Wide Bandwidth Airborne Gravity

Dr. Mark Dransfield (Fugro Airborne Surveys)

Airborne gravity gradiometry has become an accepted and established method of acquiring high-resolution gravity. The FALCON airborne gravity gradiometer (AGG) technology is now available for oil and gas exploration. This provides for a dramatic improvement in gravity quality over that available from airborne gravimeters and the use of AGG systems in oil and gas exploration is expected to grow.

AGG systems produce measurements of the earth's gravity gradient and values of the earth's gravitational acceleration, calculated from the gradients, are very accurate. At wavelengths below 1 km, accuracies can be better than 0.2 mGal. However this error increases with wavelength, initially increasing only slowly (as the square root of the wavelength) but increasing more rapidly at wavelengths greater than the width of the survey area if there are substantial sources of gravitational signal outside but adjacent to the survey area.

Boggs and Dransfield (2004) have reported on the use of sparse samples of surface gravity to conform the AGG survey gravity onto a regional field. This approach is not always practical.

In early 2008, the National Geospatial-Intelligence Agency (NGA) of the United States of America released Earth Gravity Model 2008 (EGM2008) and the Danish National Space Centre released DNSC08, a world-wide gravity data set derived from the combination of EGM2008 and satellite-derived gravity. Typical RMS errors in DNSC08 are less than 3 mGal at wavelengths above 20 km.

The combined use of FALCON gravity gradiometry and the DNSC08 model is compared with ground gravity to demonstrate that it is now possible to acquire very wide bandwidth gravity data from order 100 m to absolute gravity.

References

Boggs, D. B. & Dransfield, M. H. 2004, Analysis of errors in gravity derived from the FALCON airborne gravity gradiometer: in Lane, R. *(ed.) Airborne Gravity 2004 - Abstracts from the ASEG-PESA Airborne Gravity 2004 Workshop, Geoscience Australia Record 2004/18*, 135-141.

Andersen O. B., Knudsen, P., Berry, P., Freeman, J., Pavlis, N., Kenyon, S., 2008, The DNSC08 ocean wide altimetry derived gravity field. Presented EGU-2008, Vienna, Austria, April, 2008.