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# Direct Comparison of TAGS 7 and TAGS Relative Airborne Gravimeters with USA GRAV-D Data

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The U.S. National Geodetic Survey's (NGS) Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project is collecting airborne gravity data to support a 1 cm geoid. Started in 2008, this project will collect airborne gravity data over the entire U.S. and territories by 2022. As of December 2017, the project was over 65% complete. NGS has recently purchased and started using an upgraded Micro-g LaCoste Turn-key Airborne Gravity System (TAGS) 7. This paper will provide results from the first side-by-side comparison of the TAGS 7 and the older TAGS model.

NGS initially purchased the TAGS 7 because of its smaller, lighter design, which enabled it to fit on an optionally piloted aircraft with tighter size restrictions. However, this gravimeter also includes improvements to the sensor and platform design that should improve data quality. This includes a low-drift, zero-length spring gravity sensor, a full feedback beam, improved GPS and gravity timing, new gimbal technology, improved temperature control, and an increased data rate from 1 Hz to 20 Hz.

It is important to understand how the improvements in this technology perform in field conditions. One challenge with airborne gravity measurements is that it is impossible to replicate the exact same conditions even when flying the exact same flight path. This creates challenges comparing data from two flights even if you use the same aircraft and the same gravimeter. Those challenges increase significantly if two different gravimeters are used. To address this we used a Pilatus aircraft that is large enough to install both gravimeters side-by-side on the same aircraft and collect contemporaneous data. This eliminates variations in weather conditions as a factor and allows for a more accurate comparison. NGS conducted the flights in January through March of 2018 out of Tulsa, Oklahoma. Since most manufacturers test airborne gravity instruments in the lab and ground vehicles, this analysis is critical to understanding the impacts to gravimeter technology improvements on airborne data collection and quality.