

Estimation of local mass change effects on gravity changes observed by a superconducting gravimeter at Syowa Station, Antarctica

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Syowa Station is located on an island close to the Antarctic continent, at a distance of about 5 kilometers. Since a mass change in the continental ice sheet would have an effect on gravity observed at Syowa Station, we intend to detect signals associated with ice sheet mass changes in record of superconducting gravimeters (SG) at Syowa Station. We compared the observed gravity residuals with expected gravity changes induced by ice sheet mass changes estimated from ice sheet elevation changes measured by ICESat laser altimeter (Doi et al. (2009)). From the comparison, differences up to 5 micro-gal the causes of which are undetermined were found in the plot of temporal gravity changes.

One of the possible causes of the differences is loading effect induced by snow drift around the observation site. We estimated the effect based on an observed snow drift distribution map. In the preliminary estimation, gravity change of 0.4 micro-gal is expected when snow drift height of 100cm is assumed.

Another possible cause is a change in attraction to sensor sphere from liquid helium induced by the mass change. We plan to calculate the amount of attraction change based on the actual size and configuration of the gravimeter.