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How to build a consistent reference system for geodesy and geodynamics

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Although from physical point of view it is impossible to measure the gravity potential of the Earth, however from a combination of gravity and geometry observations it is possible to estimate the potential value of an equipotential surface, which best fits to the global Mean Sea Level (MSL). This equipotential surface that defined by Gauss, and given the name of "geoid" by Listing, is nowadays the zero level of various height systems. In this paper, we are going to show the relation, which should exist between 4 sides of a pyramid made by (i) reference figure of the Earth (ref. Ellipsoid), (ii) MSL, (iii) geopotential model, and (iv) geoid's potential value in order to have a consistent reference system for geodesy and geodynamics applications. Besides, we will offer our latest results of verification of existing geopotential models and MSL models for their consistency in the aforementioned pyramid. The verified geopotential models are EGM96, PGM2000A, Eigen-cgo1c, and Eigen-Grace2s, and the tested MSL models are CLS01, CLS-SHOM v 98.2, OSU95, CSR98, GSFC98, GSFC00.1, KMS04, and UT05. Based on the assessments and computations the current best consistent geodetic reference system could be obtained by using (i) WGD2000 as ref. ellipsoid (from Stuttgart University), (ii) UT05 as MSL model (from University of Tehran), (iii) PGM2000A as geopotential model (from NASA) and (iv) as geoid's potential value $W_0 = (62636858.30 \pm 0.14) m^2/\sec^2$ that we have computed to make the whole reference system consistent.