iodake crater, but the Gusuku volcano is the more recent volcanic edifice. The SiO₂ content is between 52.1 and 60.2 wt %. The island is currently a desert island, as all residents of the island evacuated multiple times due to eruptions. "Okinawa Iojima" is also used as the volcano's name. Recent earthquake observation showed that minor seismic activity was linked with earth tides (Takagi et al., 2004).

Topography around the Crater

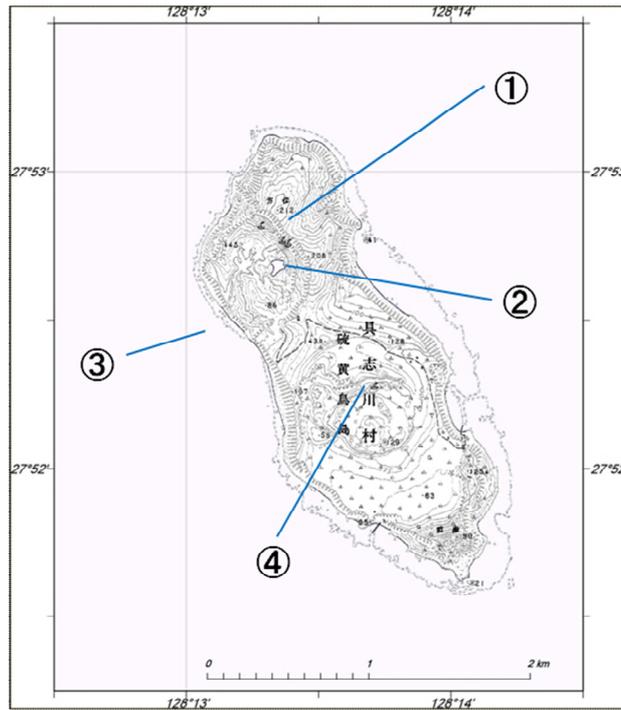


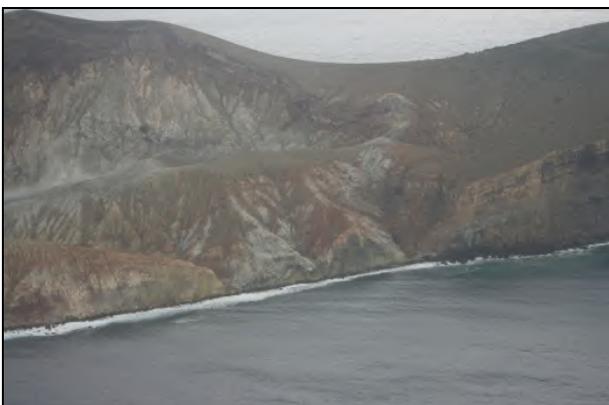
Figure 98-1 Survey of Io-Torishima by the Japan Coast Guard (January 12, 2012).



① Eruption on the inner wall of the crater taken from the Southwest Side



② Fume at collapsed vent in the center of the crater taken from the southwest side



③ Discolored water around the southwest coast of the crater taken from the southwest side



④ Fume on northern wall of Gusuku, at the center of the Island, taken from the west-southwest side

Red Relief Image Map

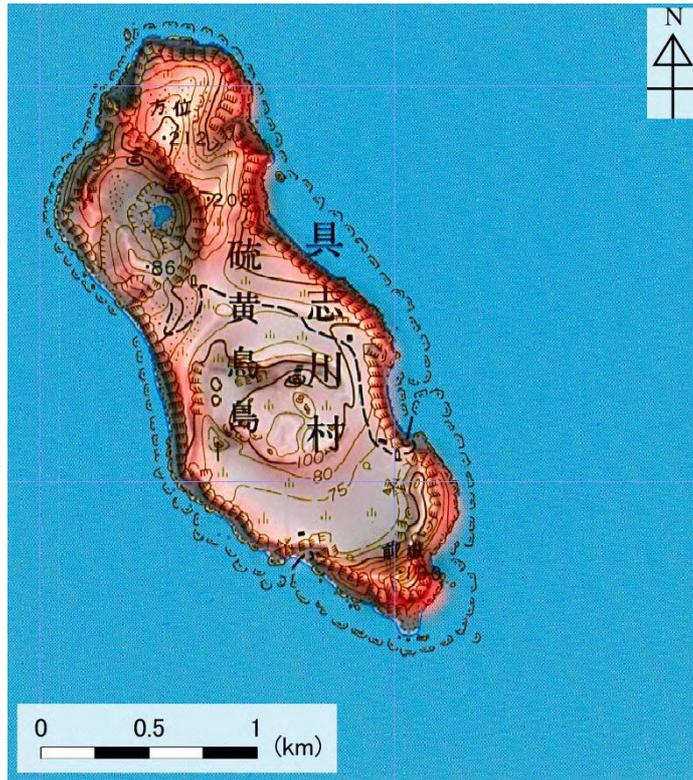


Figure 98-2 Topography of Io-Torishima.

