EGU2020-13608
https://doi.org/10.5194/egusphere-egu2020-13608
EGU General Assembly 2020

High-resolution numerical modelling of the altimetry-derived gravity disturbances and disturbing gradients

Róbert Čunderlík, Marek Macák, Michal Kollár, and Karol Mikula
Slovak University of Technology, Faculty of Civil Engineering, Dept. of Mathematics, Bratislava, Slovakia
(cunderli@svf.stuba.sk)

Recent high-resolution mean sea surface models obtained from satellite altimetry in a combination with the GRACE/GOCE-based global geopotential models provide valuable information for detailed modelling of the altimetry-derived gravity data. Our approach is based on a numerical solution of the altimetry-gravimetry boundary-value problem 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 a mean altitude of the GOCE satellite orbits. A parallel implementation of the finite volume numerical scheme and large-scale parallel computations on clusters with distributed memory allow to get a high-resolution numerical solution in the whole 3D computational domain. Our numerical experiment presents the altimetry-derived gravity disturbances and disturbing gradients determined with the high-resolution 1 x 1 arc min at two altitude levels; on the reference ellipsoid and at the altitude of 10 km above the ellipsoid. As input data, the Dirichlet boundary conditions over oceans/seas are considered in the form of the disturbing potential. It is obtained from the geopotential evaluated on the DTU18 mean sea surface model from the GO_CONS_GCF_2_TIM_R5 geopotential model and then filtered using the nonlinear diffusion filtering. On the upper boundary, the FVM solution is fixed to the disturbing potential generated from the GO_CONS_GCF_2_DIR_R5 model while exploiting information from the GRACE and GOCE satellite missions.