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Estimating geocenter motion from a GRACE, GPS and SLR combination

R. Rietbroek (1), C. Dahle (2), R. König (2), S.-E. Brunnabend (3), M. Gebler (3), M. Fritsche (4), J. Kusche (1), F. Flechtner (2), J. Schröter (3), and R. Dietrich (4)

(1) Bonn University, Institute of Geodesy and Geoinformation, Bonn, Germany (roelof@geod.uni-bonn.de), (2) Helmholtz Centre Potsdam GFZ, c/o Oberpfaffenhoffen, Wessling, Germany, (3) Alfred Wegener Institute, Bremerhaven, Germany, (4) Technische Universität Dresden, Germany

Using individual data sources, the retrieval of geocenter motion remains challenging. Geocenter motion retrieved from GPS range measurements are sensitive to errors induced by orbit modelling. On the other hand, Satellite Laser Ranging (SLR) measurements are generally more accurate but its observational groundnetwork is sparse compared to GPS. An additional problem is that the movement of the groundstations (GPS/SLR) is strongly affected by surface loading which have spatial resolutions finer than that what can be resolved by GPS/SLR alone. In contrast to GPS and SLR, GRACE cannot resolve geocenter motion directly. It does however play a crucial role in reducing the spatial aliasing of loading signal in sparse networks.

In this study we investigate a surface loading inversion with GRACE+GPS+SLR data to solve for low degree surface loading, including geocenter motion. We quantify how SLR data are weighed against GPS and GRACE, and discuss the potential benefits of this approach. Geocenter motion estimates from other GPS+GRACE combinations are additionally presented for comparison. Furthermore, we investigate the changes from using the upcoming release GFZ RL05 GRACE data in the inversion.