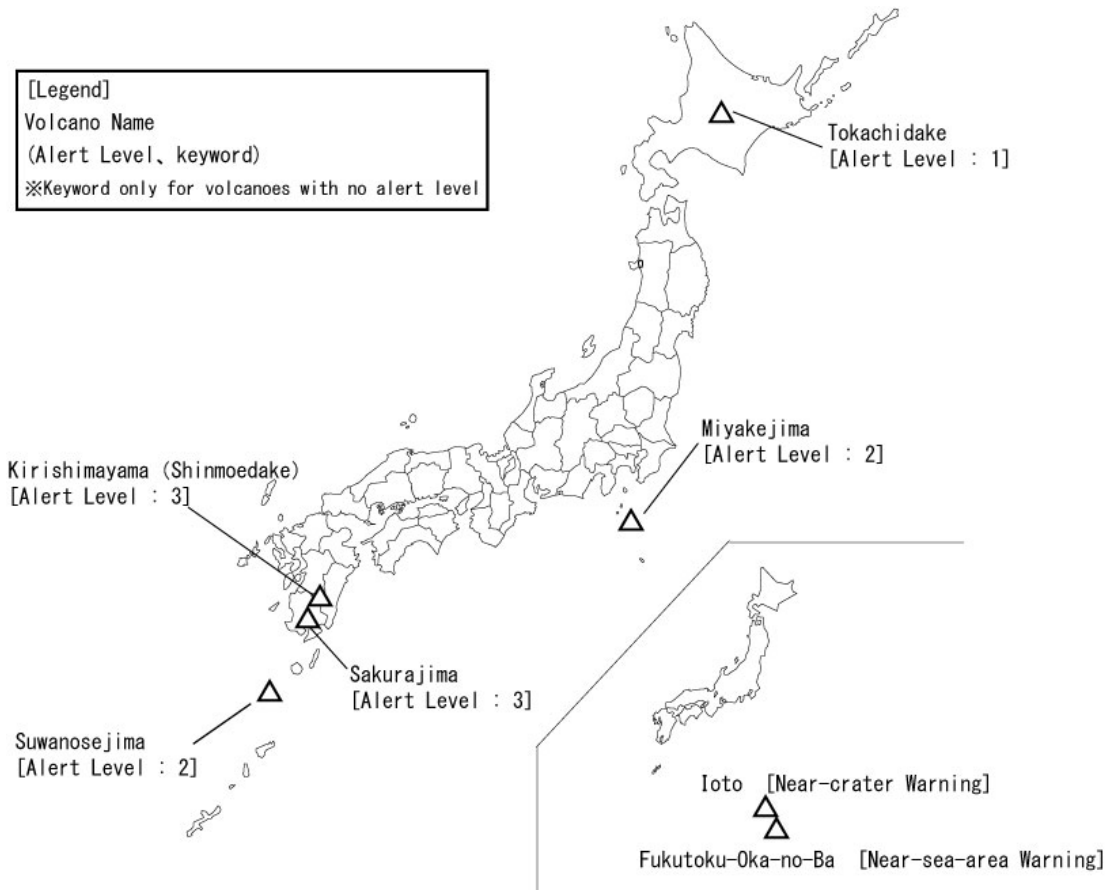


# Monthly Volcanic Activity Report (December 2012)



## **Tokachidake (Alert Level: 1)**

Volcanic earthquakes temporarily increased on December 2nd, 27th and 28th.

Fumes at the Taisho crater rose to heights of up to 100 m above the crater rim, and have remained at relatively high levels since May 2010. Plume activity at the 62-2 crater has remained at low levels and white plume was observed rising to a height of up to 100 m above the crater rim.

Seismic activity has remained at relatively high levels since around 2010. Volcanic earthquake activity temporarily increased from midday to the evening of December 2nd, with hypocenters located at depths of 1 km below sea level to the east of the Ground crater. On the same day, magnitude 2.8 and 2.0 earthquakes occurred at 13:37 JST and 13:49 JST, respectively. According to reports from Biei Town and first-hand accounts collected by the Local Meteorological Observatory, the former one was felt in the Shirogane and Tokachidake hot spring areas located at the foot of the mountain, while the latter was felt in the Shirogane area only. It is supposed that these quakes were seismic intensity of 1 in Japan Meteorological Agency (JMA) scale, respectively. These were the first felt-earthquakes in the area since June 25th, 2000. In addition, earthquakes with small magnitude temporarily increased on the night of December 27th – dawn of 28th. No tremors have been observed.

