

Revisiting estimates of glacier mass balance in Asian High Mountains from satellite gravimetry

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The advent of GRACE, the dedicated gravity satellite mission, has enabled continuous and remote measurement of the glacier mass balance in Asian High Mountain Ranges (HM Asia). Matsuo & Heki (*EPSL*, 2010) first attempted to estimate the glacier mass balance in this region using GRACE data and reported the average ice loss rate of -47 Gt/yr for the period 2003-2009. On the other hands, Jacob et al. (*Nature*, 2012) also conducted the GRACE-based estimate for this region and reported the average ice loss rate of -11 Gt/yr for the period 2003-2010. According to Matsuo & Heki (*SEPPYO*, 2014), the discrepancy between these two estimates can be attributed to the following two factors: groundwater signal leakage from the irrigated region in Northern India and inter-annual variability in glacier mass balance. Therefore, in order to correctly estimate the glacier mass balance in HM Asia, it is required to properly separate the groundwater signals from the target region and utilize the long-term GRACE data as long as possible. In this study, we re-estimate the glacier mass balance in HM Asia by employing new GRACE data, hydrological model, and data processing technique.

Keywords: Space geodesy, Glacier, Climate change, GRACE, Gravity