



AND **Locate25** | 
THE NATIONAL GEOSPATIAL CONFERENCE

Presented at the FIG Working Week 2025,
6-10 April 2025 in Brisbane, Australia



FIG

Collaboration, Innovation and Resilience: Championing a Digital Generation

Brisbane, Australia 6-10 April

Least Squares Collocation for Continental Scale Analysis Ready Gravity Data

Neda Darbeheshti and Jack McCubbine (Geoscience Australia)

Nicholas Gowans (NSW Spatial Services)

Alex Woods (Surveyor-General Victoria)



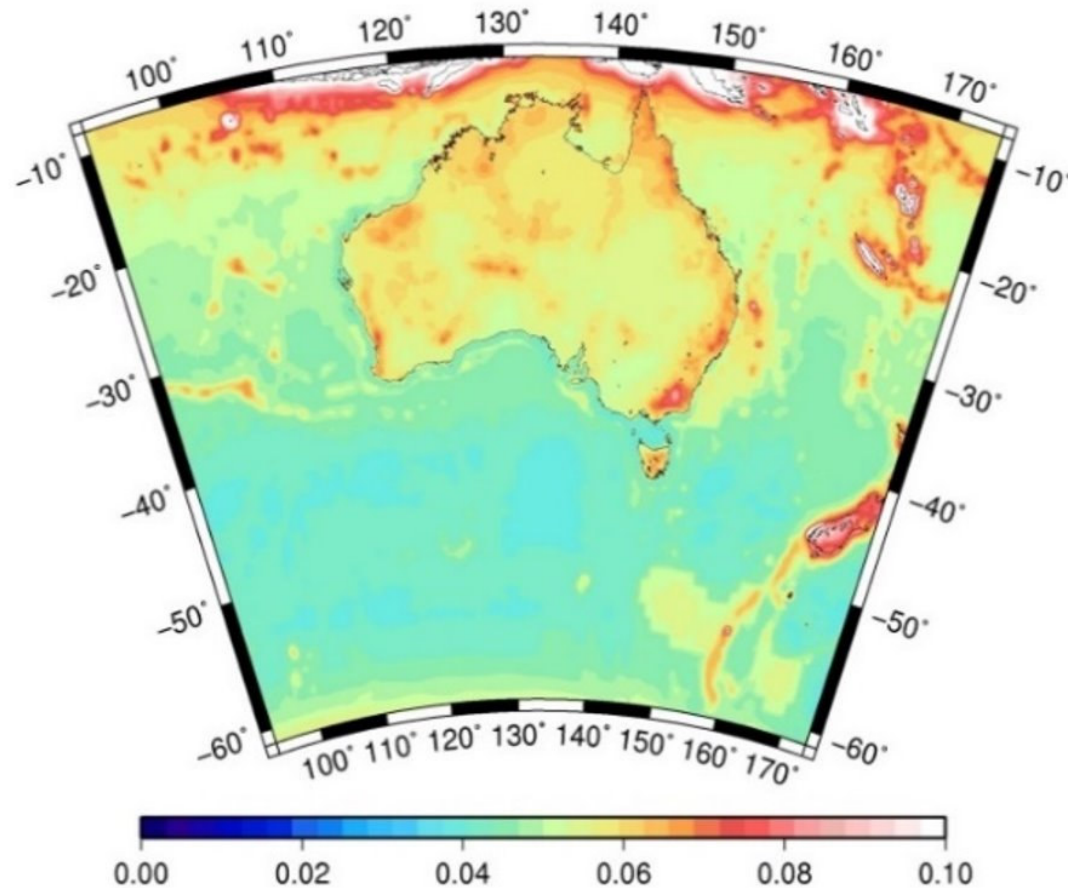
PLATINUM SPONSORS



CHCN AV



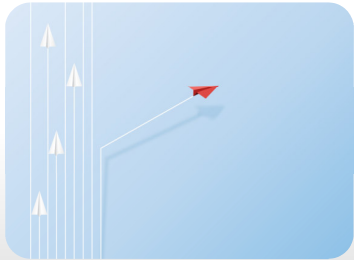
Accurate positioning requires a more accurate geoid.



