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Realtime monitoring of active volcanoes in east Asia using remote sensing data and some examples from recent eruptions

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There are lots of active volcanoes in east Asia, however, most of them are not well monitored. Monitoring volcanoes is important for disaster mitigation and scientific studies. In reality, it is impossible to install ground-based instruments to all of them, because of the cost and manpower for maintenance. Satellite remote sensing is the only way to monitor these volcanoes distributing in such wide areas.

We developed a realtime monitoring system utilising MODIS and MTSAT images ("REALVOLC" <http://vrsserv.eri.u-tokyo.ac.jp/REALVOLC/>). MODIS data are obtained from NASA and Institute of Industrial Sciences, University of Tokyo. As to MTSAT, we are operating the receiving system at our institute in Tokyo. We are monitoring about 147 active volcanoes in east Asia, with this system. This system of following four sub-systems:

MODIS Infrared system

MODIS visible system

MTSAT Infrared system

MTSAT visible system

Due to the differences in resolution and observation cycle, MODIS is mainly used for monitoring time-series variation of thermal anomaly and MTSAT is for detecting eruption events.

Observation results of the four sub-systems of REALVOLC are used for analysing eruption sequences. Also, data from other satellites are comprehensively examined for understanding the eruption processes. On 2nd February 2009 at 1:51 am Mt. Asama erupted. Although it was a small-scale eruption, involving a eruption plume rising 2000m high from the summit, the ashes accidentally fell in the Tokyo metropolitan area, due to strong seasonal wind, which draw public concern. We observed migration and enlargement processes of the eruption cloud, using infrared images from MTSAT, and analyzed its relationship to distribution of ash-fall deposits and meteorological conditions. Several months later, in June 2009, Sarychev-Peak volcano, in the Kuril islands erupted. We could successfully monitored a series of eruption clouds generated by Plinian eruptions and temporal variation of thermal anomaly using MTSAT and MODIS images, respectively. Based on these data, we were able to infer the eruption sequence.

Keywords: volcano, satellite, remote sensing, East Asia, monitoring, eruption