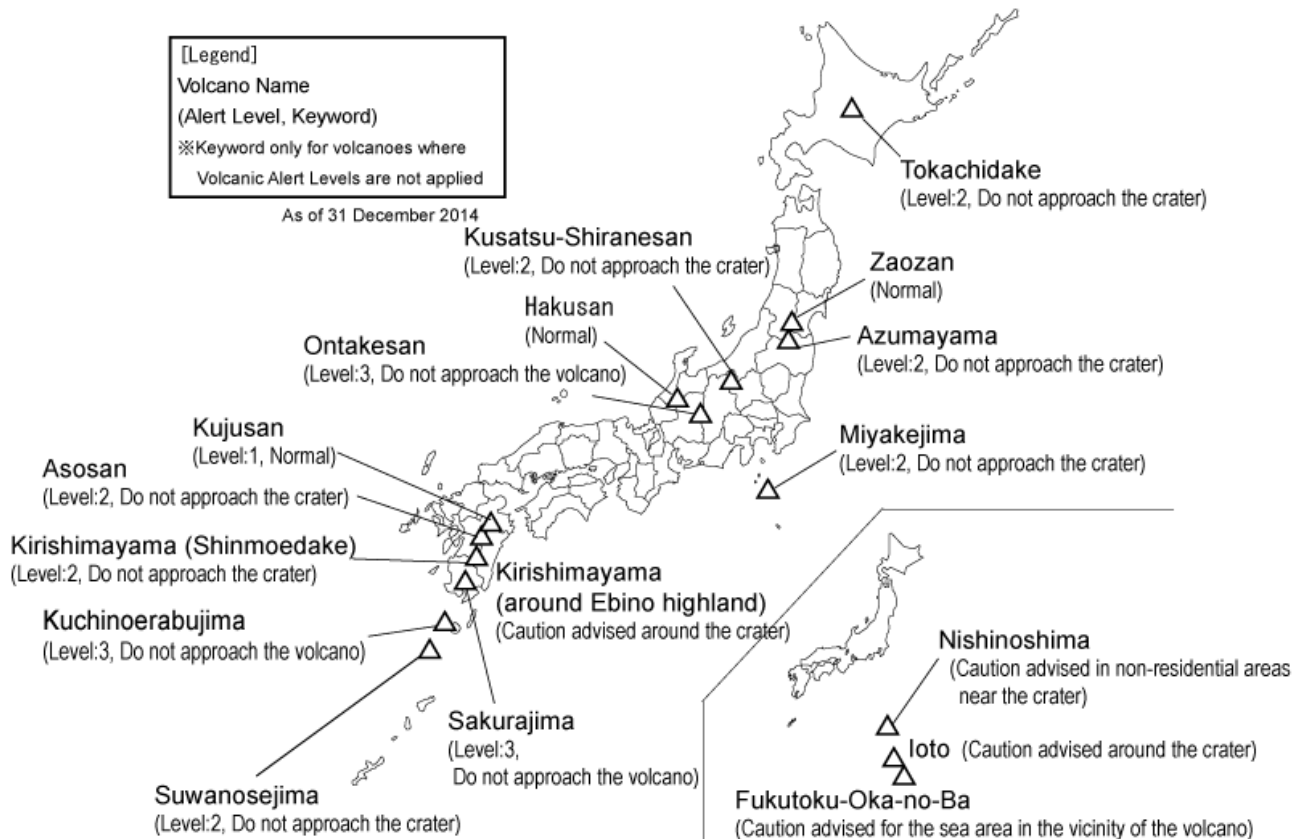


# Monthly Volcanic Activity Report (December 2014)

Japan Meteorological Agency



## **Tokachidake (Alert Level: 2)** Alert level upgrade from 1 to 2 on 16 December

Volcanic activity has gradually increased in recent years, with observed phenomena such as expansion in shallower parts, increased plume emission from the Taisho crater, increased volcanic seismicity, volcanic tremors and luminescence.

Since around July 2014, the rate of change in ground deformation has increased at a station near crater 62-2, indicating expansion in shallower parts. This suggests that expansion may also have extended to shallower parts.