According to continuous GPS observation data, ground deformation at Maetokachi indicating inflation of shallow parts at the 62-2 crater had continued since 2006, but this tendency may have slowed since April of 2012. No change indicating ground deformation in deeper parts was observed.

## Miyakejima (Alert Level: 2)

Gas-and-steam plumes rose to heights of approximately 100 – 300 m above the crater rim. According to field survey on December 5th, 11th and 18th, the amount of the sulfur dioxide (SO<sub>2</sub>) flux was approx. 400 – 600 t/d (Fig. 1), indicating that emission of volcanic gas remained higher than usual. According to a report from Miyake Village, relatively high concentrations of SO<sub>2</sub> were occasionally recorded in inhabited areas.

Geomagnetic observation revealed that there was no change in an inner-heat state beneath Miyakejima.

Seismicity has largely remained at low levels. Hypocenters were located just beneath the summit crater of Miyakejima as before. No tremors have been observed.

According to continuous GPS observation data, ground deformation indicating contraction in shallow parts of the mountain has continued since 2000, but has been gradually diminishing. Long-term extension of the baseline along the north-south section of Miyakejima has also been observed since 2006, indicating expansion in deeper parts.

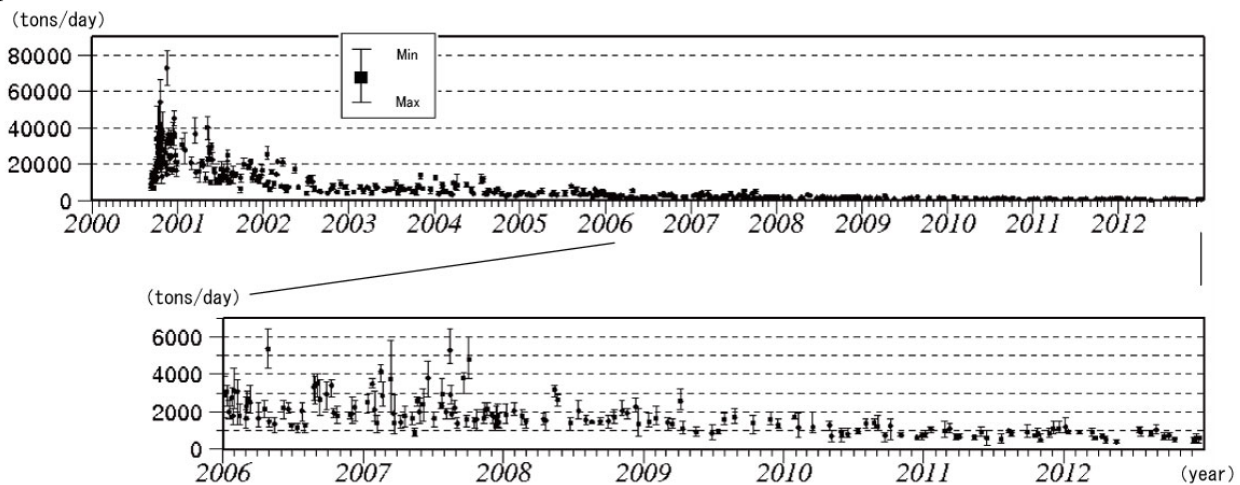


Fig. 1 SO<sub>2</sub> emission rate at Miyakejima.

## Ioto (Near-crater Warning)

It was confirmed in the morning on December 1st that mud had been scattered from the old crater located in the west of the island (so-called: Million dollar hole). Although the time when that occurred was unknown, relatively large-amplitude volcanic tremor had occurred before the dawn on the 1st, and the very small phreatic eruptions may have occurred then.

Volcanic activity of Ioto became more active from late April to early May 2012. According to deformation data obtained from observations conducted by the Geospatial Information Authority (GSI), rapid uplift changed to subsidence at the time, and ground deformation has now been in an almost static state. Seismic activity remained at low levels in the reporting period.

## Fukutoku-Oka-no-Ba (Near-sea-area Warning)

An aerial observation was conducted in cooperation with Japan Maritime Self-Defense Force (JMSDF) on December 11th. Discolored light green sea water 500 m in diameter was observed around upwelling points.

