

Precipitation effects on continuous gravity observations at Ishigakijima, Japan

望月 一磨¹、*名和 一成¹、今西 祐一²、木村 武志³

Kazuma Mochizuki¹, *Kazunari Nawa¹, Yuichi Imanishi², Takeshi Kimura³

1. 産業技術総合研究所、2. 東京大学地震研究所、3. 防災科学技術研究所

1. National Institute of Advanced Industrial Science and Technology, 2. Earthquake Research Institute, The University of Tokyo, 3. National Research Institute for Earth Science and Disaster Resilience

We are observing gravity changes with a superconducting gravimeter (SG) CT #36 at the VERA Ishigakijima station of the National Astronomical Observatory of Japan to detect slow slip events around Sakishima islands along the Ryukyu Trench, southwestern Japan since 2012. In the VERA station, precipitation and soil moisture variations have been measured in parallel with gravity measurements. No good correlation between gravity and precipitations has been observed at this station. In August 2016, continuous gravity observation with a gPhone gravimeter (#133) started at the F-net IGK (Ishigaki) station of the National Research Institute for Earth Science and Disaster Resilience (NIED), in order to supplement the SG observation at the VERA station. On analyzing the initial data of the gPhone, we detected gravity changes associated with soil moisture variations caused by precipitations around the F-net station. In this study, we analyzed approximately one year gravity data from October 2016 to September 2017 acquired with the gPhone at the F-net station and the SG at the VERA station. We investigated precipitation effects on gravity at the both stations. As a result, a difference of gravity changes between the gPhone at the F-net station and the SG at the VERA station was consistent with precipitation effects of the F-net station through the year. In particular, the gravity at F-net responds to precipitation with a factor of $-0.035 \mu\text{Gal}/\text{mm}$, and this observed value was in good agreement with a calculated factor ($-0.034 \mu\text{Gal}/\text{mm}$) by using digital elevation model. On the other hand, absolute value of the calculated factor at the VERA station was about one-fifth of that of the F-net station. In the case of the VERA station, however, there were rainfall events which were inconsistent with this calculated factor. Therefore, it is necessary to consider immediate outflow of precipitations around the VERA station. In the near future, to discuss seasonal and/or transient variation of precipitation effects on gravity, we will take into consideration the changes of water storage of the Nagura dam in the vicinity of F-net station and tidal level at the Nagura bay.