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Advanced high-resolution spherical harmonic synthesis and analysis in geodesy

Christian Gruber (1), Pavel Novák (2,3), and Josef Sebera (4)

(1) German Research Centre for Geosciences (GFZ), Department of Global Geomonitoring and Gravity Field, Oberpffafenhofen, Germany (gruber@gfz-potsdam.de), (2) Research Institute of Geodesy, Topography and Cartography, Department of Geodesy and Geodynamics, Zdiby, Czech Republic (pnovak@pecny.asu.cas.cz), (3) University of West Bohemia, Department of Mathematics, Univerzitní 22, Pilsen, Czech Republic, (4) Czech Technical University, Faculty of Civil Engineering, Prague, Czech Republic (josef.sebera@fsv.cvut.cz)

High resolution spherical harmonic modelling of the Earth gravity field as well as of alternative data sets such as, e.g., global topography data (ETOPO1) is discussed in this contribution. The spherical harmonic analysis and synthesis are based on a rigorous method in spectral domain for the computation of respective base functions. New benchmarks for the run-time performance and numerical precision will be presented concerning the expansion of the spherical harmonic series or the spherical harmonic analysis of available data sets up to the equiangular resolution of 1 arcmin x 1 arcmin that corresponds to spherical harmonic degree 10,800. The computations are based on standard desktop, shared memory architecture.