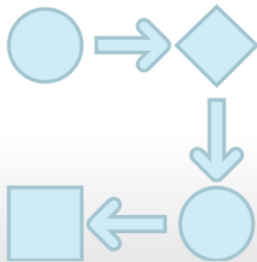
**Australian gravimetric
quasigeoid accuracy is
1 – 8 cm.**

Featherstone et al. (2017), Journal of Geodesy

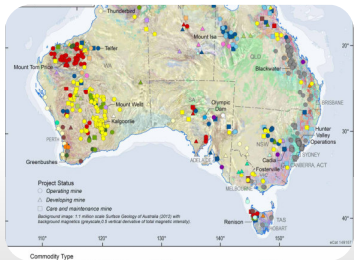
Enhancing positioning accuracy



Infill gaps with airborne gravity data.



Analysis ready gravity data workflow.

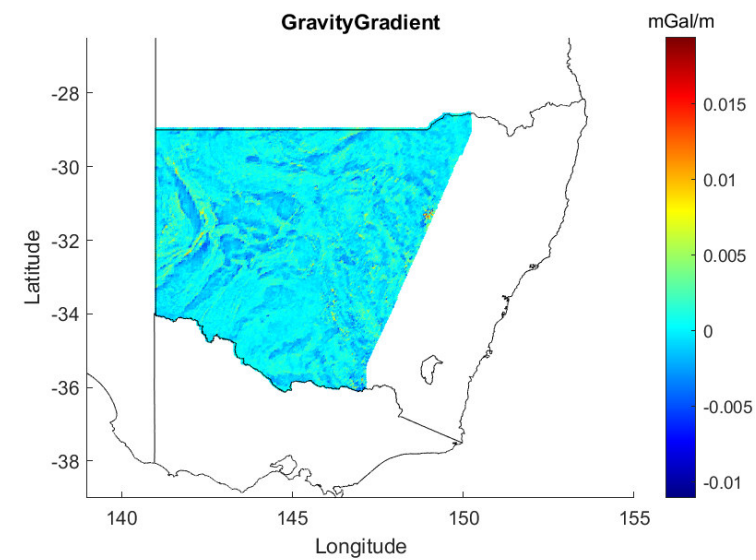
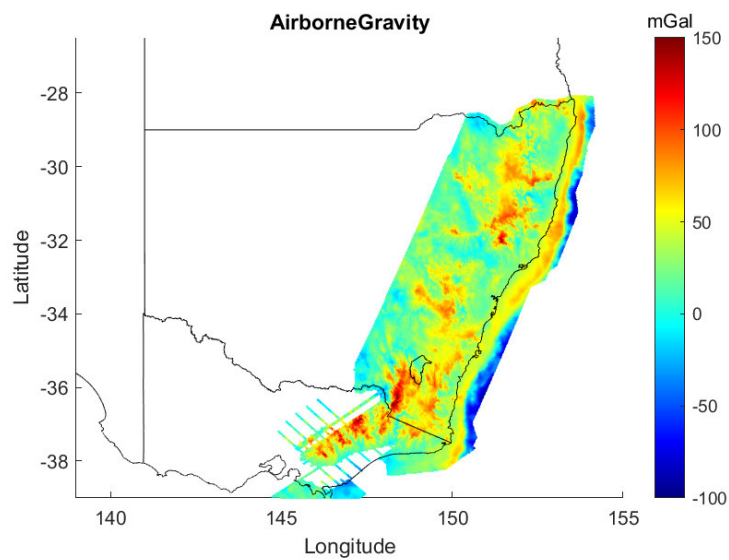
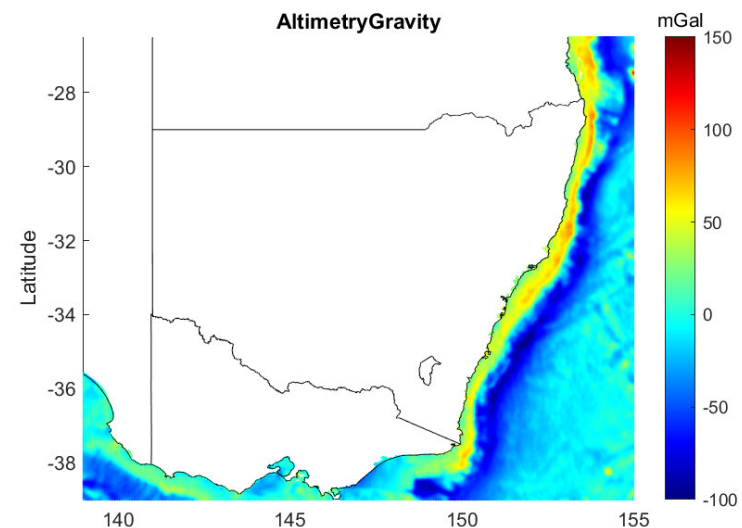
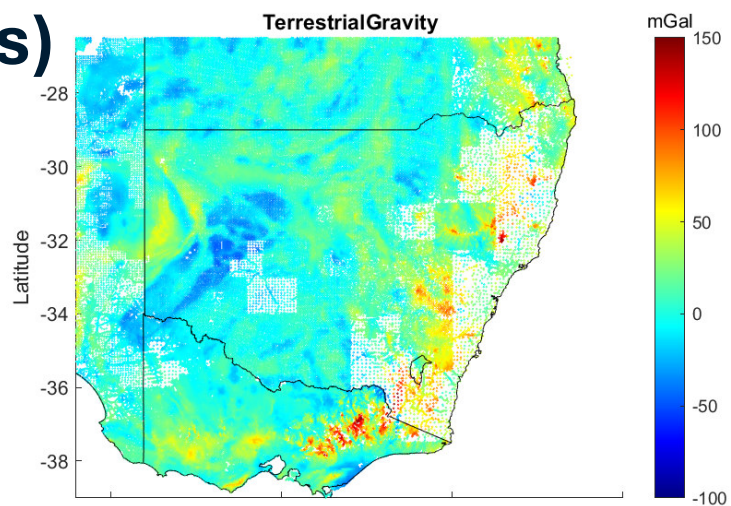


