

Gravimetric vertical array observation -the 2013 fiscal year-

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A vertical array of gravimeters (Mizunami Underground Laboratory; MIU) is quite rare in the world, and this method that suppresses rainfall responses and stacks signal from deep part of the crust can contribute to leveling up the potential of gravimetry (Tanaka et al., EPS, 2013). This time (Nov. 2013~Jan. 2014), we have succeeded in getting higher quality data than before with almost same configuration; namely, using two gPhone gravimeters (#130 on the ground, #90 at 300m under the ground). Though blasting for construction works had performed frequently during last year, we can detect sub-microGal responses of rainfall this time in the frequency band from hourly to daily. In the longer band, the sensor temperature of #130 is still shifting slightly, which can affect drifting rate. Here, we describe the four time-series data: data of belowground, (1); data on the ground, (2); sum of the two, (3); difference between the two, (4). We have finally got residual gravity values without tidal and atmospheric responses by using the BAYTAP-G (Tamura et al., 1991), with assuming of linear drift. When it rains, (1) should show gravity decrease, (2) should show gravity increase, (3) should offset the response, and (4) should superimpose the response. Because, only the main part of the Akeyo formation, which overlies an impervious layer from the surface to approximately 80m depth, responds to precipitation (e.g. Tanaka et al., Gcubed, 2006). Actually, we have observed such responses of rainfall. These depend on the way of rainfall; however, it seems that the amplitude of the response of (1) is slightly larger than (2). If so, the infinite slab assumption of a groundwater layer caused by rainfall is unsuitable for this gravimeter layout. On atmospheric correction, (1) and (2) should be almost same, (3) should superimpose, and (4) should offset the response. Actually, we have observed such responses and confirmed that (4) is one-tenth the atmospheric response of that of (1) or (2).

In the future, we will aim to accumulate high quality data, survey the habit of these two gravimeters (i.e. sensor drift, sensor temperature, and tilt response), and finally construct a vertical array including an absolute gravimeter.

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