



## Comparison of the space-wise grids with other GOCE solutions

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Beside the traditional modeling of the Earth gravity field in terms of truncated spherical harmonic expansion, the final products of the GOCE mission include also grids of gravity gradients at satellite altitude, like for example the ones computed by the space-wise approach in the framework of the High-level Processing Facility (HPF). This is motivated by the fact that the on board gradiometer performed point-wise observations of gravity gradients and by the idea that a local interpolation of these original observations on a regular grid could be somehow more informative than a global interpolation by spherical harmonics. The assessment of the grids is however more difficult because spherical harmonic global models allow to synthesize and assess different gravity field functionals in different points of the space, which is of course not possible for the grids. Another difference in terms of error evaluation is that spherical harmonic coefficients have associated a covariance matrix of the commission error (no information is generally given on the omission error), while grid values have an error covering the whole frequency spectrum.

On the basis of these considerations, in this work some statistical tests are proposed to infer the quality of the space-wise grids in comparison with some spherical harmonic solutions (e.g. the ones by the time-wise and the direct approach) and with other grid solutions (e.g. the one computed in the framework of a Support to Science Element (STSE) GOCE+ project). The comparisons can be performed at grids level (by synthesizing them from the spherical harmonic coefficients) or at coefficients level (by analyzing the grids into spherical harmonics using a numerical integration algorithm). The goal of these comparisons is not as much in assessing the accuracy of the space-wise grids, but rather in testing whether they are statistically consistent with other GOCE products. The answer of this test is in the positive, e.g. when comparing the GOCE-only space-wise grids with the GOCE-only time-wise global model.