



GOCE-based evaluation of the Hellenic Vertical Datum within the GOCE+++ project

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With the end of the GOCE mission, the latest Release5 (R5) Global Geopotential Models (GGMs), employing also the lower orbit satellite data, offer unprecedented geoid height accuracy at the 1-1.5 cm level for spherical harmonic expansions to d/o 230-240. In that sense, GOCE-based GGMs can provide a powerful tool in studies towards the modeling of Local Vertical Datum (LVD) distortions, the unification of LVDs at a country-wide scale and their referral to a World Height System (WHS) as realized by the International Height Reference System. Within the present study, the focus is put on the Hellenic LVD which is known to be of insufficient accuracy, containing biases between neighboring benchmarks (BMs) and lacking a connection between mainland Greece and the Greek islands and isles. The latest GOCE and GOCE/GRACE GGMs are employed in order first to study the distortions of the Hellenic LVD, as well as that of some of the major islands like Crete, Evoia, Rhodes, Corfu, etc. The identified distortions are then modeled using simple deterministic parametric surfaces in order to provide some reasoning on their nature, spatial pattern and possible origin. Finally, a determination of the geopotential value Wo_{LVD} for the Greek LVD is carried out, along with separate estimations for more than 85 Greek islands having available GPS/Leveling observations on BMs. The estimation of the mean offset of the Hellenic LVD was used to provide a direct link between the mainland and islands LVDs within the Greek territory, as well as with the IAG conventional value recently proposed as a Wo for a global WHS.