New gravity data benefit the resources sector.

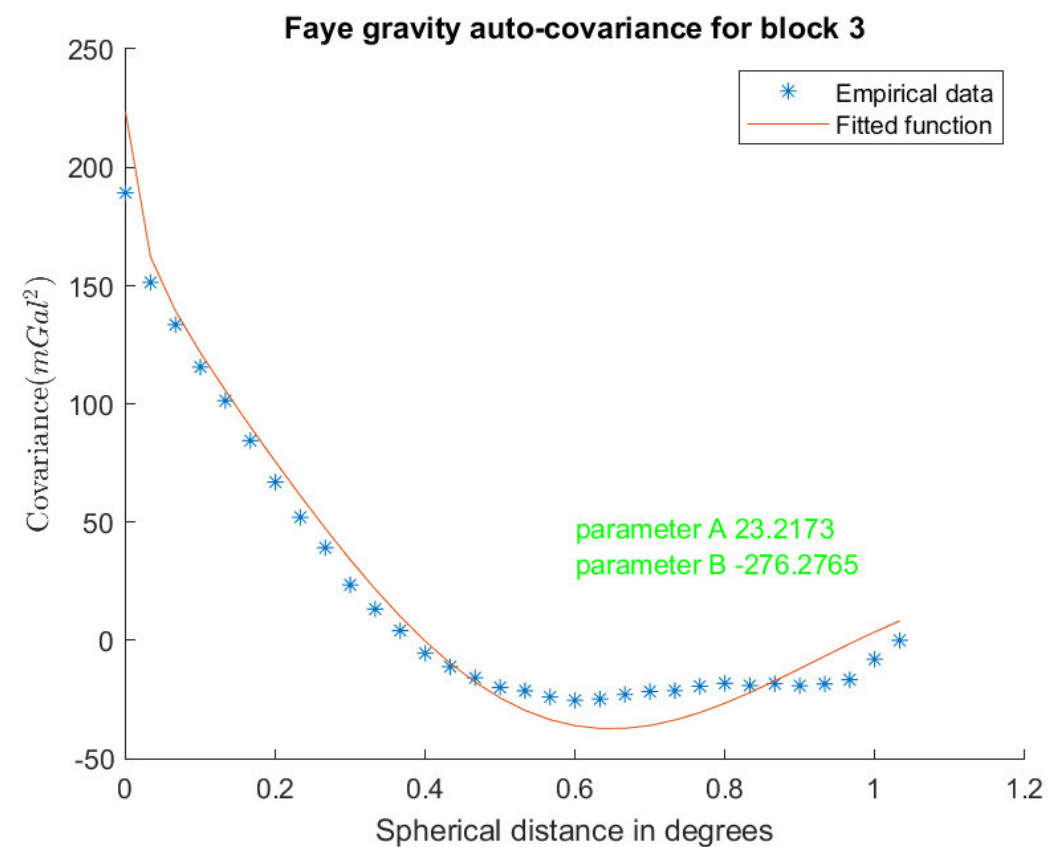
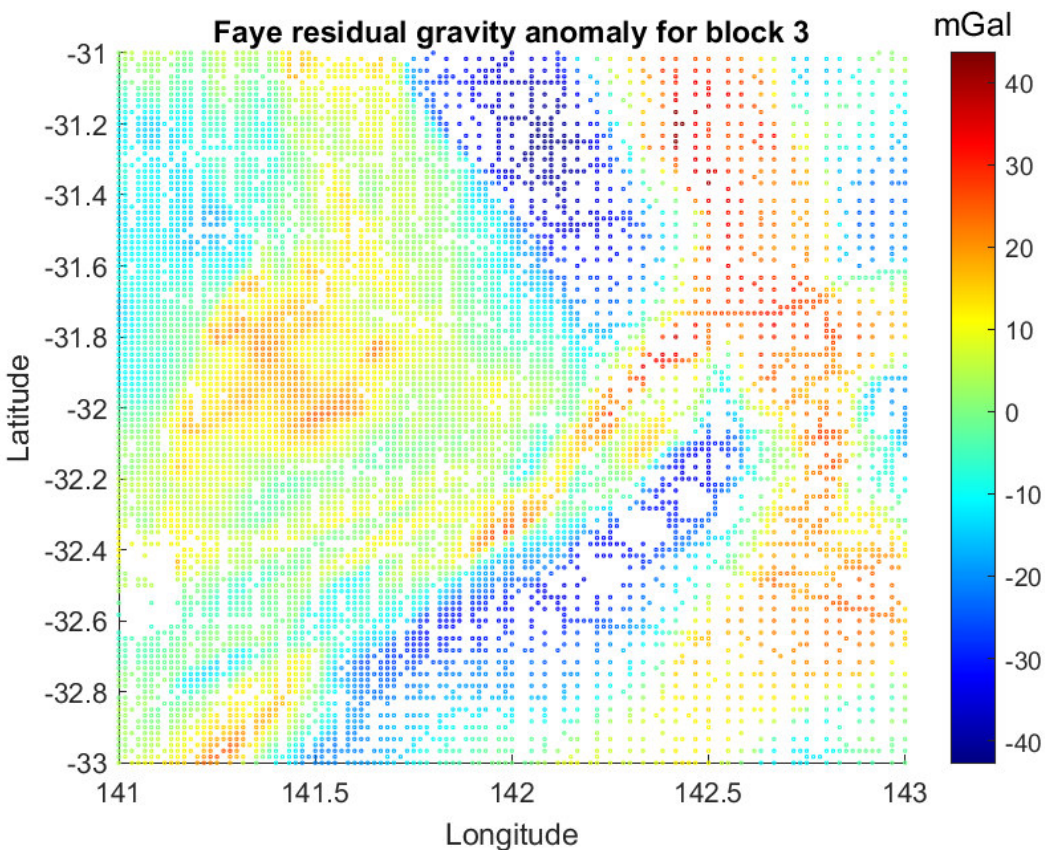
Airborne gravity data