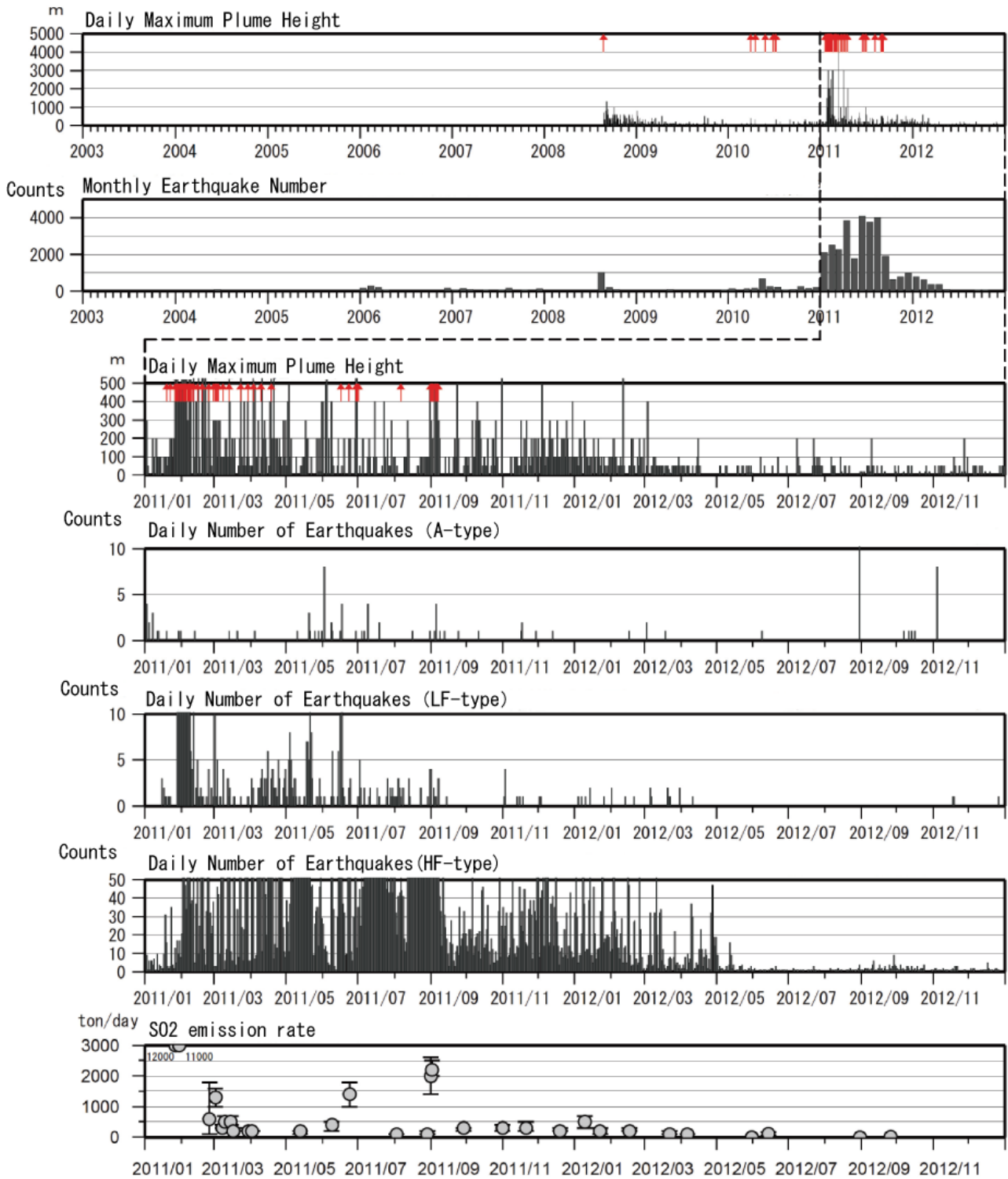
According to information from Japan Coast Guard (JCG), JMSDF and JMA, discoloration and floating objects have been frequently observed in the waters surrounding Fukutoku-Okanoba in recent years. The latest submarine eruption occurred on 3rd February 2010.

### **Kirishimayama (Shinmoedake) (Alert Level: 3)**

No eruptions were observed at Shinmoedake in the reporting period (the last explosive eruption occurred on March 1st, 2011, while the last eruption of any kind was on September 7th of the same year). As before, the white-plume height was less than 50 m above the crater rim.

A total of 25 earthquakes occurred in December (40 in November), which relatively decreased compared with November. Although there were no determined hypocenters, most of hypocenters were supposed to be just beneath the crater of Shinmoedake. No volcanic tremors were observed (as in November).

