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Time variable gravity From GRACE provides new and independent measurements of long term and seasonal mass variations of the ice sheets.

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Using measurements of time variable gravity from the Gravity Recovery And Climate Experiment (GRACE) satellites we determine long term and seasonal mass variations of the Antarctic and Greenland ice sheets during the period April 2002-Aug 2006. We use monthly GRACE gravity fields to estimate the linear trends in Greenland and Antarctic ice mass. This represents a new and independent estimate of the polar ice sheet mass balance. Both ice sheets display a large mass imbalance during the analyzed period. The mass of the Antarctic ice sheet decreases significantly from 2002 to 2006. Most of this mass loss is generated by the West Antarctic Ice Sheet. The Greenland ice sheet displays significant mass loss during the same period with significant acceleration after April 2004. The rate of ice loss increased by 250 per cent between the periods April 2002 to April 2004 and May 2004 to April 2006. The acceleration is almost entirely due to accelerated rates of ice mass loss in southern Greenland. We will present results of our analysis for the seasonal and long term variability of ice sheet mass and we will discuss error sources, strengths and weaknesses of this new remote sensing tool.