Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SVC51-P01 Room:Convention Hall Time:May 21 17:15-18:15

Volcanic activity and lava activity detection using MODIS data

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There are a lot of active volcanoes in the world. But it is difficult to monitor all volcanoes because of costs. However, we can monitor efficiently a lot of volcanoes using satellite remote sensing technologies, because a volcanic activity will cause the increase in surface temperature and satellite (whose sensor can observe the surface temperature) remote sensing can cover a large area on surface. Therefore, our purpose of this study is to create an adequate algorithm detecting thermal anomalies related to volcanic activities (especially lava activity witch causes serious damages involve human lives) using satellite data. The developed algorithm investigates the difference temperature behavior between a target point and reference points. Therefore, removing cloud is essential in our algorithm.

The developed algorithm has been applied to Mt. Merapi (Indonesia), Mt. Shinmoedake (Japan) and so on and we found the effectiveness of it and reduction of faint changes due to clouds. The details will be shown in our presentation.

Keywords: MODIS, surface temperature, volcanic and lava activity, Cloud detection, Mt. Shinmoedake, Mt. Merapi

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An attempt of estimating a possible lava flow distribution from Sakurajima Showa crater with a simple numerical model

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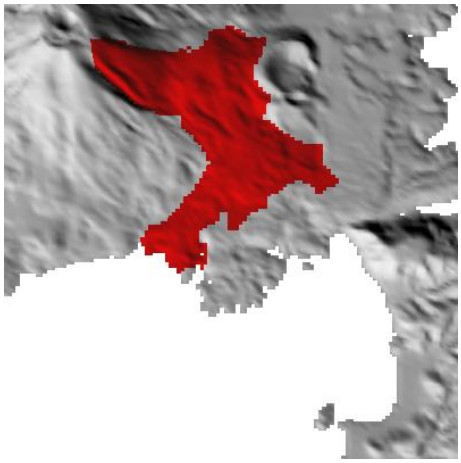
I will present a preliminary result of lava flow simulations conducted with a newly developed simple kinematic model discretized in a finite difference scheme. I estimated the distribution of a lava flow originated from Showa crater of Sakurajima Volcano because the volcanic activities at the crater have been significantly increased in these years.

The spreading speeds of lava flows are assumed to be directly proportional to the gradient of the topography including the effect of the depth of lava flows. The calculation domain is dynamically varied depending on the lava flow distribution to save computational time. The topography is described with a 50 m grid digital map of Sakurajima area published by Geospatial Information Authority of Japan.

The numerical results indicate that the distribution of lava flow that may be generated in near future is similar to the distribution of lava flow during the eruption in 1946 except that the simulation does not generate the lava flow that reaches Kurokami area throught a valley between Mt. Nabeyama and Mt. Gongenyama as shown in Figure.

Such a simple numerical model may be helpful for the civil defense officials during volcanic crises although it should be carefully validated by comparing its results with observational data obtained during actual eruptions and simulation results obtained from more sophisticated numerical models.

Keywords: lava flow, simulation, Sakurajima, Showa crater



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Quick analysis system for debris flow hazard area after volcanic eruption

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After the eruption, it is well known that rainfall is more likely to trigger debris flow. In order to mitigate debris flow disaster, it is necessary to know the distribution of volcanic ash and to know the inundation area for the post-eruption debris flow. The authors have developed the quick analysis system for estimation of the debris flow inundation area. In the system, the number of the critical parameters are limited as far as possible depending on the sensitivity for the final results. It was actually utilized at the time of the 2011 Kirishima Eruption and succeeded in showing debris flow inundation area for 35 torrents almost within a week.

Keywords: Post eruption debris flow, 2 dimensional debris flow inundation simulation, The 2011 Mount Kirishima Eruption

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The single image photogrammetry system of using CCTV-camera and Digital elevation model

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The single image photogrammetry system of using CCTV-camera and Digital elevation model

Keywords: CCTV camera, Oblique airborne image, Ortho photo, DEM(Digital Elevation Model), Ash fall area, Single image photogrammetry

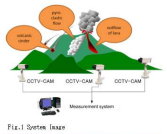

Fig.1 System Image


Fig.2 Oblique Airborne Image


Fig.3 three-dimensional model

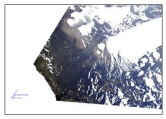
Fig.4 Ortho photo

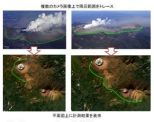
Fig.5 measurements ash fall area

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Particle source modeling using modified Tephra2; an application using Izu-Oshima 1986 eruption

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Modeling of particle release from eruption plume is critical to improve fallout forecast and also an important theme on physical volcanology. Gravity current model such as Bursik et al. (1992) has assumed particle release take place from the bottom of the horizontally spreading umbrella cloud. On the other hand, advection-diffusion models after Suzuki (1985) have modeled particle release from uprising eruption column.

In this study, a modified version of Tephra2, which is an advection-diffusion model including fallout from the umbrella, is used to obtain source parameters of the 1986B eruption of Izu-Oshima volcano. The best fit parameters such as column height, characteristic width of column, and distribution of particle release (expressed using two parameters of Suzuki function; A and lamda) are obtained as follows.

The best fit column height deduced to be 12km is consistent to the observation of the eruption; however, particle release from the umbrella is very limited and release from the column is significant. The characteristic column width is more than 1000m. This result may consistent to the fact that the eruption is a fissure eruption from more than 1km long vent system.

Keywords: eruption column, Izu-Oshima, tephra, ash fall