Due to increased potential for a very small eruption, JMA issued a Near-crater Warning at 14:00 on 16 December and raised the Volcanic Alert Level from 1 (Normal) to 2 (Do not approach the crater).

## **Zaozan (Normal)**

Volcanic tremors were recorded on 19 and 29 December. The former occurred at around 04:38, and lasted only around 1 minute and 20 seconds. However, its amplitude was the second-largest since the start of observation in September 2010. The latter, which occurred at 10:26 on 29 December, had a small amplitude and a short duration. Volcanic seismicity has generally remained at low levels, with just 18 volcanic earthquakes recorded during the month.

According to data from a tiltmeter at Boudaira Station (around 5 km southwest of the summit), ground deformation with a clear rising trend began on the southeastern side (southern side of the summit) before a volcanic tremor at around 04:38 on 19 December and continued to occur until around noon on that day. Ground deformation with a slight rising trend on the eastern side (i.e., the southern side of the summit) subsequently began,

and remains ongoing with a gradually slowing trend. Minor ground deformation with a rising trend on the southeastern side was also observed before a volcanic tremor occurred at around 10:26 on 29 December.

No remarkable change in ground deformation (according to continuous GNSS\* observation data) or fumarolic activity has been observed.

Volcanic activity has remained at high levels since August 2014.

\* GNSS (Global Navigation Satellite System) is a generic name for satellite positioning systems such as GPS.

### **Azumayama (Alert Level: 2)** Alert level upgrade from 1 to 2 on 12 December

A volcanic tremor occurring at around 06:21 on 12 December lasted around 35 minutes.

According to data from a tiltmeter at Joudodaira Station (around 1 km ESE of the Oana crater), ground deformation with a subsiding trend was observed on the western side (in the direction toward the crater) in conjunction with the volcanic tremor. However, its development has now stopped and the situation is similar to how it was previously.

In recognition of increased volcanic activity and the possibility of a small eruption, JMA issued a Near-crater Warning at 15:00 on 12 December and raised the Volcanic Alert Level from 1 (Normal) to 2 (Do not approach the crater).

Volcanic seismicity had remained at relatively high levels since October, but has been high since a few days before the volcanic tremor of 12 December. Seismic activity is estimated to be occurring in shallow parts immediately under the Oana crater as before.

No anomalies have been observed in the characteristics of fumes in and around the Oana crater as viewed with a high-sensitivity camera at Joudodaira (installed by the Tohoku Regional Bureau Ministry of Land, Infrastructure, Transport and Tourism) or at Kaminodera.

Continuous GNSS observation data show a slow change in the baseline at Issaikyouzan-Minamisanpuku Station (around 500 m north of the Oana crater), indicating the possibility of inflation in shallow parts near the crater.

### **Kusatsu-Shiranesan (Alert Level: 2)**

Aerial observation was conducted in collaboration with Gunma Prefecture on 10 December 2014. No remarkable changes were seen in terms of the high-temperature zones in the northern wall of the Yugama crater and the fumarolic area around the northern parts of Yugama in infrared observation since the last survey (24 September 2014).

Volcanic seismicity beneath Yugama (a crater lake) and its southern area began to fluctuate at high levels in early March 2014, but has remained at relatively low levels since 20 August of the same year. Data from ground deformation observation show a trend of inflation around Yugama. According to the Tokyo Institute of Technology, composition of gas in a fumarolic area to the north has also shown the changes indicating increased volcanic activity. Geomagnetic total intensity variations, considered indicative of a temperature rise beneath Yugama, were seen in observation data from May onward but stopped around July.

### **Ontakesan (Alert Level: 3)**

The white-plume height was approximately 100 - 300 m above the crater rim in visual observation.

No results were obtained in volcanic gas observation conducted at the foot of the volcano during this period, but SO<sub>2</sub> emission amounts are considered to be slightly lower than before.

Volcanic seismicity has remained at low levels, but has not yet returned to the levels observed before August.