1:50,000 scale topographic map (Kumejima) and digital map 50 m grid (elevation) published by the Geospatial Information Authority of Japan were used.

Submarine Topographic Map

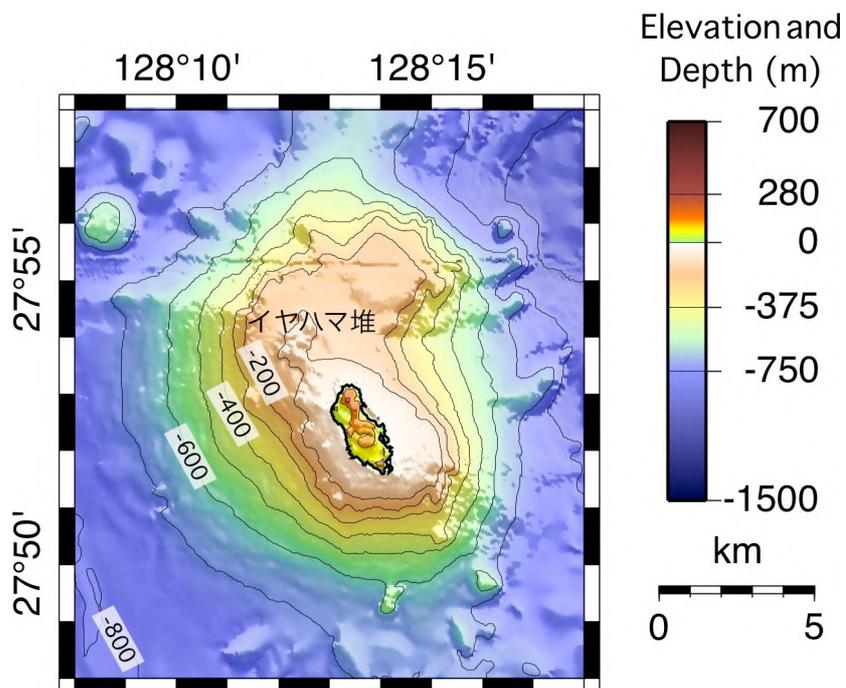


Figure 98-3 Submarine topographic map of the Io-Torishima area (Japan Coast Guard).

