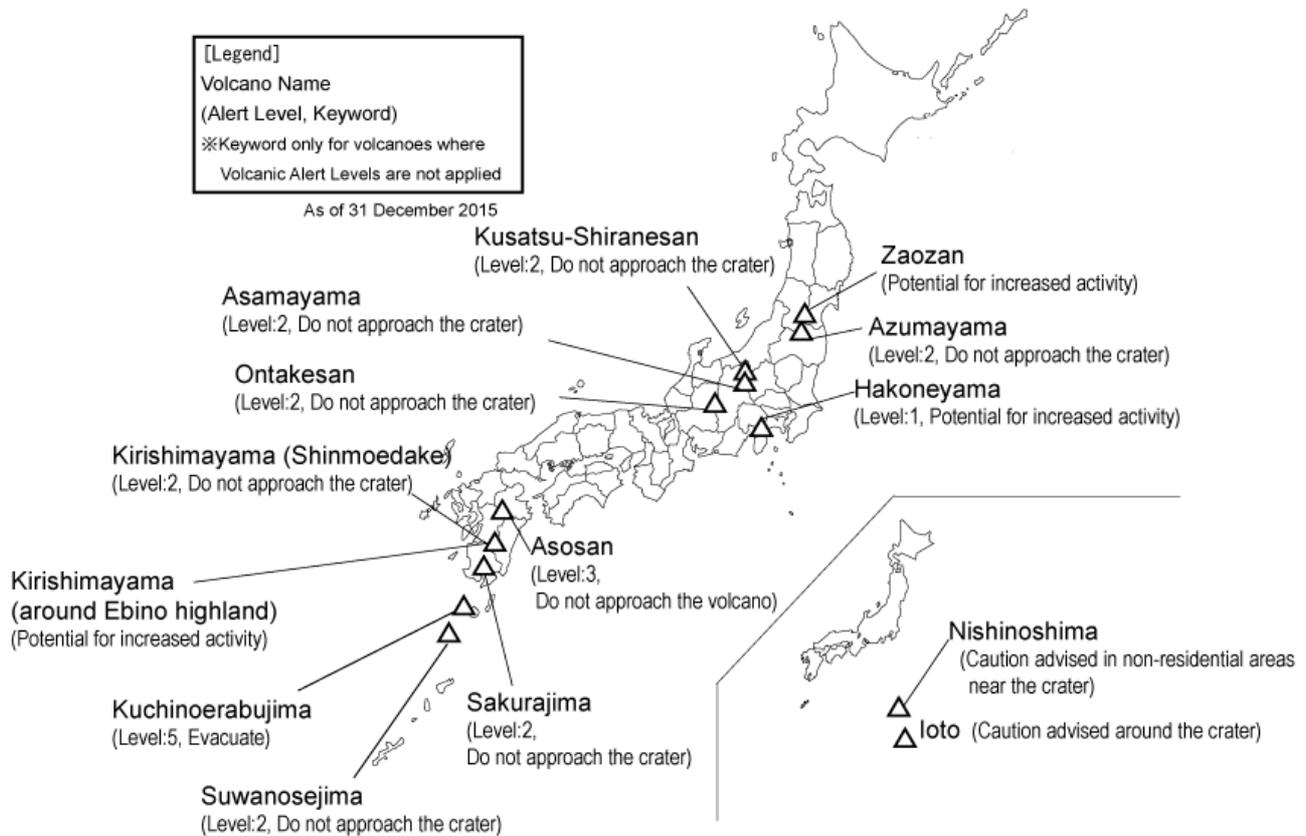


Monthly Volcanic Activity Report (December 2015)

Japan Meteorological Agency



Zaozan (Potential for increased activity)

A small volcanic tremor occurred on 8 December 2015, two occurred on 1 January 2016, and one occurred on 5 January 2016. In data from a tiltmeter at Boudaira Station, a slight rising trend was observed on the southeastern side before the volcanic tremors at around 17:37 on 8 December 2015 and at around 19:35 on 1 January 2016, and a slight declining trend was observed on the southeastern side immediately after the tremors. No remarkable changes were seen in seismic activity before or after the tremors.

Aerial observation conducted on 2 December in collaboration with the Yamagata Prefectural Police revealed no fumes or geothermal fields in or around Okama (a crater lake). Volcanic seismicity has remained at low levels.

Increase in volcanic seismicity and the number of volcanic tremors has been observed since 2013, and ground deformation indicating a slight expansion of the volcano has been observed since October 2014. Volcanic activity has remained at relatively high levels over a long period.

Azumayama (Alert Level: 2)

Fumarolic activity at the Oana crater has remained at relatively high levels.

The height of fumes from the crater (at Issaikyouzan-Minamisanpuku Station) has remained at 100 m or less based on visual observation. Fumes from outside the crater have been observed continuously since January.

