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Global grids of gravity anomalies and vertical gravity gradients at 10 km altitude from GOCE gradient data 2009-2011 and polar gravity.

The GOCE satellite measures gravity gradients which are filtered and transformed to gradients into an Earth-referenced frame by the GOCE High Level processing Facility. More than 80000000 data with 6 components are available from the period 2009-2011. IAG Arctic gravity was used north of 83 deg., while data at the Antarctic was not used due to bureaucratic restrictions by the data-holders.
Subsets of the data have been used to produce gridded values at 10 km altitude of gravity anomalies and vertical gravity gradients in 20 deg. x 20 deg. blocks with 10' spacing. Various combinations and densities of data were used to obtain values in areas with known gravity anomalies. The (marginally) best choice was vertical gravity gradients selected with an approximately 0.125 deg spacing. Using Least-Squares Collocation, error-estimates were computed and compared to the difference between the GOCE-grids and grids derived from EGM2008 to deg. 512. In general a good agreement was found, however with some inconsistencies in certain areas.

The computation time on a usual server with 24 processors was typically 100 minutes for a block with generally 40000 GOCE vertical gradients as input. The computations will be updated with new Wiener-filtered data in the near future.