

GRAV-D: Using Aerogravity to Produce a Refined Vertical Datum

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SUMMARY

The National Geodetic Survey holds primary responsibility for maintaining access to the National Spatial Reference System inside the United States for all commercial, engineering, and scientific applications. This includes the geometric and vertical datums. In 2022, the NGS intends to update the existing datums, NAD 83 and NAVD 88, respectively. The topic of this paper focuses specifically on the impending vertical datum, which will be realized through GNSS technology and a gravimetric geoid model. This geoid model will be based on GRACE, GOCE and other satellite models to be consistent with the World Height System being established through cooperative efforts in the International Association of Geodesy. However, the existing surface gravity data is replete with systematic errors that degrade the derived vertical heights dm-level uncertainty. The Gravity for the Redefinition of the American Vertical Datum (GRAV-D) Project has collected data over nearly half the U.S. states and territories. Significant portions of this data have now been absorbed into a regional geoid height model that spans nearly a quarter of the Earth's surface centered on North America. The aerogravity data bridge the gap in scales between the signal determined from satellite observations and that from the surface data. Significant (dm-level) errors in the geoid derive from biases in surface gravity surveys that span regions below the scale of resolution for GRACE or GOCE missions. Hence, the aerogravity have been required to implement a refined model that is more consistent. The resulting model has been placed online for inspection of proposed new vertical heights for select regions. Several prominent errors have been detected primarily in the littoral regions, where the impact on heights along the shoreline is most significant. Efforts continue to develop more refined techniques for combining these data with a goal of providing the model by 2022 shortly after completion of final aerogravity collection.