No volcanic earthquakes and tremors have been recorded.

According to data from a tiltmeter at Joudodaira station, ground deformation with a slow rising trend had been seen on the western side (toward the crater) since April 2014 but it stopped around July 2015. Since late September 2015, a declining trend on the western side has been seen.

Continuous GNSS* observation data had shown a slow change since around September 2014 indicating the inflation around Issaikyouzan, but it stopped around June 2015. Data from wide-area ground deformation observation conducted by the Geospatial Information Authority of Japan (GSI) revealed a trend indicating that the

volcano had inflated along some parts of the baseline from around December 2014, but the trend stopped around July 2015 and turned to a contracting trend around October.

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

Kusatsu-Shiranesan (Alert Level: 2)

Thermal activity remains ongoing on the northeastern side and the northern wall of the Yugama crater and on the north-to-northeastern slope of the Mizugama crater. According to the Tokyo Institute of Technology, composition of gas in a fumarolic area to the north and chemical composition of water in the Yugama crater have shown the changes indicating increased volcanic activity as before.

No fumes were seen from Yugama (a crater lake) and the fumarolic area to the north of Yugama in visual observations.

Changes in data from continuous and repeated geomagnetic total intensity observation (considered indicative of a temperature rise beneath Yugama) were seen from May 2014 but stopped around July 2014.

Volcanic seismicity beneath Yugama and its southern area began to increase in early March 2014 and to fluctuate at high levels, but has remained relatively low since late August of the same year.

Data from ground deformation observation had shown a trend of inflation around Yugama since around April 2014, but this has declined since around April 2015. Data from a Tokyo Institute of Technology tiltmeter in the area around Yugama indicated a trend of inflation in shallow parts of the area from around March 2014, but the situation has remained relatively static since around November 2015.

Asamayama (Alert Level: 2)

No eruption has been recorded since the eruption on 19 June 2015.

White plumes rose as high as 100 – 300 m above the crater rim in volume of plumes that have been increasing since June 2015. Weak volcanic glows visible only at night with a high-sensitivity camera continued at the summit crater.

According to field surveys conducted on 2, 9 and 22 December 2015, amounts of volcanic gas (SO₂) emissions have remained at relatively high levels at 600 – 900 tons a day (1,700 tons on 24 November).

The number of imperceptible volcanic earthquakes and tremors in very shallow parts immediately under the summit crater shows a long-term increasing trend since around 2014. The number of imperceptible volcanic earthquakes followed an increasingly upward trend from late April 2015. The number has remained high, but has decreased slightly since August. Many of the earthquakes were low-frequency BL types. The number of short-period BH-type volcanic earthquakes that increased in July 2015 decreased in August. No migration of source locations to shallower parts or other changes have been seen. The number of volcanic tremors has remained low since September, and none were recorded in December.

Data from electro-optical distance measurement showed a trend of contraction between the summit and Oiwake from around June 2015, but the trend stopped around October. Data from tiltmeter observation show a gradual change from around early June. This trend has weakened but remains ongoing. Data from continuous GNSS observation show that the slight extension observed along some parts of the baseline since around May 2015 stopped around October.

The potential for small eruptions affecting areas around the crater remains.

Ontakesan (Alert Level: 2)

White plume emissions have remained ongoing at 300 m or lower above the crater rim according to visual observation data.

Volcanic seismicity has remained at low levels, but has not yet returned to the levels observed before August 2014. No low-frequency earthquakes and volcanic tremors have been recorded. Data from tiltmeter observation and continuous GNSS measurement revealed no changes indicating an increase of volcanic activity.

The potential for eruptions on the scale of the one that occurred on 27 September 2014 is considered low, as volcanic activity has remained at low levels and no eruptions have occurred since October 2014. However, the potential for small eruptions remains as plume activity from a line of craters and seismic activity have been ongoing.

Hakoneyama (Alert Level: 1)

No eruptions were recorded since a very small eruption on 1 July 2015 at Owakudani.

Volcanic seismicity has remained at low levels. No volcanic tremors have been recorded.

No remarkable changes have been seen in data from continuous GNSS measurement, JMA/Hot Springs Research Institute of Kanagawa Prefecture tiltmeter data or JMA volumetric strainmeter observation at Yugawara-Kajiya.

Violent emissions of steam were observed as before at the 15-1 crater, fumaroles and the nearby Owakudani hot spring supply facilities in visual observations. Fume heights have remained up to 600 m in the area around Owakudani. In field surveys conducted on 7 and 9 December 2015, violent emissions of fumes and steam were observed as before at the 15-1 crater, the 15-2, 15-3 and 15-4 fumaroles and the nearby Owakudani hot spring supply facilities. Ejection of material considered to be soil in the 15-1 crater was not seen in these surveys. The high-temperature area to the east of the 15-1 crater was not seen in thermal infrared observation due to plumes.