According to regional deformation observations conducted by GSI, baseline extension caused by magma supply to a deeper chamber to the northwest of the crater gradually has slowed down to a static state since December 2011. However, baselines between Ebino and Makizono, as well as Makizono and Miyakonojo2 had shown a tendency to shorten slightly since May 2012, but have been in a static state since September.



※ The notation “↑” represents an eruption.

Fig. 2 Seismicity, plume activity and SO<sub>2</sub> emission rate at Shinmoedake from January 2003 to December 2012.

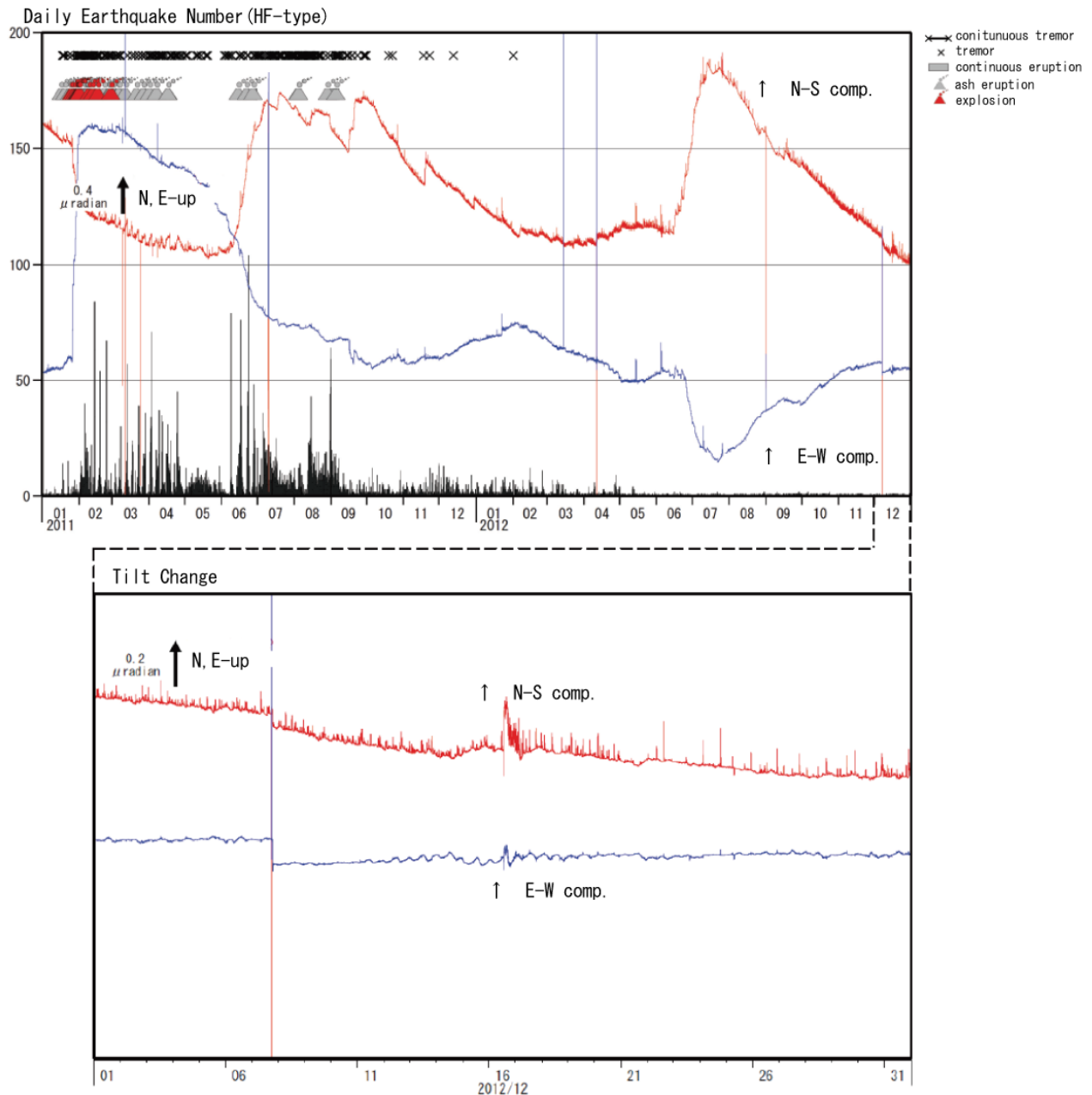


Fig. 3 Tiltmeter observation at Shinmoedake from January 2011 to November 2012.

