

Monitoring of Nishinoshima volcano from space

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The eruption column was discovered near Nishinoshima, Ogasawara islands, Japan on November 20, 2013 by the aircraft of Japan Maritime Self-Defense Force, and a new islet was confirmed by Japan Coast Guard on the same day. The new island continues growing up with lava flows for more than a year. For monitoring of volcanic activity of Nishinoshima, Japan Coast Guard and the Self-Defense Forces carry out the aerial observations at least once a month (a few times a month until March 2014). The changes of the area of island, position of crater, land form, eruption style, and discolored seawater are investigated from these observations. Also, aerial survey of 5 times was carried until January 2014 by the Geospatial Information Authority of Japan. In addition, Earthquake Research Institute estimated temporal change of the effusion rates from TerraSAR-X images and aerial photos taken by JCG and others.

Various data is acquired periodically from space. In particular, the data of Earth observation satellites such as LANDSAT-8 has quickly become available through internet at no charge.

Thermal activity and the feature of ground surface of Nishinoshima volcano were estimated with following satellite images.

1) Heat discharge rates were evaluated from plume rise method (Kagiyama, 1978) by using images of panchromatic band of LANDSAT-8/OLI and EO-1/ALI, and visible band of Terra/ASTER.

2) Surface temperature of Nishinoshima was evaluated from the thermal band of LANDSAT-8/OLI, EO-1/ALI, EO-1/Hyperion, Terra/ASTER, and MTSAT (Himawari).

3) Land area assessments by ALOS-2/PALSAR-2.

4) Extraction of time variation of the spectral data of EO-1/Hyperion.

The effusion rates of lava, which estimated by Earthquake Research Institute, had decreased temporarily in around June to September 2014. The temporal change of temperature estimated from thermal band (3.8 μm) of MTSAT showed the similar changes to effusion rates. The heat discharge rates estimated from volcanic plumes keep at the same level for more than a year.

Keywords: Nishinoshima, volcano monitoring, volcanic plume, ground temperature, remote sensing