According to data from a tiltmeter installed around 3 km southeast of the Kengamine summit, ground deformation with a rising trend began on the mountainside seven minutes before the eruption of 27 September but subsided after the eruption. A slow subsiding trend continues to be observed on the mountainside. Continuous GNSS observation data show no remarkable change during this period. GSI analysis of GNSS data indicates a long-term slight extension of the baseline across Ontakesan since early September. A tendency of slight baseline contraction was seen from late September onward, but by December this has returned to the extent observed in

early September.

Although volcanic activity has shown a declining trend, the potential for minor eruptions remains. If fumarolic activity and/or seismicity increase, eruptions may be accompanied by pyroclastic flows with scattering of ballistic projectiles around the crater.

### **Hakusan (Normal)**

A M3.4 earthquake occurred at a depth of about 3 km beneath the summit area at around 01:32 on 16 December. The tremor had an intensity of 1 on the JMA scale in Hakusan City in Ishikawa Prefecture (located near Hakusan), Ono City in Fukui Prefecture and Takayama City in Gifu Prefecture. Volcanic seismicity increased immediately after the quake until 03:00 – 04:00 but declined thereafter. No low-frequency earthquakes or volcanic tremors were observed.

No remarkable changes were seen in other data from visual observation and other sources during the period (including the time before volcanic seismicity temporarily increased), and there were no eruption precursors.

Seismicity in shallow parts also showed a temporary increase from 31 January to 1 February 2013.

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

The rate of volcanic gas emission has exhibited a long-term declining trend and has remained relatively low since February 2013. According to a report from Miyake Village, relatively high concentrations of SO<sub>2</sub> were recorded only occasionally in inhabited areas.

Volcanic seismicity has generally remained at low levels, and no volcanic tremors have been observed.

According to continuous GNSS observation data, ground deformation indicating contraction in shallow parts of the mountains began to diminish gradually in 2000 and stopped around 2013. Long-term extension of the baselines along the long section of Miyakejima has also been observed since 2006, indicating expansion in deeper parts.

### **Nishinoshima (Near-crater Warning)**

A report from the Japan Coast Guard (JCG) and other institutions shows that eruption and lava flow have continued and the area of newly formed land has expanded.

Aerial observation conducted by JCG on 25 December revealed repeated eruptions at the 7th crater producing gray plumes and emitting pieces of lava over a short period. Lava was flowing to the northwest and northeast from the crater. The tip of a lava flow fanned out and reached the coast. The newly formed land measured around 1,710 m in the east-west direction and 1,830 m in the north-south direction, creating an area of around 2.29 km<sup>2</sup> (1.85 km<sup>2</sup> as of 16 October 2014). Plumes from the 7th crater were also seen in aerial observation conducted by JCG on 31 December.

### **Ioto (Near-crater Warning)**

A report on Ioto by the Japan Maritime Self-Defense Force (JMSDF) indicated that a dark-brown substance was ejected as high as 10 to 15 m near Tenzan for a few seconds at around 08:20 on 16 December. This is thought to have been mud ejected due to a temporary increase in emission intensity. No remarkable changes in seismicity were recorded during the period of this emission.

Volcanic seismicity has remained at relatively low levels. 13 volcanic tremors were recorded but no anomalies were observed in other data.

The results of continuous GNSS measurement showed a rising trend of ground deformation from late February 2014 onward. However, deformation entered an almost-static state in September 2014 and it has shown a rising trend again since early December.

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

Past observations conducted by JCG, JMSDF and JMA have frequently identified discoloration and floating objects in the water surrounding Fukutoku-Oka-no-Ba in recent years. These are considered to stem from volcanic activity. The latest submarine eruption occurred on 3 February 2010.

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

Volcanic seismicity temporarily increased on 25 December, when 18 volcanic earthquakes occurred. This was the highest daily total since 26 March 2004, when 32 were recorded. No volcanic tremors were observed.

A white plume rose around Ioyama to a height of up to 300 m above the crater.

According to a field survey conducted on 30 December, weak fumes were observed from the lower part of area A.