### Sakurajima (Alert Level: 3)

Eruption activity at the Showa crater has remained at high levels. During the reporting period, 55 eruptions were observed (71 in November), and 43 of them were explosive (55 in November). Ballistic rocks reached third station (1,300 – 1,800 m from the Showa crater) during explosive eruptions at 05:25 JST on December 10th and 16:41 JST on the 26th. When eruptions occurred at 21:10 JST on December 1st, relatively significant plume rose to a height of 2,600 m above the crater rim. In addition, for the first time since November 30th 2012, a very small pyroclastic flow occurred in association with the explosive eruption at 16:41 JST on December 26th, and then flowed down about 500 m to the east. Weak volcanic glows in the Showa crater were sometimes recorded at night with high-sensitivity cameras. At the Minamidake summit crater, small explosive eruption occurred at 16:34 JST on December 2nd and very small eruptions were sometimes observed. Weak volcanic glow in the crater was recorded at night with high-sensitivity cameras on December 20th.

A total of 813 earthquakes occurred in December (635 in November), which remained low levels. The number

of tremors accompanying eruptions amounted to 453 in December (363 in November) with a total duration of 59 h 50 m, which was about the same as that in November (60 h 58 m).

Field surveys to measure SO<sub>2</sub> flux were conducted on December 4th, 13th and 19th. The SO<sub>2</sub> flux was approx. 1,200 t/d – 1,400 t/d (approx. 1,600 t/d – 2,200 t/d in November), showing relatively high levels.

Ground deformation of the mountain had been in an almost static state since February 2012, but has changed to slight subsidence around August, according to observations made with a water-tube tiltmeter installed 2.5 km southeast of the Minamidake summit crater by Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT). The results of continuous GPS measurement have shown that the baselines inside Sakurajima Island had been slightly extended since around September 2011, then have been slightly shorten since October 2012, Based on deformation observations made by GSI, long-term extension of the baselines that traverse the Aira Caldera (in a closed-off section of Kagoshima Bay) has been observed, indicating expansion of the deeper magma chamber beneath the caldera.

A total of 13 g/m<sup>2</sup> (6 days) of volcanic ash have fallen on Kagoshima Local Meteorological Observatory (KLMO). The total amount of ashfall calculated by using data which provided by the Kagoshima prefectural government was 0.5 million tons in November 2012. Total amount of ashfall in 2012 by the end of November was 6.1 million tons.

An aerial observation conducted in cooperation with the JMSDF on December 26th revealed that gray-white plumes were drifted southeast from the Showa crater. Although the state of inside the Showa crater could not be observed due to the plume, infrared observation revealed high-temperature areas around emission place of plumes at the crater. At the Minamidake summit crater white plumes were drifted southeast. Although the detailed state of inside the Minamidake summit crater could not be observed due to the plume, white plumes from bottom of A-crater were observed. Infrared observation revealed relatively high-temperature areas around emission place of white plumes at bottom of A-crater (Photo 1).

