

2010-2011 Eruptive activity of Shinmoedake Volcano, Kyushu, Japan

Koji Kato¹, Shin'ichi Matsusue², Hiroshi Yamauchi¹
¹Fukuoka Volcano Observation and Information Center, JMA,
²Kagoshima Local Meteorological Observatory, JMA

Introduction

Shinmoedake volcano is one of the members of Kirishimayama volcanoes group, located in Kyushu, southwestern Japan. Major eruptions occurred in 1716 – 1717, fall out deposits, pyroclastic flows and mudflows were widely dispersed around the volcano. Recently, small phreatic eruption occurred in 1959 and 1991. After Shinmoedake volcano repeated phreatic eruption on August, 2008 and during March – July 2010, started magmatic eruptions from 19 January, 2011, after 300 years dormancy.

Fukuoka Volcano Observation and Information Center, JMA and Kagoshima Local Meteorological Observatory, JMA monitor Shinmoedake volcano for 24 hours a day. Based on an analyzed result of monitoring, a volcanic warning is released. In this presentation, we report about 2010 - 2011 eruptive activity of Shinmoedake volcano with the observational data mainly by the JMA.

2010-2011 eruptive activity

The first precursory eruption, occurred at August 2008, was phreatic one, which produced tephra of 0.2 million ton (Geshi et al., 2010). The next eruption occurred on 30 March 2010 and small ones happened successively on 17 April, 27 May, 27 and 28 June, 5 and 10 July. The inflation of magma chamber around several kilometers NW of Shinmoedake volcano had been observed by GPS network since December 2010. On 19 January, a small phreatomagmatic eruption occurred. On 26 January morning, a small phreatomagmatic eruption occurred again. At 14:49, eruptive activity moved into the sub-plinian eruptions and ash plumes rose to a maximum altitude of 3,000m above the crater. On 26 January at 18:00, JMA raised the volcanic alert level from 2 to 3, transitioning the volcano into a period of possible high activity (Target area had changed from the area around the crater to the non-residential areas near the crater). Sub-plinian eruption continued on 27 January, and deposited about 10 million m³ (DRE) of tephra (Nakada et al., 2011). On 28 January, a lava which a diameter of several 10 meters was appeared on the crater floor (Nakada et al., 2011), and the lava in the crater had grown 500 meters in diameter on 30 January (Ando et al., 2011).

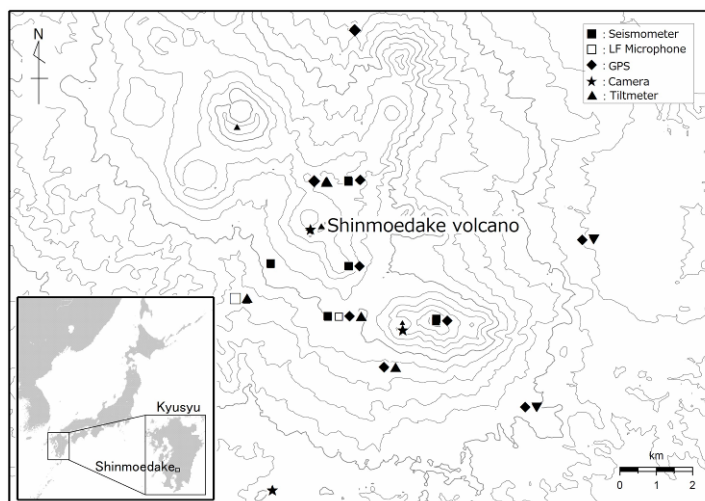


Fig.1 Volcanic observation at Shinmoedake volcano.



Fig.2 Sub-plinian eruption on 27 January.

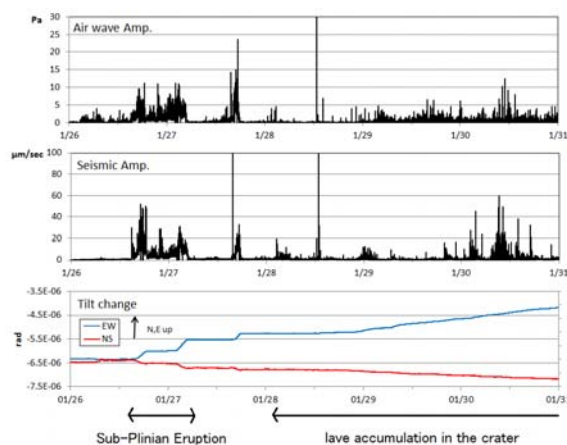


Fig.3 Air wave, seismic Amp. and tilt change.

On 31 January at 01:35, The target alert area was enlarged from 2km to 3km radius from the crater (Volcanic alert level was still 3) , taking into account the danger of pyroclastic flow. Finally, the lava in the crater grew up to about 600m (about 10 million m³) in diameter by 2 February.

Accompanying sub-plinian eruptions and lava effusion, deflation of magma chamber around several kilometers NW of Shinmoedake was observed by GPS measurements and tiltmeter. The volume of inflation before the 2011 eruptions (20 million m³) is roughly equal to that of magma erupted during 26-31 January.

Vulcanian eruption occurred on 1st February at 07:54. Ballistic bombs reached 3.2km distant from the crater and windows glasses were broken by strong air wave. On 1st February at 11:20, the target alert area was enlarged from 3km to 4km radius from the crater (Volcanic alert level was still 3), taking into account the danger of ballistics. After that, eruptions including vulcanian ones intermittently occurred.

Preceding these eruptions, tilt changes and increase of volcanic earthquakes were observed before several hours to 2days of eruptions. Tilt changes and increase of volcanic earthquakes indicate that magma ascent from magma chamber to Shinmoedake volcano intermittently.

Though the sulfur-dioxide fluxes were 11,000-12,000 ton/day on January, it decreased more than an order of magnitude to several hundred ton/day after the middle of February.

On March, volcanic activity have become lower compared to the peak activity from January to the beginning of February although intermittent eruptions have occurred and GPS measurements detected that the supply of magma to deeper magma chamber around several kilometers NW of Shinmoedake has continued since the beginning of February. On 22 March at 17:00, the target alert area was reduced from 4 km to a 3 km radius from the crater (Volcanic alert level was still 3).