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Error analysis of the airborne gravity data collected over Alabama in 2008

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Airborne gravity data collected at 3 altitudes (1700, 6300 and 11000m) over Alabama in 2008 has been re-processed using various software at NGS. Initial analysis indicates that the airborne gravity coming out of the gravimeter is of high quality; with the RMS values of the crossovers being 1.6, 1.9 and 2.1 mGal for data at 1700, 6300 and 11000m altitude, depending somewhat on the exact software and methodology used. To have a better understanding of the characteristics of the errors, the airborne gravity sets are inter-compared at the highest altitude 11000m and the lowest altitude 1700m by upward/downward continuing the gravity sets at different altitude using Poisson integral, 3D Fourier series and spherical harmonic series.

The comparisons reveal some interesting issues with the reprocessed airborne gravity, such as a software-independent bias at the 11000 km altitude, whose cause and characteristics are being investigated. Furthermore, the 11000 km altitude flights were taken at 5 km spacing, while the lower flights were at a 10 km spacing, and the information gain from this denser line spacing is investigated. In addition, to understand the data accuracy by frequency band, the airborne gravity data also compared with NGS surface gravity data at different frequency bands at three altitudes. The impact of the flight heights on the geoid is also investigated.