

## Repeated gravity measurement for hydrothermal monitoring beneath Aso volcano

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At the end of 2010, the water level in the Nakadake crater in Aso volcano reduced and then was followed by a small eruption in May 2011. The eruption and water level variation in the crater has strong relation to hydrothermal dynamics beneath volcano. To monitor hydrothermal dynamics, the relative gravity measurements were performed with Scintrex CG-5 (549) and LaCoste Romberg type G-1016 gravimeter at 28 benchmarks before the eruption in April 2011 and some measurements after the eruption in 2011 and 2012. It covered the area more than 60 km<sup>2</sup> in the west side of Aso caldera. In another measurement, we installed a new microgravity network on May 2010 at seven benchmarks using A10-017 Absolute gravimeter, which we re-occupied in October 2010, and June 2011.

Gravity changes in the monitoring study clarify mass variation in the subsurface. Large residual gravity changes between the surveys are found at benchmarks around Nakadake crater and Ikeno kubo, a southwestern area from Nakadake crater. The changes between April and August 2011 significantly raise about 60 microGal near to Nakadake crater. The next period gravity monitoring from August to November 2011 shows the broad positive anomaly shifted to Ikeno kubo area. The large positive gravity variation in second period is up to 80 microGal. The opposite variation trend of previous period appears in gravity variation between November 2011 and April 2012.

The gravity changes around crater have good validation from water level variation in Nakadake crater. The water level variation of Nakadake crater is supplied from groundwater, high temperature fluid supply from depth, and precipitation. The 3D inversion models of 4-D gravity data deduce density contrast distribution beneath Aso volcano. The model of the microgravity data in short period indicates mass variation or density contrast dynamically occurred at shallow depth beneath Aso volcano. The gravity monitoring can contribute to understanding the process of eruption.

Keywords: Repeated gravity measurement, Hydrothermal dynamics, Aso volcano