Nishinoshima (Near-crater Warning)

Reports from the Japan Coast Guard (JCG), the Japan Maritime Self Defense Force (JMSDF) and other institutions show active eruptive activity since November 2013.

No indication of an eruption was observed at the 7th crater or other parts during aerial observation conducted from 13:45 to 14:45 on 22 December by JCG. Very weak white plumes were seen coming from the inner wall of the 7th crater and the southern foot of a pyroclastic cone. No new lava flow was seen. Thermal measurement revealed no remarkable high-temperature areas on the island (including the 7th crater or lava flows), and showed a remarkable decline in temperature compared with that observed on 17 November. Light brownish discolored water was seen along the northern-to-eastern coast of the island with a width of around 200 – 300 m.

No faults parallel to the coastline or cracks with the potential to generate tsunamis were seen on the island or on newly formed land.

The newly formed land covered around 1,900 m east-west and 1,920 m north-south, which was almost the same as seen in the previous observation. Its total area was around 2.62 km² (2.63 km² as of the previous observation in November).

Eruptions are estimated to continue at the crater on the newly formed land, and submarine eruptions may also occur around the island. A submarine eruption affecting the sea surface may scatter ballistic projectiles or generate a base surge spreading across the surface at a high speed. Related impacts may reach areas as far as around 2 km away.

Ioto (Near-crater Warning)

Volcanic seismicity has remained at relatively low levels. A total of 7 volcanic tremors occurred. No anomalies were observed in data during the period in which volcanic tremors were recorded.

Continuous GNSS measurement showed repeated rising trend and static state from around late February 2014. The rate of the rising trend began to increase around March 2015, but since October it has returned to the rate observed before February. Data from GNSS measurement conducted by GSI showed that the rate of deformation to the west began to increase in mid-April 2015, but the increase stopped around September.

According to the field survey conducted on 15 December 2015 in collaboration with JMSDF, no remarkable changes were seen around Asodai pit crater and Million-dollar hole (former crater).

Asosan (Alert Level: 2)

A very small eruption occurred at the Nakadake No.1 crater at 08:11 on 7 December 2015. Milk-white plumes rose as high as 700 m above the crater rim. It was the first time to observe an eruption at Asosan since 23 October. A field survey conducted on the same day revealed slight ash fall on the southwestern side of the Nakadake No.1 crater.

Field surveys conducted on 14 and 24 December to the south of the crater rim revealed a lake in the Nakadake No. 1 crater, but the exact status of the crater could not be observed due to the presence of plumes.

A volcanic tremor with relatively large amplitude and an accompanying air shock occurred at around 04:21 on 25 December. The situation regarding plumes and other effects could not be seen due to the presence of clouds around the crater. However, a field survey conducted on 7 January 2016 by JMA and the Aso Volcanological

Laboratory of the Institute of Geothermal Sciences at Kyoto University's Graduate School of Science revealed the presence of new ballistic projectiles to the southwest of the crater. Accordingly, an eruption is considered to have occurred in conjunction with the volcanic tremor of 25 December. The ballistic projectiles were fist- or half-body-sized and scattered as far as around 100 m away from the crater rim.

A large-amplitude volcanic earthquake occurred in very shallow parts near the Nakadake No. 1 crater at 03:45 on 4 December, and a seismic intensity of 1 on the JMA scale was registered at Minamiasomura-Nakamatsu. This was the first time a seismic intensity of 1 or greater had been observed for a volcanic earthquake since a level 3 quake occurred on 8 May 2015. No remarkable changes were seen in plume activity or ground deformation before or after the earthquake.

According to field surveys conducted on 9 and 24 December, amounts of volcanic gas (SO₂) emissions have generally been large at 700 – 1,800 tons a day (800 – 1,100 tons a day in November).

Amplitudes of volcanic tremors fluctuated and remained relatively small. The number of isolated volcanic tremors has generally been small but increased occasionally.

Volcanic activity at the Nakadake No.1 crater has remained at high levels since November 2014 and the potential for eruptions affecting the area around the crater remains.

Kirishimayama (Shinmoedake) (Alert Level: 2)

Volcanic earthquakes occasionally occurred around Shinmoedake. The number of such quakes in December was 69, which was higher than that in November when 24 seismic events were recorded. No volcanic tremors were recorded.

According to GNSS observation data, ground deformation indicating deeper magma chamber inflation at several kilometers northwest of Shinmoedake stopped around January 2015. A slight extension had been observed along some baselines around Shinmoedake but it stopped in around October.

Small eruptions may occur at the Shinmoedake crater affecting the area around the crater.