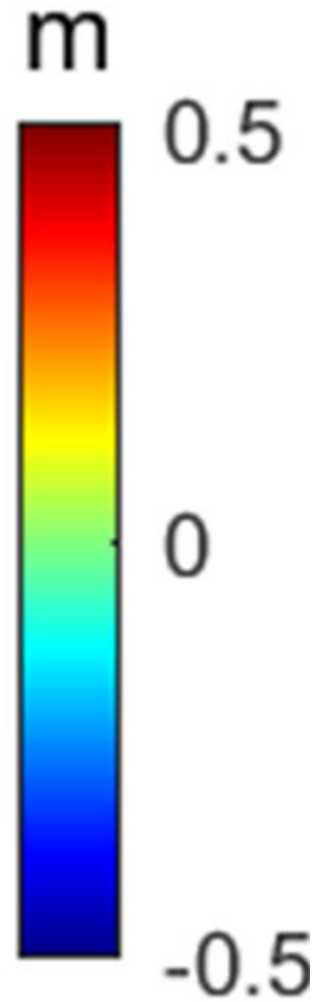
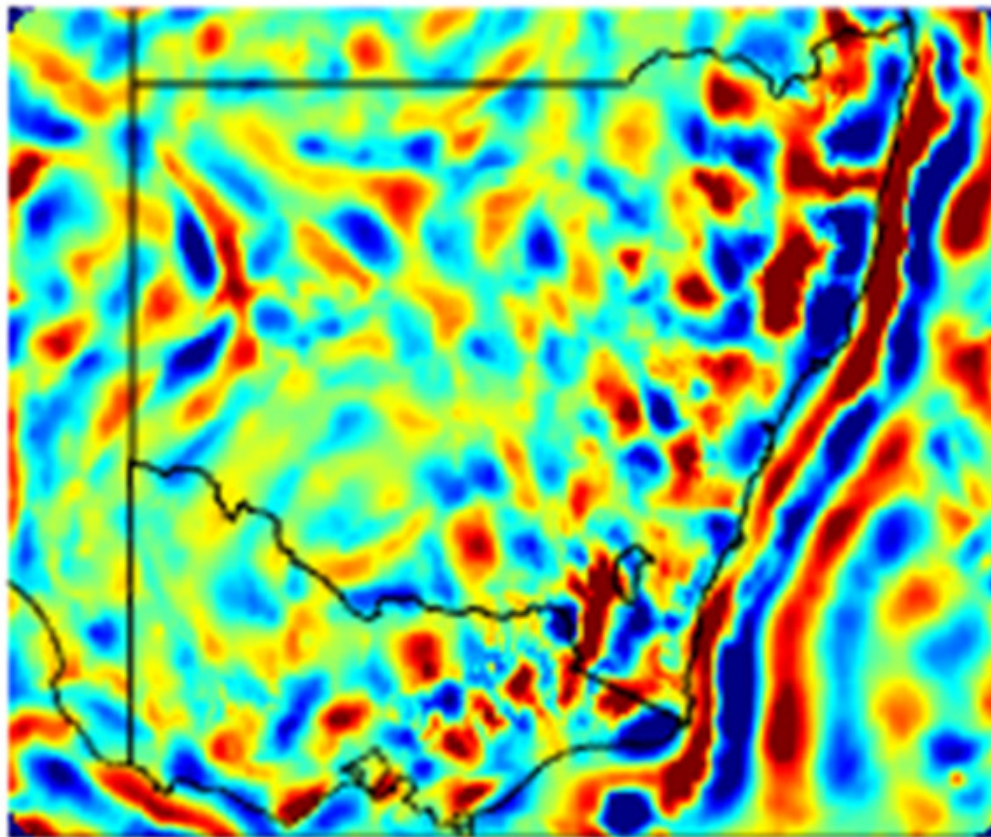
Gravity data (multiple sources)



