

Recent seismic activities at Miyake-jima volcano

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Since the latest eruption at Miyake-jima in 2000, the volcanic edifice deflated until 2006, and then inflates gradually with almost constant rate except the period of first half of the year of 2016. In the first half year of 2016, the inflation accelerated temporally and SO₂ gas emission rate decreased to 1/10. It shows that the conduit of volcanic gas may be plugged at the period. After the above small episode, the edifice inflates with the previous rate and SO₂ gas emission rate is still low. From the above facts, Miyake-jima volcano is not in quiescent condition now, but becomes a little more active and is under preparing the future eruption. To investigate the precursory process of the volcano eruption, we installed 3 broadband seismometers at the middle flank of the summit in December 2018. Then we added two short period seismometers at the rim of the summit crater and one at the southern flank in May 2019. Using 11 pre-existing seismometers operated by JMA, NIED and Tokyo Metropolitan Government and our 6 temporally-installed ones, we relocate hypocenters for more than 950 events occurring between December 2018 and September 2019. The number of our relocated hypocenters are ten times greater than those listed in JMA hypocenter catalogue.

From relocated hypocenters, we can find out the following features in the present seismicity in Miyake-jima;

1. Almost all earthquakes concentrate at the region beneath southern part of the summit crater from the ground surface to the depth of 3km below sea level. Earthquakes are classified as BH, BL and A types from the point of the features in waveforms.
2. More than 50% of the events are classified as BL type, more than 20% as A type, and less than 20% as BH type.
3. Focal depths of BL type earthquakes are shallower than 1km below sea level. On the other hand, those of A type are greater than the depth. The boundary of their distributions are very sharp. The focal depths of BH are concentrated very shallow and partly overwrapped with those of BL type.
4. The distribution boundary of BL and A types agree with the depth where high resistivity zone changes to low resistivity zone inferred from MT survey carried out 2012.
5. In addition, epicenters of A type linearly extends to southwestward to the point 2km far from the summit crater. It is the “node point” where direction of dike intrusions changed from south-westward to north-westward in the first stage of 2000 eruption, and might be also the center of sources of VLP events occurring just before the summit collapse in August 2000.

In the 2000 eruption, the “node point” might play important role, but detailed process is still unsolved. From the present seismic activity, the “node point” is still alive and may play important role again in future eruption.

In this study, we grateful to JMA, NIED and Tokyo Metropolitan Government for providing data. This research is partly supported by Integrate Program for Next Generation Volcano Research and Human Resource Development sponsored by MEXT.

Keywords: volcanic earthquakes, volcanic activity, Miyake-jima volcano

