

## Study of surface mass balance of Shirase Glacier using 2002 to 2014 GRACE satellite gravity data

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Recent studies of the Antarctic ice sheet mass balance using satellite gravity mission GRACE data reported that the Antarctic is decreasing in the last decade, and the decrease is accelerating in recent years. The decrease is mainly due to the large-scale ice sheet melting or run-off in West Antarctica, while the ice sheet mass is slightly increasing at the same time period in East Antarctica. Shirase Glacier, which is located in Enderby Land is the most significant surface mass increase region in East Antarctica. Thus, in this study, we purposed to investigate ice flow mechanism of Shirase Glacier using GRACE and other auxiliary satellite and meteorological data sets. We firstly estimated regional average of inter-annual mass variations of Shirase Glacier using GRACE satellite gravity data from March 2002 to March 2014. The result showed that the mass increase of this region is +23.7 Gt/yr. We considered that the observed positive mass trend was mainly caused by surface ice sheet mass change, because it is known that the GIA mass trend in this region is small. The peak of the positive trend was located at the mouth of the Shirase Glacier (38.6 deg E and -70.5 deg N). One of our interests is whether the observed surface mass increase can just be explained by snow accumulation or should be also considered the effects of horizontal outflow and inflow of basal ice sheet. To clarify this, we compared the GRACE-derived surface mass change with the one calculated from atmospheric objective analysis data of this region. On the basis of the result, we will discuss ice sheet flow mechanism of Shirase Glacier in detail.

Keywords: Antarctic ice sheet change, GRACE, satellite gravity mission, surface mass balance, Shirase Glacier