Geological Map

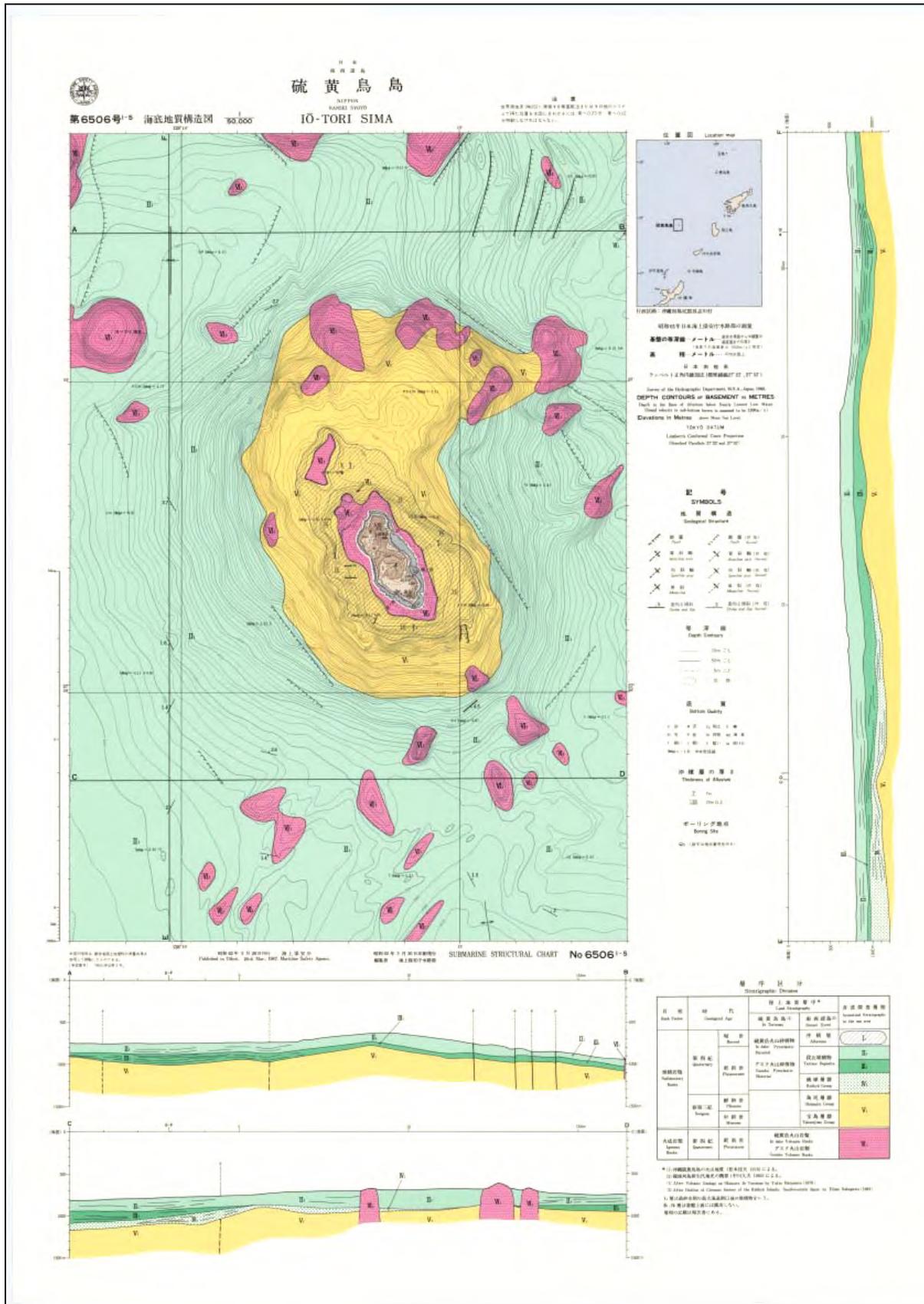


Figure 98-4 Geological map of the Io-Torishima area (Maritime Safety Agency, 1987).

Chronology of Eruptions

▪ Volcanic Activity in the Past 10,000 Years

Some tephra layers in the past 30,000 years are distributed across Tokunoshima, but no details regarding tephra after 10,000 years ago have been obtained. Small eruptions were reported since 1664.

▪ Historical Activity

Year	Phenomenon	Activity Sequence, Damages, etc.
1664 (Kanbun 4)	Eruption, earthquake	Caused fatalities. It is possible that the eruptive activity occurred at Iō-Tōrishima.
1796 (Kansei 8)	Eruption	October to November. Tephra fall, crop damage. It is possible that the eruptive activity occurred at Iō-Tōrishima.
1829 (Bunsei 12)	Eruption	December 1 to 16. It is possible that the eruptive activity occurred at Iō-Tōrishima.
1855 (Ansei 2)	Eruption	March to May. It is possible that the eruptive activity occurred at Iō-Tōrishima.
1868 (Meiji 1)	Eruption	February to April. Tephra fall? It is possible that the eruptive activity occurred at Iō-Tōrishima. Tephra fall.
1903 (Meiji 36)	Phreatic eruption?	April 11 to mid-August. Tephra fall. The eruptive activity occurred at the Iodake (Hoi or Hoinoyama) crater. Volcanic blocks were ejected, and all island residents temporarily evacuated to Kumejima.
1934 (Showa 9)	Fume	Three new fumaroles were formed on the northern crater wall of the southeast volcano.
1959 (Showa 34)	Moderate: Eruption	Approximately one month, starting on June 8. Tephra fall, lahar? Sulfur flow? The eruptive activity occurred at the Iodake ("Hoi" or "Hoinoyama") crater. A volcanic plume stretched 3000 m from the northwest crater, and volcanic blocks and ash were ejected. The activity lasted for approximately 1 month, with mud and sulfur flowing into the sea. All 86 island residents moved off the island. (VEI 2)
1967 (Showa 42)	Eruption	Roughly November 25. A large volcanic plume was emitted, and sulfur miners moved off the island. It is possible that the eruptive activity occurred at Iodake.
1968 (Showa 43)	Phreatic eruption	Approximately July 18. Tephra fall. The eruptive activity occurred at the Iodake (Hoi or Hoinoyama) crater.

