



On the latest improvements in the geoid's potential value computations: Procedure and accuracy

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Computation of geoid's potential value W_0 according to Gauss/Listing's definition for the geoid as an equipotential surface that best fits to Mean Sea Level (MSL) in least squares sense, by its nature depends on the following sources of information: (i) Realization of the MSL, and (ii) models of the gravity field of the earth to represent the geopotential surfaces. Considering recent developments in monitoring the sea surface via satellite altimetry techniques and global gravity field observations based on new satellite gravimetric missions such as CHAMP, and GRACE as well as developments in the accuracy of ground and airborne gravimetry techniques we can confidently admit that all the required data for a reliable estimation of geoid's potential value W_0 , for all practical applications, have been acquired. In this paper, first the major geopotential models developed between the years 1996-2006, namely, EIGEN-GL04C, EIGEN-CG03C, GGM02C, EIGEN-CG01C, PGM2000A, and EGM96 are investigated for their accuracy using the GRACE gravity observations as the benchmark. Next, using latest MSL model, i.e., KMSS04, which is a solution based on Geosat, ERS-1, ERS-2, GFO, and TOPEX/Poseidon altimetry satellites, we have made a thorough investigation on the achievable accuracy and uncertainty level of the geoid's potential value W_0 , and have presented a new value for this fundamental geodetic parameter, which can be regarded as its "current best estimate".