High-resolution numerical modelling of altimetry-derived gravity data

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High-resolution altimetry-derived gravity data over oceans/seas are determined by a numerical solution of the altimetry-gravimetry boundary-value problem (AGBVP) using the finite volume method (FVM). FVM discretizes the 3D computational domain between an ellipsoidal approximation of the Earth's surface and an upper boundary chosen at altitude of 200 km. Here the FVM solution is fixed to the GRACE/GOCE-based satellite-only geopotential model, namely to GO_CONS_GCF_2_DIR_R6. Over oceas/seas on the bottom boundary, the disturbing potential is prescribed as well. Its quality has a crucial impact on accuracy of the modelled marine altimetry-derived gravity data. It is obtained by nonlinear diffusion filtering of the geopotential generated from GO_CONS_GCF_2_DIR_R6 on the DTU21 mean sea surface (DTU21_MSS). A parallel implementation of FVM and large-scale parallel computations on the cluster with distributed memory result in high-resolution numerical solution of AGBVP. Hence, the disturbing potential is obtained in the whole 3D computational domain with the high-resolution 1×1 arc min in horizontal directions. It allows us to derive the first, second or higher derivatives with the same resolution, even at different altitudes. We present such detailed marine altimetry-

derived gravity data evaluated on DTU_MSS and at altitude of 10 km. Finally, the altimetry-derived gravity disturbances obtained on DTU_MSS are compared with ones generated from the DTU21_GRAV and SS_v31.1 datasets.

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