* Volcanic periods, areas of activity, and eruption types taken from the Active Volcano Database of Japan, AIST (Kudo and Hoshizumi, 2006).

Recent Volcanic Activity

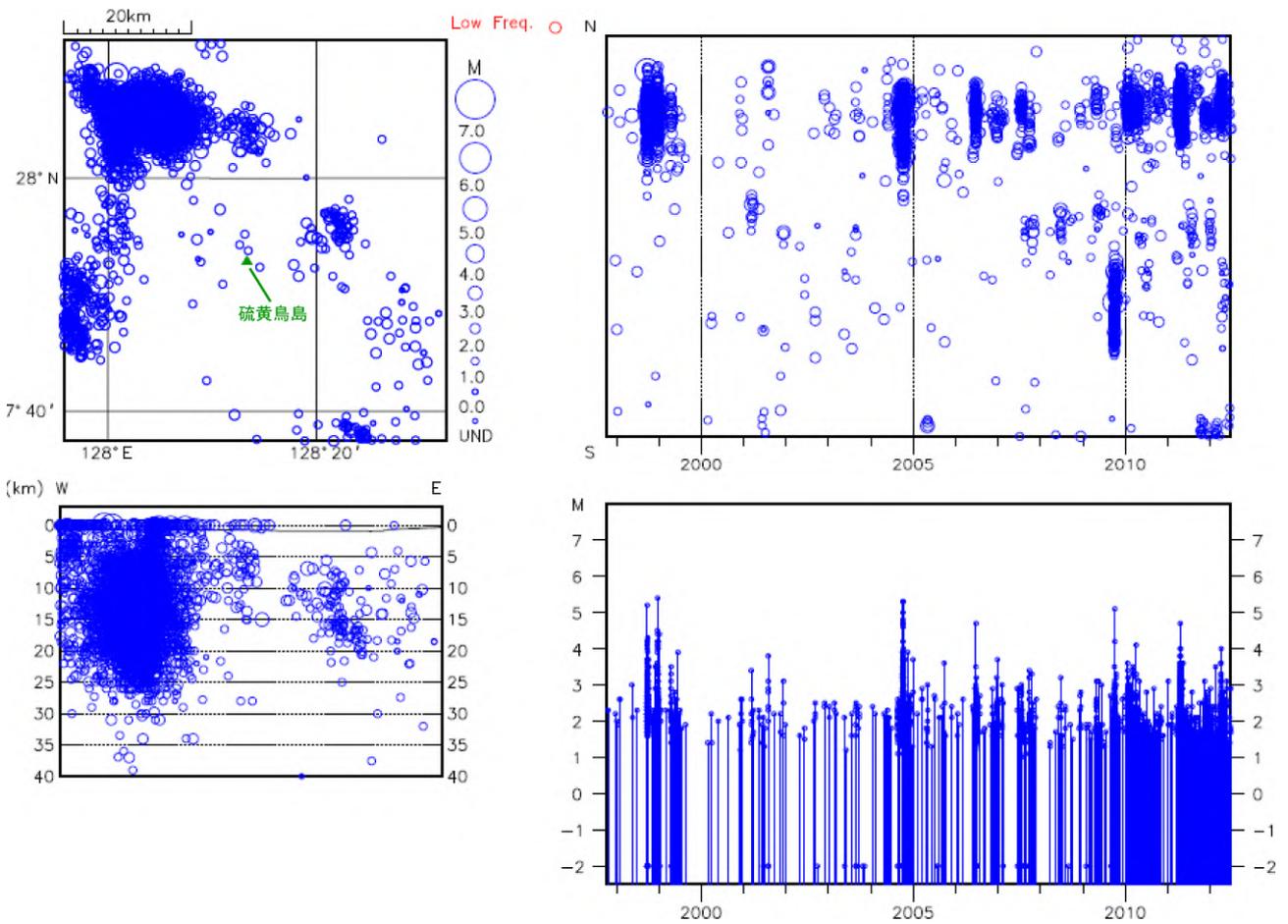


Figure 98-5 Activity of shallow VT earthquakes (blue circles) and deep low-frequency earthquakes (red circles) observed by a regional seismometer network (October, 1997, to June 30, 2012). Epicenter distribution (upper left), space-time plot (N-S cross-section) (upper right), E-W cross-section (lower left) and magnitude-time diagram (by scale) (lower right).

