



## Advances and Best Practices in Airborne Gravimetry from the U.S. GRAV-D Project

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The Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project, an official policy of the U.S. National Geodetic Survey as of 2007, is working to survey the entire U.S. and its holdings with high-altitude airborne gravimetry. The goal of the project is to provide a consistent, high-quality gravity dataset that will become the cornerstone of a new gravimetric geoid and national vertical datum in 2022. Over the last five years, the GRAV-D project has surveyed more than 25% of the country, accomplishing almost 500 flights on six different aircraft platforms and producing more than 3.7 Million square km of data thus far. This wealth of experience has led to advances in the collection, processing, and evaluation of high-altitude (20,000 – 35,000 ft) airborne gravity data. This presentation will highlight the most important practical and theoretical advances of the GRAV-D project, giving an introduction to each. Examples of innovation include: 1. Use of navigation grade inertial measurement unit data and precise lever arm measurements for positioning; 2. New quality control tests and software for near real-time analysis of data in the field; 3. Increased accuracy of gravity post-processing by reexamining assumptions and simplifications that were inconsistent with a goal of 1 mGal precision; and 4. Better final data evaluation through crossovers, additional statistics, and inclusion of airborne data into harmonic models that use EGM08 as a base model. The increases in data quality that resulted from implementation of the above advances (and others) will be shown with a case study of the GRAV-D 2008 southern Alaska survey near Anchorage, over Cook Inlet. The case study's statistics and comparisons to global models illustrate the impact that these advances have had on the final airborne gravity data quality. Finally, the presentation will summarize the best practices identified by the project from its last five years of experience.