Kirishimayama (around Ebino highland) (Potential for increased activity)

Based on a local report of fumes being emitted from Ioyama on the Ebino highland on 14 December 2015, field surveys were conducted by the Kagoshima Meteorological Office and Kagoshima University on 15 December and by the JMA Mobile Observation Team (JMA-MOT) on 16 December. The results showed weak fumes coming from the southwestern side in a crater on Ioyama. No fumes had been seen in field surveys at Ioyama since 2003. Thermal infrared observation showed a thermal anomaly near the area where fumes were seen. This anomaly was not seen during the previous survey on 2 November 2015.

Field surveys conducted on 21 and 28 December revealed a slight expansion of the area of thermal anomaly. Distinct H₂S odors were recorded around Ioyama.

A small-amplitude volcanic tremor that lasted around 2 minutes and 30 seconds occurred at 17:37 on 2 January 2016. Volcanic seismicity temporarily increased after the volcanic tremor. The volcanic tremor was accompanied by slight changes in tiltmeter data. No volcanic tremors have been recorded since then, and volcanic seismicity has remained at low levels. A field survey conducted on 3 January revealed weak fumes as before from the southwestern side in a crater on Ioyama. Thermal infrared observation showed a slight expansion of the area of thermal anomaly near the area of the fumes as compared to the situation of the previous observation conducted on 28 December 2015, but the highest temperature in the area of thermal anomaly was around 80°C (around 80°C in the previous observation) and no remarkable changes were seen.

Volcanic activity has increased slightly, with new fumes from Ioyama and occasional small-amplitude volcanic tremors occurring since around July 2014.

Sakurajima (Alert Level: 2)

No explosive eruptions occurred at the Showa crater since 17 September 2015 and no small eruptions were observed at the Showa crater and the Minamidake summit crater since 29 September.

White plumes rising 50 – 200 m above the rim of the Showa crater and 50 – 600 m above the rim of the Minamidake summit crater were observed.

Aerial observation conducted on 2 December 2015 in collaboration with JMSDF revealed a circular bottom in the Showa crater, which is considered to have formed as a result of accumulated volcanic ash and lapilli pieces from previous eruptions, and white plumes rising as high as around 100 m from the edges of the crater bottom.

Thermal infrared observation showed high-temperature areas at the edges and the center of the crater bottom as seen during the previous observation conducted on 19 August 2015. White plumes rose as high as 200 m above the rim of the Minamidake summit crater, and observation of the inside of the crater was not possible.

A total of 37 volcanic earthquakes occurred. This was lower than that in November, when 98 seismic events were recorded. No volcanic tremors have been recorded. Data from tiltmeter and strainmeter observation conducted on the island show no remarkable ground deformation indicating the expansion of the volcano since the rapid change in August. Data from continuous GNSS observation show that extension of the baseline across the Aira Caldera (in the inner part of Kagoshima Bay) has continued since the rapid change in August. However, the expanding trend of the volcano observed since around January 2015 turned into a contracting trend after the rapid expansion of the volcano in August.

According to a field survey conducted on 22 December 2015, amounts of volcanic gas (SO₂) emissions have remained at low levels at 100 tons a day (70 – 100 tons a day in November).

Despite low levels of volcanic activity, repeated eruptions have occurred and the potential for eruptions affecting the area around the crater remains.

Kuchinoerabujima (Alert Level: 5)

No eruption has been observed at the Shindake crater after the eruption on 19 June 2015.

White plume emissions have remained at 300 m or lower above the crater rim in visual observation.

A field survey revealed no remarkable changes in geographical features around the crater or fume emissions. Thermal infrared observation showed that the temperature around a fissure to the west of the Shindake crater remained low, having previously risen from around March until 29 May 2015 before the eruption.

Observation conducted by the University of Tokyo's Graduate School of Science, Kyoto University's Disaster Prevention Research Institute, Yakushima Town and JMA showed that amounts of volcanic gas (SO₂) emissions were at 100 – 200 tons a day until the beginning of December 2015 but increased to 100 – 900 tons a day (preliminary report) in mid-December (200 – 300 tons a day in November).

Volcanic seismicity remained at low levels. No volcanic tremor has been recorded.

No remarkable changes have been seen in ground deformation observations after the eruption on 29 May 2015.

The potential for eruptions on the scale of the one that occurred on 29 May 2015 is low but there remains a potential for eruptions.

An eruption may affect areas within 1.4 nautical miles from the Shindake crater.

Suwanosejima (Alert Level: 2)

No eruption occurred at the Otake crater. White plumes rose as high as 600 m above the crater rim (1,000 m in November).

According to the Suwanosejima branch of the Toshima Village administration, rumbling was heard in the village (located around 4 km SSW of Otake) on 12 December 2015.

Volcanic glows were observed at the crater occasionally at night with a high-sensitivity camera.

Eruptions have repeatedly occurred at the Otake crater over a long period of time. The potential for eruptions affecting areas around the crater remains.