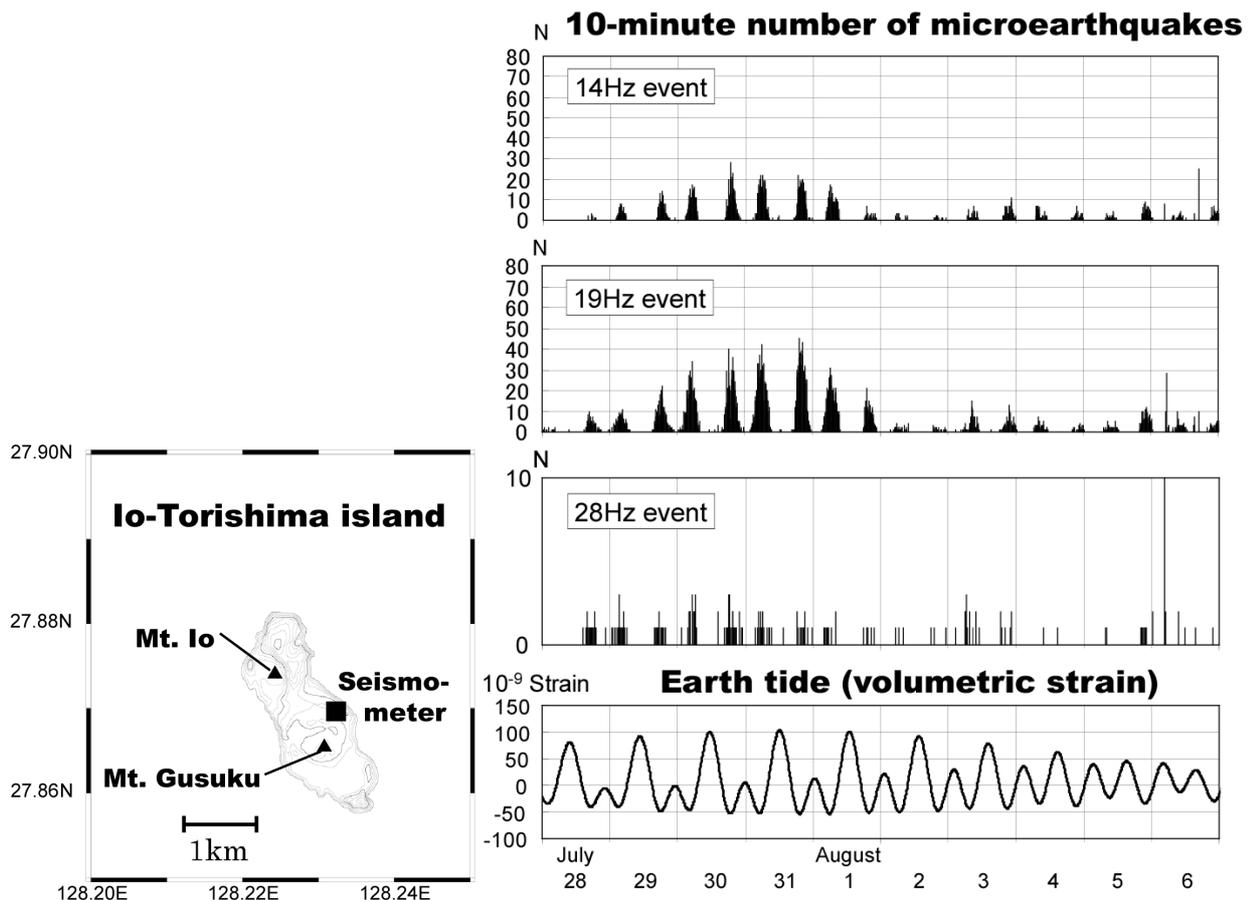


Figure 98-6 Seismic activity at Io-Torishima (July 28, 2004 to August 6, 2004) (Takagi et al., 2004).

The charts show the number of earthquakes with dominant frequencies of 14, 19, and 28Hz every 10 minutes, and calculated volumetric strain caused by earth tides. When the amount of strain fell, seismic activity increased intermittently.

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