

Gravimetric Connection with CG type Relative Gravimeter in Kamioka

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Gravimetric connection was executed in October 2016, between four points in and around the Kamioka Observatory, Institute for Cosmic Ray Research, University of Tokyo (ICRR). The measurement was performed by two relative gravimeters, Scintrex CG-3M (National Astronomical Observatory of Japan) and CG-5 (Nagoya University). Before this measurement, we had found by some experiments that the Scintrex CG type relative gravimeter shows hysteresis like behavior after each transportation. This portable type gravimeter shows gravity decrease of several tens of micro-gal just after any state of tilt, and recovers exponentially (Some CG-3 shows gravity increase, contrary). The recovery time seems to depend on its length of time under the tilted state, and sometimes it takes more than several hours. Taking this feature into account, we carefully performed the gravity connection by continuous measurement.

The gravity stations we connected are as follows. 1) Superconducting Gravity (S.G.) measurement station in the CLIO section, ICRR. 2) Absolute Gravity (A.G.) measurement station just ten meters away from the S.G. station. 3) Newly installed station at the Atotsu Entrance of ICRR. 4) Newly installed station at the Atotsu-KAGRA Entrance of ICRR. We first measured at the Atotsu Entrance for about an hour, then moved to the CLIO section. Then we measured each two times at S.G. and A.G. station for about half an hour by two gravimeters, alternately. The measurement time on each station is about 30 minutes to 1 hour like the way denoted above. We also made continuous measurements through the night-time to test the scale factor difference and to stabilize the instruments. As a result, we acquired two continuous sets of gravity data by the two gravimeters. After the earth tide correction, we gave offset values to each measurement sequences at each station, so that all the data are smoothly fitted to one line. Then we adopted the offset values as gravity differences between the stations. The gravity differences from the A.G. station are -0.096 mGal to the S.G. station, -50.084 mGal to the Atotsu-KAGRA Entrance station, and -53.684 mGal to the Atotsu Entrance station.

Acknowledgement

We appreciate Kamioka Observatory, ICRR for every convenience. We are also thankful to Nagoya University for allowing us to use CG-5 gravimeter.

Keywords: Gravity, Gravimetric Connection