

## A preliminary measurement and assessment of the precision using the absolute gravimeter A10 around Takigami geothermal power plant

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It is necessary to monitor the mass balance in the geothermal reservoir to produce the geothermal fluid for a long time. The production and reinjection of geothermal fluid cause mass movement and redistributions, which can cause measurable gravity changes on the ground surface.

Repeat gravity measurements have been applied at some geothermal power stations and the erupting volcano in Kyushu, Japan. But the observed gravity changes include the effect of shallow groundwater level changes. It is necessary to remove such an effect before applying repeat gravity measurement for the geothermal reservoir monitoring. We applied a multivariate regression model and removed the effect of shallow groundwater level change in order to extract the gravity change associated with the production and reinjection of geothermal fluid at Takigami geothermal field, central Kyushu, Japan.

We used Scintrex CG-3 and CG-3M gravimeters to measure precise gravity change around the Takigami geothermal power station. The two-way measurements method was taken to evaluate the instrumental drift and precision. We estimated the errors of observation as 10 microgals.

We detected gravity decrease and increase in the production and reinjection zone. These gravity changes are consistent with the changes in mass balance in the geothermal reservoir. This study suggests that repeat gravity measurement is an effective method to monitor geothermal systems. Because we only used the relative gravimeter, we can not assess the gravity change at the reference station.

A10 absolute gravimeter (Microg LaCoste, Inc) can operate on a 12V DC power supply. We used this gravimeter for not only the assessment of the gravity changes at the reference station, but also the detection of the gravity change caused by the underground fluid flow changes. In addition, we assessed the precision, repeatability, accuracy of A10-017 at the laboratory. We will report the preliminary result of the field and laboratory measurements.