

Applications of GOCE for Glacial-Isostatic Adjustment and Sea-Level Studies

*L.L.A. Vermeersen, R. Sabadini and G. Di Donato
TU Delft, The Netherlands*

Glacial Isostatic Adjustment (GIA) due to ice melt of the last Great Ice Age that ended some 10,000 years ago, has a world-wide non-negligible contribution to present-day secular sea-level variations. Both disappearance of the ice sheet domes (negative loading) and their consequential sea-level rise of more than 100 meter (positive loading) have left their imprints in the present-day geoid, and still cause contemporary solid-earth deformation and temporal changes in gravity.

One of the recent developments in GIA and associated sea-level modeling is the incorporation of low-viscosity intra-crustal layers and shallow low-viscosity mantle layers in the solid-earth relaxation models. These more realistic earth models replace more commonly used solid-earth models in which the top part consists of a single, homogeneous elastic layer (the lithosphere).

Due to their shallowness and due to their laterally non-homogeneous occurrence, these low-viscosity earth layers are expected to leave discernable signatures in the high-harmonic steady-state components of the geoid. GOCE might therefore contribute in constraining stratification and rheological properties of the shallow solid earth, and thereby contribute to establish the contribution of on-going GIA to secular sea-level change.