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Gravimetrical vertical array observation -A preliminary report-

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We carried out ”gravimeter array method” proposed in Tanaka et al.(2012, JpGU) experimentally for two months and will report the preliminary results and problems revealed by the experiment. All three gravimeters we used are made in Microg LaCoste Inc.: two continuous relative devices, gPhone (#78 and #90) and an absolute device, FG5(#225). Please refer to Tanaka et al.(EPS, in press) for data-processing procedure and observed precipitation responses.Though we name here ”vertical array” for convenience, the horizontal distance between gPhone#90 at 300m-depth belowground and gPhone#78 on the ground is approximately 100 m. Thus the institution, Mizunami Underground Laboratory (MIU) which enables to construct the gravimeter array is rare in the world. Such the gravity monitoring system may contribute to the studies of slab-subduction process and geological disposal because it suppresses rainfall responses and stacks signal from deep part of crust. We constructed the array system for two months from October, 2012 because of rental of the gPhone#78. Unfortunately, the data quality of gPhone#90 at 300m-depth belowground was very low because blasting for a horizontal gallery (the North gallery) excavation at 500m belowground performed frequently during this period. However, we found the following two points: 1) blastings at the South gallery at 500m-depth belowground were no effect to gPhone#90, 2) the accuracy of atmospheric correction of gPhone#90 was worse than the one of gPhone#78 approximately one digit (because gPhone#90 was installed at the end of 100m-length horizontal cave). We will improve the layout of array in consideration of blasting position and substitute the atmospheric pressure near the Main Shaft for in situ in future. On the other hand, it was suggested by the data at 300m-depth belowground during no blasting period before constructing the array that the rainfall responses were almost same amplitude the one of at 100m-depth belowground. This result insists that the acceptability of infinite plate assumption for unconfined aquifer distributed shallower than 100m-depth belowground. Though the same hourly rainfall depth at a rain gauge, the distributional area is not same. So that, it is necessary to check parallel gravity observations at different depth (i.e., 100m- and 300m- depth) in future. With regard to evaluation of the drift gPhone#78 by using FG5#225, we could not implement it because of a data-missing of gPhone#78 caused by earthquake vibration.

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