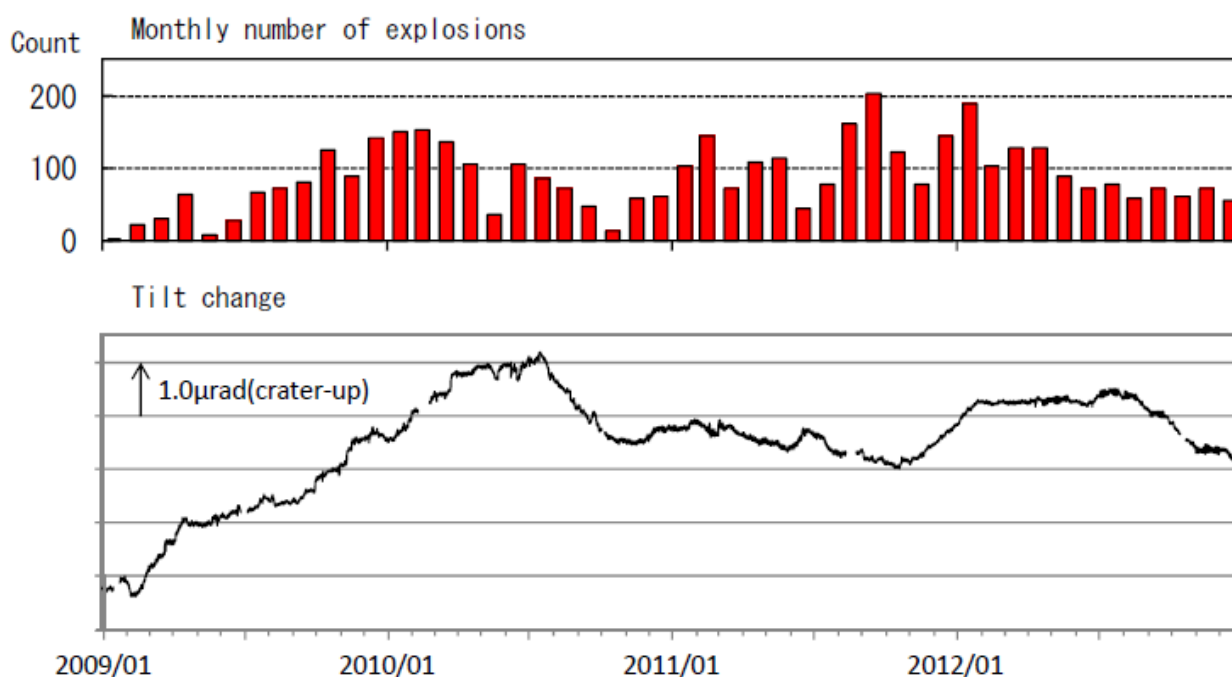


Fig. 4 Tilt change observed with a water-tube tiltmeter at Arimura Station from January 2009 to December 2012 with tidal response and eruptions eliminated. Upheavals of the summit side correspond to positive tilts. The red bars in figure denote monthly explosion frequencies at the Showa crater.

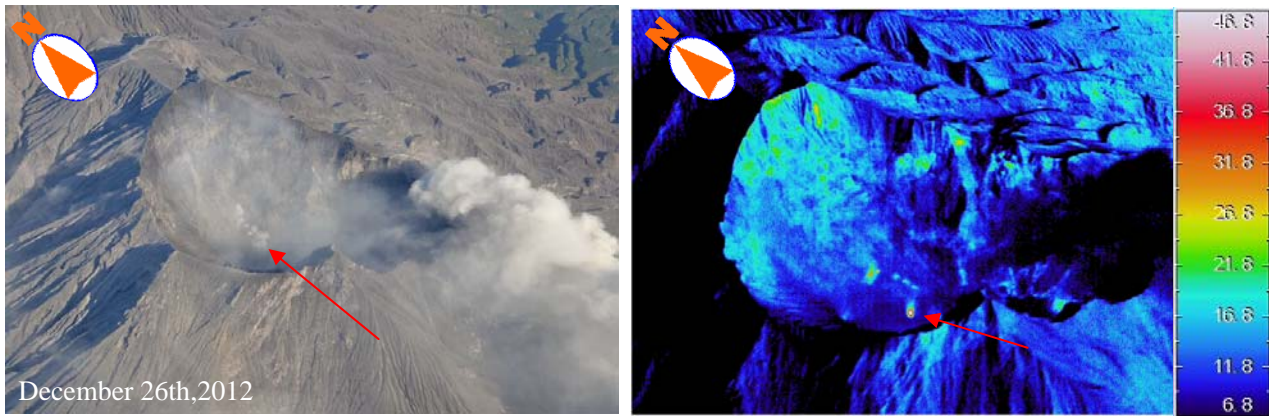


Photo 1. Aerial survey on December 26th. Courtesy of JMSDF.  
Red arrows indicate bottom of A-crater at Minamidake summit crater.

### **Suwanosejima (Alert Level: 2)**

Although no explosive eruptions occurred at Otake crater in December, very small eruptions occurred there on December 4th and 7th. The maximum plume height was 500 m above the crater rim during this period (max. 600 m in November). Weak volcanic glows in the crater were continually recorded at night with high-sensitivity cameras. An aerial observation conducted in cooperation with the JMSDF on December 26th revealed the red-hot lava mass accumulated at the center of Otake crater and high-temperature areas on the mass by infrared observation. Such phenomena have been sometimes observed in the past.

Seismic activity remained at low levels. Volcanic tremors have occurred almost continuously since September 28th 2012. The total tremor duration in December was 622 h 23 m (720 h in November).