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The comparison of downward continued global models and true geoid ondulations

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The recent release by the US National Geospatial Intellence Agency of the Earth Gravitational Model EGM08 provides a description of the Earth gravity field with unprecedented resolution and accuracy.

Since EGM08 actually yields height anomalies ζ, a corrective term depending on the topography, i.e. the downward continuation of ζsgs needed to estimate the ondulations of the geoid N.

In this work, a simple correction model to convert ζ into N is derived and implemented.

Results obtained with this new approach have been compared with the corrective term computed by EGM08, based on a description of the Earth surface in terms of spherical harmonic expansion, and with the other well known (classical) topographic correction that makes use of Bouguer anomalies and orthometric heights.

Numerical comparisons among the three different approximations have been performed over a wide area in Europe.

The results of the three methods have been checked over Italy using GPS/leveling data. Results show a general good agreement among the three corrections, with differences of centimeter order (r.m.s) and higher differences (up to 30 centimeters) occurring in high mountainous areas (Alps).

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