

Geodetic Constraints on Post-eruptive deformation of 2014 eruption on Ontake Volcano

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ALOS-2 / PALSAR-2 data revealed that post-eruptive deflation over a small region of Jigokudani crater has been continuing. It started immediately after the 2014 phreatic eruption on Ontake Volcano. This deflation was clearly triggered by 2014 phreatic eruption, so this indicates pre-existing reservoir at the shallow depth beneath Jigokudani crater. In the pre-eruptive stage, hydrothermal fluid should have accumulated in this shallow reservoir. So, InSAR analysis of this deflation signal contributes to understanding pre-eruptive process in the pre-existing reservoir. Our aim is to understand the mechanism of the deflation and to constrain pre-eruptive process in the shallow reservoir beneath Jigokudani crater.

The result of InSAR analysis for pairs corresponding to post-eruptive deformation shows a typical spatial pattern of deflation over Jigokudani crater during 2014-2016. Characteristics of inversion result using half-space point source are as follows. Depth of deflation source ranges between 400-750m beneath Jigokudani crater. Total amount of volume change of the source is $6-7 \times 10^5 \text{ m}^3$ during 2014-2016. In order to evaluate topographic effects on ground deformation which might be significant in the region with complex terrain, we built a three-dimensional finite element model of Ontake Volcano. We carried out finite element computation and found that topographic effect is negligible from viewpoint of estimating source depth and the amount of volume change.

Assuming that the post-eruptive deflation is caused by discharge of hydrothermal fluid accumulated in the pre-existing reservoir, total mass of hydrothermal fluid emitted from the shallow reservoir, corresponding to the amount of volume change of the deflation source, is less than that of plume emitted from vents during September 2014-November 2014. This indicates that a large part of water mass emitted from eruptive vents must be originated from not the deflation source but deeper part of Ontake Volcano.

Assuming that accumulation of hydrothermal fluid inside the deflation source was triggered by 2007 dike intrusion event, an increase of GNSS baseline length between Otiai- Tanohara must be 3 cm during 2007-2014, but actually, such increase has not been observed. This suggests that accumulation of hydrothermal fluid inside the deflation source of the 2014 eruption almost completed by 2007 eruption accompanying dike intrusion event.

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