

Vertical Deformation Detected by the Precise Levelling Survey after the 2014 Mt. Ontake Eruption (2014-2017)

*Masayuki Murase¹, Hitoshi Yamashita Mori¹, Yang Li¹, Kazuki Ofuchi¹, Yoshiko Yamanaka², Yuta Maeda², Takahiro Kunitomo², Shinichiro Horikawa², Takashi OKUDA², Kenjiro Matsuhira², Kazushi Tanoue², Takeshi Matsushima³, Yoshiko Teguri³, Rintaro Miyamachi³, Kaori Morita³, Shin Yoshikawa⁴, Hiroyuki Inoue⁴, Fumiaki Kimata⁵, Hiroaki Yanagisawa⁶, Tomoyuki Muramatsu⁶, Tatafumi Taniguchi⁶

1. Department of Earth and Environmental Sciences, College of Humanities and Sciences, NIHON University, 2. Graduate School of Environmental Studies, Nagoya University, 3. Graduate School of Science, Kyushu University, 4. Graduate School of Science, Kyoto University, 5. Tono Research Institute of Earthquake Science, 6. Japan Meteorological Agency

We conducted the precise leveling surveys in the Ontake volcano in October 2014, April 2015, September 2016 and April 2017, and discussed vertical deformations in the periods of after the 2014 Mt. Ontake Eruption.

The leveling routes of about 38 km with 98 benchmarks were established on the eastern flank of Mount Ontake volcano. The main routes were extended to the Yashikino village (Kakehashi and Yashikino routes). In order to improve the spatial layout of the benchmarks, a branched leveling routes were established (Kiso-Onsen, Ontake Ropeway and Nakanoyu routes).

In the half year after the 2014 eruption (October 2014-April 2015), the small uplift less than 4mm was detected on the Ontake Ropeway route. In the period between April 2015 and September 2016, the uplift of about 6mm was detected in the Ontake Ropeway and Nakanoyu routes. However the subsidence of about 5mm was detected in the Ontake Ropeway and Nakanoyu routes in the period between September 2016 and April 2017.

In the period of before the 2014 eruption (2006-2009), notable uplifts were detected on the Yashikino and the Kiso-Onsen routes. The pressure source model based on this notable uplift was estimated to infer preparatory process preceding the 2014 eruption.

Although small uplifts were detected in the period between 2014 and 2016, the subsidence of 5mm was detected in the period between September 2016 and April 2017. This result suggests that the volcanic activity associated with the 2014 eruption was decreased in Mt Ontake.

The M5.6 earthquake occurred just beneath the leveling routes in June 25, 2017. In order to detect the vertical deformation associated with this earthquake, the leveling survey was conducted in the Yashikino and Kiso-Onsen routes. The benchmarks of the Yashikino and Kiso-Onsen routes showed uplift. The maximum uplift of 28mm was detected in central part of Yashikino route. We need continued and careful observation of the deformation in Mt. Ontake volcano.

Keywords: Precise Leveling Survey, Ontake Volcano, Vertical Deformation