

Twelve Years of Gravity Observation at Kamioka with a Superconducting Gravimeter

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We had been carried out continuous gravity observation at Kamioka using GWR superconducting gravimeter (SG) model TT70#016. We started the observation in October 2004 and finished in April 2016. The observation site belongs to Institute for Cosmic Ray Research, University of Tokyo. The observation site is located about 1km under the ground and it is surrounded by rigid bedrock. The site is expected to provide quite and stable observation environment.

We got several observation results from SG such as Earth tide, free oscillation of the Earth, coseismic and postseismic gravity changes, seasonal change, and secular change. The SG has a low drift rate but it is difficult to distinguish secular gravity change from instrumental drift. To compensate the weakness of SG, we carried out absolute gravity measurements several times at Kamioka. In early time, Micro-g gravimeter FG5#210 of Kyoto University was used. In latter time, FG5#217 of AIST (National Institute of Advanced Industrial Science and Technology) was used. The data of absolute gravity measurements were used to discuss secular gravity change, and used for SG scale factor calibrations.

For the study of coseismic gravity change, we discussed the change caused by the Noto Hanto Earthquake in 2007. For the study of postseismic gravity change, we discovered steady decrease at the rate of about 10 micro gals per year in gravity after the great Tohoku Earthquake in March 2011. For the study of seasonal change, we found large seasonal gravity change of 10-30 micro gal. We investigated ground water behavior, especially the effect of fallen snow, to understand seasonal gravity change. We will report complete gravity observation results for twelve years at Kamioka.

Keywords: superconducting gravimeter, gravity change, Kamioka, Tohoku Earthquake