Preprocessing of GOCE gravity gradients for the gravity field model derived by the direct numerical method

Oleh Abrykosov (1), Christoph Foerste (1), Sean Bruinsma (2), and Jean-Charles Matry (2)

(1) GFZ German Research Centre for Geosciences, Potsdam, Germany (abrik@gfz-potsdam.de), (2) CNES/GRGS, Toulouse, France (sean.bruinsma@cnes.fr)

We present an iterative algorithm for a simultaneous detrending and screening of time series of GOCE gravity gradients which were used to generate the Earth's gravity field model in the frame of the direct approach.

The detrending is based on piece-wise continuous time-dependent approximation of the gradients by quasi-periodic polynoms of low orders. The detection of outliers is based on the analysis of empirical probability density functions of detrended residuals. Only the interquartile ranges of the residuals govern construction of such functions making the outlier detection to be free of usage of "n-sigma" criteria in any form.

In addition to the preprocessing used for our previous releases of the gravity model, DIR-3 and DIR-4, the least-squares collocation was applied locally along the GOCE orbit to correct the detected outliers. As a result, we have generally smaller residuals and better spectral properties of the gradients preprocessed for the upcoming release, DIR-5.