Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SSS33-P03 Room:Convention Hall Time:May 19 18:15-19:30

Estimation of vibration mode of Mt. Fuji from microtremor measurements

Kaoru Kojima[1*], Hiroaki Yamanaka[1], Kosuke Chimoto[1], Koichiro Saguchi[1]

[1]Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology

Natural frequency is one of the important characteristics which are determined with physical properties and geometry in subsurface structure including mountains. In particular Monitoring of natural frequency for active volcanic mountain can facilitate our understanding of its dynamic change, such as the intrusion of magma for prediction of the eruption.

In this study, we verify if we can estimate the frequency characteristics of Mt Fuji, the highest mountain in Japan, with microtremor observation. The microtremor observation was conducted from 6 to 9 August 2012. 7 locations are prepared in the observation at the 2nd and from the 5th to the 10th stations of Mt.Fuji. We temporarily installed a three-component accelerometer and a data logger at each station.

In the analysis, we made a spectral analysis of the observed records, and we found the predominant frequency around 0.2 Hz in the NS component. Amplitude distribution at this frequency is similar to fundamental mode shape of vibration. However, the vibration at the 6th station at the predominant frequency shows slight different features. We confirm from a cross-correlation function in the vicinity of the predominant frequency that delay time between the 6th and 10th stations is greater than others. The result suggests the vibration mode changes near the boundary of the 6th station of Mt.Fuji. This feature of the vibration may be related with the subsurface structural changes around there, because it is located near the boundary of Older Fuji and Younger Fuji or it is close to the volcano Hoei. We need to discuss this from long-term observation data.

We also conducted eigen value analysis with FEM using a simple cone model; 20km in diameter and 3km height. The first natural frequency of the model is about 0.2 Hz, and this is almost the same as the results with the observations. This shows that it is possible to estimate the frequency characteristics of Mt.Fuji with microtremor observation. However, the used model was a very simple model, and it is necessary to consider a model closer to the actual model for detailed investigation. Moreover, we need to verify how the natural frequency changes with changing the properties.

We thank participants of the observation in this study. We are also indebted to the people in the mountain hut. We would like to sincerely thank them.

Keywords: Mt.Fuji, frequency charateristics, volcano