Regional Gravimetric Geoid Determination for Australia based on new mathematical Models and new Data Sources

Degree:	PhD
Keywords:	geodesy, geoid, gravity, GPS-heighting, Australian Height Datum
Entry:	Bachelors, preferably 1st class Honours, Postgraduate Diploma or Masters degree in geoscience, physics, mathematics, or any related discipline
Supervisor:	Professor Will Featherstone (W.Featherstone@curtin.edu.au), Western Australian Centre for Geodesy, Department of Spatial Sciences, Curtin University of Technology
Project Funding:	Australian Research Council, Western Australian Centre for Geodesy
Student Funding:	Department of Spatial Sciences Scholarship
Resources:	Australian gravity and terrain data, global geopotential models, geoid computation software, Australian GPS and AHD data
Collaboration:	Geoscience Australia
Starting Date:	Unrestricted

Project Description:

The determination of the Australian geoid has attracted the attention of geodesists for over three decades. This is not only because it is a challenging problem, but also because it is subject to continual advances in geoid determination theory and the data available to compute gravimetric geoid models. This continues today with the release of additional gravity data, improved marine gravity anomalies from satellite radar altimetry, new digital elevation models (such as the Shuttle radar topography mission), airborne gravity and gravity gradiometry data (eg from BHPB's Falcon gravity gradiometer), and probably most importantly, improved long-wavelength geoid information from the current and planned dedicated satellite gravity field missions (i.e., GRACE, CHAMP and GOCE). In parallel, several new or refined theories have been proposed for the determination of the geoid.

The proposed project will involve research into the determination of a new Australian geoid model that advances upon the most recent model, AUSGeoid98 (Featherstone et al., 1998), and takes into account the availability of new datasets and new/refined geoid determination theories. Examples of novel work that can be conducted include the optimal use of modified kernels to compute the geoid, the inclusion of airborne gravity gradiometry data, and the computation of more sophisticated terrain and downward continuation corrections.

Recommended Reading:

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Featherstone, W.E. (2001) Comparison of recent satellite altimeter-derived gravity anomalies with one another, EGM96 and ship-borne gravimetry around Australia, *Geophysical Journal International* (submitted)

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Kirby, J.F., W.E. Featherstone and A.H.W. Kearsley (1997) Geoid computations using ring integration: gridded versus point data, *Geomatics Research Australasia*, 67: 33-46.

Vaníček, P., J.L. Huang, P. Novàk, S.D. Pagiatakis, M. Véronneau, Z. Martinec, W.E. Featherstone (1999) Determination of the boundary values for the Stokes-Helmert problem, *Journal of Geodesy*, 73(4): 180-192.