

Soil parameters and their heterogeneities at Yaeyama Islands for precise estimation of hydrological effects on gravity

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Superconducting and absolute gravity has been continuously observed at Yaeyama Islands in the southwestern Japan since 2012, in order to detect gravity changes due to slow slip events. However, the gravity signals can be masked by hydrological gravity disturbances, because the annual amount of rainfall reaches about 2200 mm/year, which is about 1.5 times more than that in Tokyo. The hydrological disturbances must be corrected precisely by utilizing hydrological models, so as to quantitatively discuss the slowslip-derived gravity changes.

We were thus motivated to measure physical parameters of soil at Yaeyama Islands for precise estimations of hydrological gravity disturbances. We first sampled soil cores at three gravity stations (listed below) on 13-15 November 2012. We then applied soil tests for the sampled cores, and measured porosity (n) and saturated permeability (k_s) as follows:

At Ishigakijima Local Meteorological Observatory: $n = 0.419$ [m³/m³], $k_s = 7.2 \text{ E-}6$ [m/s]

At VERA Ishigakijima Station, NAO: $n = 0.385$ [m³/m³], $k_s = 4.9 \text{ E-}6$ [m/s]

At Iriomote Station, Ryukyu University: $n = 0.387$ [m³/m³], $k_s = 9.8 \text{ E-}7$ [m/s]

At the coming presentation, we will show modeled results of spatiotemporal hydrological distributions and gravity changes at three gravity stations with the above parameters. In addition, we will present soil parameters of sampled beach sand at Yaeyama Islands, in order to discuss spatial heterogeneity of the soil parameters.

Keywords: gravity change, slow slip event, Yaeyama Islands, soil parameter, hydrological modeling, maaji soil