REALTIME MONITORING OF ACTIVE VOLCANOES IN EAST ASIA USING MODIS AND MTSAT DATA AND ITS ADVANCEMENT BY GCOM-C1 SGLI

Takayuki KANEKO[1], Atsushi YASUDA[1], Kenji TAKASAKI[2], Hiroyuki DEN[1], Yosuke AOKI[1]

[1]Earthquake Research Insitute, University of Tokyo, Japan, [2]Keio Research Institute at SFC, Japan

E-mail: kaneko@eri.u-tokyo.ac.jp

There are many active volcanoes distributing in east Asia, however, most of them are not well monitored. Monitoring volcanoes is a key issue for disaster mitigation. Practically, it is not realistic to install ground-based instruments to all of the active volcanoes, because of the cost and manpower for maintenance. Satellite remote sensing is the only way to monitor these volcanoes existing in such wide areas. We developed a monitoring system based on infrared images from Moderate Resolution Imaging Spectroradiometer (MODIS) and Multi-functional Transport Satellite (MTSAT), and are currently observing 147 active volcanoes of this region. In this system, observed results are immediately uploaded to the website, so that the information can be widely used. Unfortunately, resolution of MODIS and MTSAT is not sufficient for observing detailed situation of eruptions (MODIS: 1km, MTSAT: 4km). Japan Aerospace Exploration Agency (JAXA) is lunching the GCOM-C1 satellite carrying Second Generation Global Imager (SGLI) of which 1.6um, 11um and 12um channels possess 250m resolution, in 2015. Such high resolution infrared images are useful for observing effusing process of small scale lava flows or distribution of small pyroclastic flows. We worked on improving observation capability of the current system, utilizing images from SGLI, and developed a method to detect and monitor pyroclastic-flows generation associated with growth of lava dome. The concept is as follows. As the lava dome grows, the marginal parts of the dome collapse to generate pyroclastic flows. These pyroclastic flows spread and accumulate on the slope. The surface temperature is much lower than that of the dome growth area, because of effective cooling in flowing process. On the 1.6um images, the dome growth area will be radiant, however the depositional areas of pyroclastic flows will not be visible, because of the detection limit of this channel. On the other hand, on the 11um images pyroclastic flow deposits will be radiant, as well as the dome growth area - 11um channel is sensitive to low temperature. Accordingly, size of thermal anomaly will be larger on the 11um than on the 1.6um images here. In contrast, in the case of activities without pyroclastic flows, both on the 1.6um and 11um images, the sizes of thermal anomaly will be about the same, because of no hot materials existing around the lava dome. We tested this discrimination method, using simulated SGLI data produced from Landsat TM of the Unzen 1991-1992 activity. The results showed that activities with pyroclastic flows have systematically higher 11um /1.6um size ratios than those without pyroclastic flows, as expected. We plan to add this discrimination method to the system for realtime monitoring pyroclastic-flow generation. Pyroclastic flows are most destructive volcanic phenomena, so, this kind of information will be useful for mitigation of volcano-related disasters in east Asia.