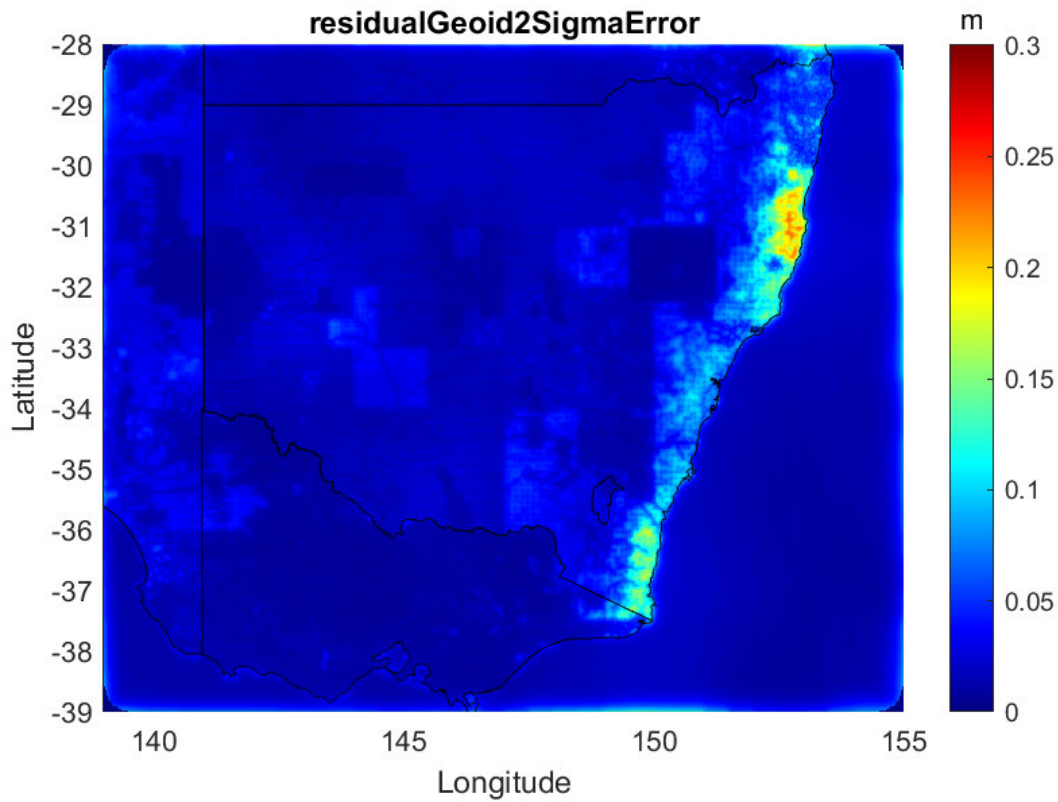
Least squares collocation to compute quasigeoid



