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# Current Status of Glacial Isostatic Adjustment Solutions Using GRACE

E. R. Ivins (1), T. S. James (2), X-P. Wu (1) and V. Zlotnicki (1)

(1) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109-8099, USA, (2) Geological Survey of Canada, Sidney, British Columbia V8L 4B2, Canada, (eri@fryxell.jpl.nasa.gov / FAX: 001 818 354 9476 / Phone: 001 818 354 4785)

A long-standing goal of satellite observations of time-dependent gravity has been to determine the deep mantle viscosity and to better characterize the massive ice sheets of the last glacial maximum, some 21,000 years ago. Using Gravity Recovery and Climate Experiment (GRACE) data we are now able to recover a robust signal over Canadian North America, and a clear signal over Fennoscandia. A greater challenge is to decipher the signal in Antarctica, as this is masked to a great degree by on-going secular signals associated with ice mass loss and/or gain by accumulation, calving, increased ice stream flow and basal melting of ice shelves at the margins. Here we attempt to characterize the balance that can be derived from non-gravitational solutions. Such a priori models are currently the only method we have of obtaining glacial isostatic adjustment (GIA) solutions that match GRACE observations. We also attempt to use GPS vertical motion data, rock exposure dating, shoreline emergence data, and tide gauge observations to better constrain the GIA forward models. An iterative path to an optimum solution involving ice sheet flow modeling is suggested, but the poorly known aliasing effects of the K1 and K2 ocean tides, should be dealt with before such refined solutions are acceptable. We also discuss progress that can be made in determining the error budgets for rebound induced secular gravity changes in Patagonia and the Antarctic Peninsula, since these are unique low viscosity environments that have the potential for cm/yr rock uplift signatures that must be removed from cryospheric gravity change solutions.