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HPF's preliminary gravity field model using the direct numerical method based on all GOCE data

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The European GOCE Gravity Consortium (EGG-C) computes gravity fields on behalf of the European Space Agency (ESA). This presentation deals with the preliminary release 5 of the GOCE gravity field model by means of the direct method, which is obtained with the reprocessed GOCE data from the entire mission (November 2009 through September 2013) as well as with GRACE data. With respect to release 4, GOCE data at the four lower mission altitudes have been assimilated and the maximum degree of this model has been increased to 280.
The three-axes gradiometer (approximately radial, along-track, normal to the orbit plane) provides gravity gradients that are measured with a high accuracy only within its measurement bandwidth of approximately 0.005 to 0.1 Hz. Due to this instrumental behavior, the gravity gradient observation equations must be filtered. Within the direct numerical method this has been done using a band pass filter of 8 - 120 seconds. The GOCE GPS-SST data are only used to geolocate the gradients. The low-to-medium degree spherical harmonic coefficients of the gravity field are determined using GRACE GPS-SST and KBR data, as well as LAGEOS SLR data, from the CNES/GRGS release 3 models. All data are combined at normal equation level, which are solved using Cholesky decomposition. We apply the spherical cap regularization to stabilize the low-order spherical harmonic coefficients for the polar gaps in the GOCE data. Furthermore, Kaula regularization is used at the high degrees.
A geodetic validation of the ESA models is done within EGG-C. We present additional validation results using an independent oceanographic evaluation method. The Mean Dynamic Ocean Topography and the associated mean geostrophic currents were computed for different geoid models together with an altimetric Mean Sea Surface. These derived mean currents are compared with observed mean geostrophic ocean currents using SVP buoy velocity data. The differences between the geostrophic currents derived from gravity field models and inferred from drifter data are then analyzed as a function of spatial resolution (down to 80 km) and location.