Thermal infrared data indicated thermal anomalies and no remarkable change was seen. Data from ground deformation observation showed a trend of slight extension in part of the baseline for continuous GNSS measurement.

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

Volcanic activity increased to high levels at the Nakadake No. 1 crater on 25 November 2014, and eruptions occurred intermittently. Grayish plumes rose as high as 1,200 m above the crater rim on 31 December. Observation conducted in conjunction with a nighttime eruption on 9 December showed lapilli pieces being carried by strong winds and falling about 1 km southwest of the crater from around 19:00 to 21:00.

According to a field survey conducted on 10 December, lapilli pieces with diameters of up to 20 cm were found about 500 m southwest of the Nakadake No. 1 crater, and pieces with diameters of 3 to 10 cm were found about 1.2 km southeast of the crater. Strombolian eruptions were observed on 19 and 25 December.

The amplitudes of the volcanic tremors remained large.

### **Kirishimayama (Shinmoedake) (Alert Level: 2)**

Aerial observation was conducted in collaboration with the Japan Maritime Self-Defense Force (JMSDF) on 18 December. No remarkable change in the shape of lava accumulated in the crater had been seen since the last survey (7 October 2014), and no remarkable changes were observed around the Shinmoedake crater. Thermal infrared observation indicated no remarkable change in thermal anomalies since the last survey.

According to GNSS observation data, ground deformation indicating magma chamber inflation at a depth of several kilometers northwest of Shinmoedake stopped in December 2011 before resuming again around December 2013.

Volcanic seismicity immediately under the Shinmoedake crater has generally remained at low levels.

### **Kirishimayama (around Ebino highland) (Near-crater Warning)**

No fumes were observed at Ioyama and on the northern side of Karakunidake.

Volcanic earthquakes have occasionally occurred around the Ebino highland area.

### **Sakurajima (Alert Level: 3)**

Eruption activity at the Showa crater has remained at high levels, with 32 explosions during this period.

Eruptions occurring at 13:44 on 8 and 18:52 on 11 December sent ballistic projectiles as far as the third station (1,300 to 1,800 m from the Showa crater). A plume from an eruption at 03:24 on 31 December reached heights of 3,000 m or more above the crater rim.

No eruptions were observed at the Minamidake summit crater.

Aerial observation conducted in collaboration with JMSDF on 18 December revealed milk-white plumes from the Showa crater, which prevented detailed observation of the area. Thermal infrared data indicated thermal anomalies in the crater caused by fume vents and accumulated ejecta. No remarkable changes were observed around the crater. The Minamidake summit crater was filled with white plumes, and no observation was conducted there. No remarkable changes were observed around the Minamidake summit crater.

### **Kuchinoerabujima (Alert Level: 3)**

No eruptions were observed. Volcanic earthquakes occasionally occurred, and the rate of volcanic gas emissions has been relatively high compared to that before the eruption. Volcanic activity has remained high.

According to a field survey conducted on 14 December 2014, plumes were observed around a fissure to the west of the Shindake crater and on the southwestern slope of the crater as before. Thermal infrared data indicated thermal anomalies to the west of the Shindake crater rim, around a fissure in the area and in the fumarolic area on the southwestern slope as before.

Aerial observation conducted in collaboration with JMSDF on 18 December revealed plumes around a fissure to the west of the Shindake crater and on the southwestern slope. Thermal infrared data showed no remarkable change in thermal anomalies in the area from the west to the southwestern side of the crater.

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

Five explosive eruptions occurred at the Otake crater. Eruptions also occurred occasionally. An explosive eruption occurring at 19:13 on 7 December scattered rocks up to 1 km away from the crater. Grayish plumes accompanying the eruption rose as high as 1,000 m above the crater rim. According to the Suwanosejima branch of the Toshima Village administration, no ash fall was observed in the village (located around 4 km SSW of Otake).

Aerial observation conducted in collaboration with JMSDF on 18 December showed no remarkable changes in landform at or around the Otake crater. Thermal infrared data indicated thermal anomalies in and around the crater.