

Low-degree geopotential changes due to past and present-day ice-load changes: Comparisons with GRACE observations

Kevin Fleming and Zdeněk Martinec

Geodesy and Remote Sensing, GeoForschungsZentrum Potsdam, Telegrafenberg, Potsdam, D-14473, Germany

Rates of change in the low-degree geopotential coefficients ($\dot{J}_l, l = 1$ to 8) have been inferred by various observational methods over the past few decades (e.g. SLR, VLBI). Extensive studies have at the same time been carried out to determine the contribution to \dot{J}_l of past and present-day ice-load fluctuations. \dot{J}_l estimates have also been used to place constraints on these ice-load changes and the Earth's viscosity structure (e.g. Mitrovica and Peltier, 1993; Tamisiea *et al.*, 2002; Tosi *et al.*, 2005).

This work will discuss the sensitivity of \dot{J}_l to various aspects of glacial-isostatic adjustment, especially the Earth's viscosity structure. Two ice models describing the last glacial cycle are used, and the contribution from changes in the present-day ice masses of Greenland, Antarctica, Patagonia and Alaska are examined. Our predictions are then compared with \dot{J}_l values inferred from the Gravity Recovery and Climate Experiment (GRACE) space mission.

References:

- Mitrovica, J. and Peltier, W. (1993) Present-day secular variations in the zonal harmonics of Earth's geopotential, Journal of Geophysical Research, vol. 98 (B3), pp. 4509-4526.*
- Tamisiea, M.E. and Mitrovica, J.X., Tromp, J. and Milne, G.A. (2002) Present-day secular variations in the low-degree harmonics of the geopotential: Sensitivity analysis on spherically symmetric Earth models, Journal of Geophysical Research, vol. 107, 10.1029/2001JB000696.*
- Tosi, N., Sabadini, R., Marotta, A.M. and Vermeersen, L.L.A. (2005) Simultaneous inversion for the Earth's mantle viscosity and ice mass imbalance in Antarctica and Greenland, Journal of Geophysical Research, vol. 110, 10.1029/2004JB993236.*