

## Gravity change around the Kirishima volcanoes after the 2011 eruption of Shinmodake

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### 1. Introduction

Mt. Shinmoedake of the Kirishima volcanoes woke from a 300 year long period of dormancy in 2011. Semi-Plinian eruptions on Jan. 26 and 27 were followed by formation of a lava dome and Vulcanian eruptions in February 2011. Although crustal deformation revealed deflation of a magma source in the early stage of the eruption, recent observation suggests magma accumulation is still ongoing. Since gravity is sensitive to movement of mass such as magma, we carried out two types of gravity observations from the early February 2011. One is continuous absolute gravity measurement and the other is hybrid gravity observations around the Kirishima volcanoes. These are complementary in a sense that the former has higher temporal resolution but with poor spatial resolution and the latter vice versa. We shall integrate the two kinds of observation to describe the overall picture of the mass movement around the Kirishima volcanoes.

### 2. Absolute gravity measurement

We installed an absolute gravimeter FG5 at the Kirisima Volcano Observatory, which is located just above the supposed inflation/deflation source before and after the 2011 eruption. Gravity shows a peculiar temporal change before the Vulcanian eruptions in February 2011; Gravity started to decrease from 8-10 hours before Vulcanian eruptions followed by quick recovery 2 hours before the eruption. Besides the short term change, we observed 30 microgal gravity variation during the recent 1 year, which is mostly attributable to gravity disturbance arising from groundwater. In particular, we detected 16 and 12 microgal gravity step during the two heavy rainfall periods; 1200 mm rainfall during 10 days in June 2011 and 700 mm rainfall during 6 days in September. The gravity disturbance should be properly eliminated so that we may discuss the magma transport process from gravity observations.

### 3. Repeated hybrid gravity measurement

Precise relative gravity measurement using 4 LCR gravimeters were carried out in March and in August 2011 and is planned in March 2012 at 23 stations around the Kirishima volcanoes. The measurements are tied to the absolute gravity station so that we may derive absolute gravity values at each station. The result in Aug. 2011 also indicated significant contribution of groundwater disturbance to the observed gravity (Ueki et al. 2011). We shall also describe the result in March 2012.

Keywords: Eruption of Shinmoedake 2011, Gravity change, Magma accumulation process, groundwater