Analysis of short-period variation of volcanic plume by infrared-visible image

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It has been recognized that volcanic plume has a certain kind of time variation according to the volcanic activity. In recent years, acquisition and processing techniques for a continuous infrared or visible image has been developed to examine a variation of volcanic plume easily. Kagiyama et al. (2000) and Hiyama et al. (2002) examined volcanic plumes of the 2000 Eruption of Usu Volcano, and found a periodic variation in 12 seconds. It is very interesting if such a rhythm commonly exists or not in other volcanoes. It is also interesting if such a rhythm depends on a state of volcanic activity. Moreover, it is necessary to verify a reliability of the result, because the development of this analysis is on the way. From this viewpoint, visible and infrared images were taken in many volcanoes, and the analysis was tried. This paper presents a result in Suwanose-Jima and Asama volcanoes.

In Suwanose-Jima Volcano, visible images in March and May, 2003 were analyzed. Suwanose-Jima emitted a large amount of steam almost continuously in March, and emitted gray smoke including volcanic ash in May, 2003. Volcanic plume showed a certain time variation in both periods. We got time series data of RGB value from imageries of volcanic plume, and examined a spectrum analysis. As a result of analysis, some peaks were confirmed at the multiple of 0.01Hz. This result indicates that Suwanose-Jima has some resonance beneath volcanic body. In Asama Volcano, view of the crater bottom has been recorded since July, 2003. As a result of the analysis, some peaks were also confirmed at the multiple of 0.01Hz. This result indicates that Asama Volcano has also some resonance beneath volcanic body. However, some turbulence appeared within the crater under the strong wind condition. After a precise examination, it was found that this turbulence also makes some time variation of volcanic plume. This result indicates that the analysis of time variation of volcanic plume needs to note the change by another factor.