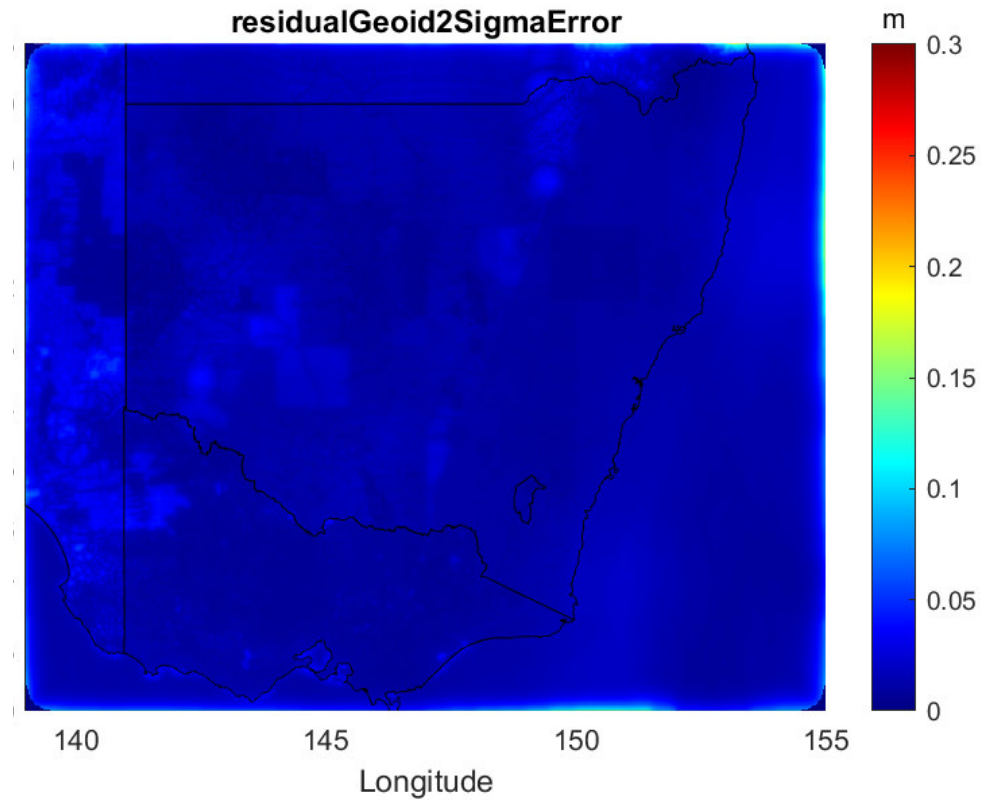
Gridded gravimetric quasigeoid



QuasiGeoid uncertainty



Without airborne data



With airborne data

Mean geoid error reduced by 33.33%

Geoid sigma error (m)	min	max	mean	std
Without airborne data	0.0026	0.1148	0.0114	0.0106
With airborne data	0.0009	0.0864	0.0076	0.0057

