GRACE mass balance estimates for all the Earth's ice-covered regions

Thomas Jacob, J. Wahr, T. W. Pfeffer, S. Swenson

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We have used GRACE satellite gravity measurements to construct 2003-2010 mass loss estimates for all the world's mountain glacier systems and ice caps (GIC's), as well as for Greenland and Antarctica. We find that the GIC's, excluding the Greenland and Antarctic peripheral glaciers and ice caps (PGIC's), lost mass at a rate of 148 ± 30 Gt yr-1 from January 2003 to December 2010, contributing 0.41 ± 0.08 mm yr-1 to global sea level rise (SLR) during this period. This rate is about 30% smaller than previously published ground-based estimates that most nearly matched this time span. Our results for the high mountains of Asia, in particular, show a mass loss of only 4 20 Gt yr-1, compared to 47-55 Gt yr-1 in previously published estimates.
We also estimate that the Greenland and Antarctic ice sheets, including their PGIC's, lost 384 ±71 Gt yr-1, contributing 1.06 ± 0.19 mm yr-1 to SLR, over this same time period. The total SLR contribution from all ice-covered regions was then 1.48 ± 0.26 mm yr-1, agreeing with independent estimates of SLR from new water to within the respective error bars.