# Recent contributions of glaciers and ice caps to sea level rise, from GRACE

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**Summary paragraph**

Glaciers and ice caps (GIC) are important contributors to present-day global mean sea-level rise (SLR). Most previous global mass balance estimates for GIC rely on interpolation of sparse mass balance measurements, representing a small fraction of the GIC area. Instead, we here perform a global, simultaneous inversion of mass change over all ice-covered regions larger than 100 km$^2$ using monthly GRACE-derived satellite gravity fields spanning January 2003 to December 2010. This is the first GRACE-based study where every such GIC region is considered and the results quantified. We conclude that GIC, excluding the Greenland and Antarctic peripheral glaciers and ice caps (PGIC), lost mass at a rate of 148 ± 30 giga tonnes per year (Gt/yr) during this period, contributing 0.41 ± 0.08 mm/yr to SLR. This rate is significantly smaller than previous estimates that rely on extrapolation of mass balance measurements. Our high mountain Asia (HMA) result, in particular, shows only a modest mass loss; far smaller than previously published estimates. For completeness, we also consider Greenland and Antarctica for this same time period, and find that those ice sheets, including their PGIC lost 384 ± 71 Gt/yr, contributing 1.06 ± 0.19 mm/yr to SLR. The total SLR contribution from all ice-covered regions was then 1.48 ± 0.26 mm/yr, agreeing with independent estimates of SLR from new water to within the respective error bars.