Detectability of global ice-volume changes by the GRACE gravity-space mission

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Abstract

Global geoid displacement resulting from ice-mass fluctuations in several regions of major present-day glaciation are examined within the context of the GRACE gravity space mission. The regions of interest are Antarctica, Greenland, Patagonia, Alaska and Iceland. We first examine geoid displacement arising from the ongoing isostatic adjustment of the Earth to past ice-load changes, specifically those following the Last Glacial Maximum (21 ka BP). For present-day changes in the ice masses of interest, we use recently published works that make use of a variety of data types. Our predictions are intended to represented the expected geoid changes over the 5-year lifetime of the GRACE mission. A preliminary assessment of the available GRACE data, representing monthly and annual geoid changes, is also presented.