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A GOCE-only global gravity field model by the space-wise approach

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The space-wise approach is a multi-step collocation procedure, developed in the framework of the GOCE HPF data processing for the estimation of the spherical harmonic coefficients of the Earth gravitational field and their error covariance matrix. The solution is based both on the satellite-to-satellite tracking (SST) data derived from the GOCE on-board GPS receiver and on the satellite gravity gradients (SGG) observed by the on-board electrostatic gradiometer. In particular, the low frequency part of the field is estimated from kinematic orbits by means of the energy conservation approach. The high frequency part is then derived by combining the estimated along-track gravitational potential with the observed gravity gradients. Finally spherical harmonic coefficients are computed by integrating estimated grids of potential and of its second radial derivatives at mean satellite altitude. The error covariance matrix of the estimated coefficients is derived by Monte Carlo simulations.
In this work a GOCE-only global gravity field model is computed by applying the space-wise approach to several months of GOCE orbit and gradiometer data. Due to different data calibrations and for computational reasons, the full data set cannot be processed as a whole; therefore a combination of grids estimated from different data subsets is performed before deriving the final spherical harmonic coefficients. The obtained solution is then compared with a previous one where some information on low degrees came from existing global gravity models.