

Joint Working Groups of Sub-Commission 2.2

JWG 2.2.1: Integration and validation of local geoid estimates (joint with ISG, IGFS, ICGEM)

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Terms of Reference

Regional geoid estimates (in areas having e.g. extension of some degrees) can give a detailed description of the high frequency geoid features. They are based on local gravity databases and high resolution DTMs that allow to reconstruct the high frequency spectrum of the gravity field, thus improving the global geopotential model representation. Local geoid estimates are computed following well-defined estimation methods that can give reliable results. These estimates are frequently used in engineering applications to transform GPS derived ellipsoidal heights into normal or orthometric heights.

Despite the fact that methodologies in geoid estimation have a sound basis, there are still some related issues that are to be addressed.

In comparing local geoid estimates of two adjacent areas inconsistencies can occur. They can be caused by the different global geopotential models used in representing the low frequency part of the gravity field spectrum and/or the method that has been adopted in the geoid estimation procedure. Biases due to a different height datum can also be present. Thus proper procedures should be proposed and assessed to homogenize the two local solutions.

Validation of regional geoid is another issue that is to be better standardized. Usually the validation is based on GPS/levelling data that are compared with the geoid estimates. Differences between GPS/levelling and geoid/quasi-geoid values are then fitted with polynomial surfaces to account for reference frames discrepancies. Statistics of the post-fit residuals are then considered as the estimates of the geoid precision. In this respect, some issues related to the fitting procedure could be better defined and standardized.

Finally, another question to be investigated is the definition of procedures for local geoid estimates in areas with sparse gravity data. The interactions existing among the maximum degree of the global geopotential model, the DTM resolution, the local gravity database mean spatial density, the estimation geoid grid step should be studied to define some general best-practice rules.

Goals and Objectives

The objectives of the Working Group are to:

- Study and define methodologies for merging local geoid solutions
- Discuss and define proper procedure to assess the geoid estimation precision
- Compare different geoid estimation methods
- Define general rules for geoid estimation in areas with sparse gravity data

Program of Activities

The Working Group activities will be developed following the objective stating above. Particularly, based on the geoid solution available at ISG, numerical tests will be carried out. Members will be required to participate in these tests with their own software/methodologies. Results of these tests will be discussed through the ISG website and in face-to-face meeting to be held in connection with major geodesy related congresses.

Members

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