

Detection of crustal deformation accompanied by the 2014 eruption of Ontake volcano using GNSS stacking data.

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Phreatic eruption occurred at Mt. Ontake on September 27, 2014.

Although remarkable crustal deformations preceded the eruption were not detected at that time, some small changes in GNSS baseline data were reported by JMA and GSI afterward.

In this study, we applied the stacking method (Miyaoka and Yokota, 2012) to GNSS data and tried to find the crustal deformation induced by that volcanic activities. The stacking method can extract a common signal component included in the plural of the data. This method is intended to improve the SN ratio by cumulating the time series data of crustal deformation.

We set two types of combinations that composed the short baselines (Short Combination) and long ones (Long Combination). They are expected to detect crustal deformations due to a shallower pressure source and a deeper one respectively.

As the result of this analysis, we detected small expansionary changes before the eruption and small contractive changes after the event in Short Combination.

Furthermore, we also analyzed GNSS data of 2007 eruption with the same method. Then we found that the amount of Short Combination's change in 2007 is same as or slightly larger than that in 2014. On the other hand, in Long Combination, although the change observed in 2014 was small as comparable to the noise or less, a distinct change was found in 2007 and it was much larger than that in 2014.

These differences of changes in Short and Long Combination between 2007 and 2014 may reflect the difference in behavior of a material at shallower and deeper part of Ontake volcano.

Miyaoka, K., Yokota, T., 2012. Development of Stacking Method for the Detection of Crustal Deformation: Application to the Early Detection of Slow Slip Phenomena on the Plate Boundary in the Tokai Region Using Strain Data (in Japanese), J. Seism. Soc. Jpn. (Zisin) 65, 205-218.

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