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Ultra-high degree spectral modelling of Earth and planetary topography

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New methods for ultra-high degree spherical harmonic analyses and syntheses have been developed and studied over the past years. The focus group “High-resolution Gravity Modelling”, established in 2013 at TU Munich, has implemented ultra-high degree spectral modelling techniques and used successfully to transform high-resolution topography grids of Earth, Moon and Mars into spherical harmonics.
For Earth, a new set of 1 arc-min topography models, developed by our group and released under the name Earth2014, was expanded into a spherical harmonic series to degree 10,800. For the 15 arc-sec resolution SRTM15_plus topography and bathymetry, a spectral resolution of degree 43,200 was achieved. For Moon and Mars, topography grids from laser altimetry were harmonically analysed up to degree ∼46,000.
The spectral representations of the topography grids presented in this contribution are required in the context of spectral gravity forward modelling with ultra-high degree, where the topographic potential is computed as a function of the spherical harmonic series of the topography and its integer powers.

References:
Hirt, C., and M. Rexer (2015) Earth2014: 1 arc-min shape, topography, bedrock and ice-sheet models - available as gridded data and degree-10,800 spherical harmonics, International Journal of Applied Earth Observation and Geoinformation 39, 103-112, doi:10.1016/j.jag.2015.03.001.

Rexer, M. and C. Hirt (2015), Ultra-high degree surface spherical harmonic analysis using the Gauss-Legendre and the Driscoll/Healy quadrature theorem and application to planetary topography models of Earth, Moon and Mars. Surveys in Geophysics 36(6), 803-830, doi: 10.1007/s10712-015-9345-z.