



Sensitivity of vertical datum offsets to height data uncertainties

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For the purpose of unifying the North American height datums, experiments are conducted to study the sensitivity of the estimated datum offsets, computed with respect to a common reference surface, and their errors to the errors of the available height data sets. On land, only the highest order GNSS stations are used, for which ellipsoidal height errors are available from national geodetic agencies. For those points, orthometric heights in the NAVD88 for USA and Mexico, and CGVD28, NAVD88 and Nov07 datums for Canada are used even though their errors may not be available from the adjustments of the national leveling networks. This is the case for the old, official vertical datum of Canada, CGVD28. In the coastal areas of North America, where GNSS-surveyed tide gauges are used for computing the datum offsets, errors of computed heights of mean sea level are usually unknown. In addition to the ellipsoidal and orthometric heights, several geoid models with their uncertainties are used in our experiments. These are the time-wise release 4 GOCE geoid, the newest gravimetric geoid in North America CGG2013, and EGM2008. Both simulated and model error information is used. Results from our analysis with coastal data suggest that the error of the estimated height datum offsets in Canada can be reduced to the level of one decimetre while the corresponding error in USA is reduced to 6 cm.