

Local Geoid Modelling by Multiple Regression Equations and a Comparison with *AUSGeoid98*

Degree:	Honours
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Entry:	Bachelors degree in geoscience, physics, mathematics, or any related discipline, or invited entry to the Honours program in the Department
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Project Funding:	Western Australian Centre for Geodesy
Student Funding:	The student will receive some assistance with the costs of thesis production and photocopying
Resources:	Some software, GPS-levelling data, AUSGeoid98
Collaboration:	Geoscience Australia, Western Australian Department of Land Administration
Starting Date:	Unrestricted

Project Description:

Given sufficient GPS measurements at Australian Height Datum (AHD) benchmarks, it is possible to geometrically create a model of the geoid (cf Friedlieb et al., 1997). However, these geoid heights are only defined at discrete points and it is necessary to interpolate these to unknown positions. Given that this essentially represents a datum transformation, multiple regression equations (Applebaum, 1982) can be used for this purpose. This will allow the separation of the reference ellipsoid and the base of the AHD to be defined, which is expected to be superior to a pure gravimetric geoid for the transformation of heights (Featherstone, 1998 and 2000).

This project will refine an existing 16-parameter multiple regression equation to increase the number of parameters modelled and introduce statistical testing on the significance of the determined parameters. This software will first be tested on the METROFIX GPS network in the Perth metropolitan region and compared with the AUSGeoid98 gravimetric geoid model. If time permits, this will then be extended over the whole of Australia using a nation-wide GPS-AHD data set comprising 1013 points (Featherstone and Guo, 2001).

The multiple regression equation, if superior to the gravimetric geoid model, can be stored as a simple algorithm in map software, thus allowing the efficient conversion of GPS heights to the AHD. This work is new to Australia, though previous successful attempts have been used in Singapore.

Further reading:

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- Freidlieb, O.J., W.E. Featherstone and M.C. Dentith (1997) A WGS84-AHD profile over the Darling Fault, Western Australia, *Geomatics Research Australasia*, 67: 17-32.