Computational statistics

Number of Tiles	660
Computation Time per Tile	~ 3 minutes
Total Computation Time	~29 hours

analysis-ready-gravity-data-workflow Public Edit Pins Watch 3 Fork 0 Star 1

main 1 Branch 1 Tags Go to file Add file Code

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RunDemo.m	news	4 days ago

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Analysis Ready Gravity Data Workflow

About

Analysis ready data for gravity observations is a set of Matlab files to calculate gravimetric quasigeoid.

gravity geoid

- Readme
- CC0-1.0 license
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- 3 watching
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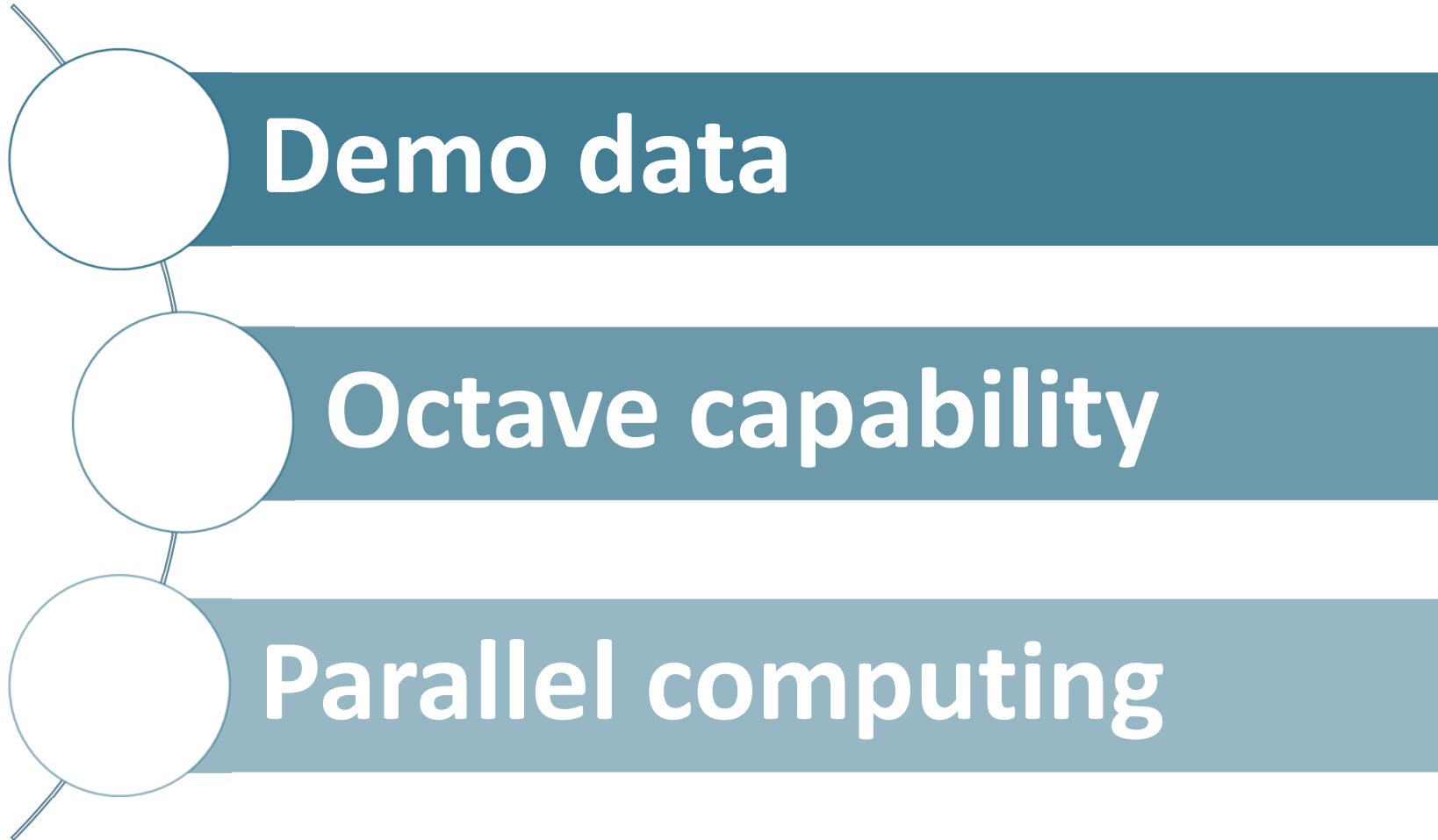
Releases

1 tags
[Create a new release](#)

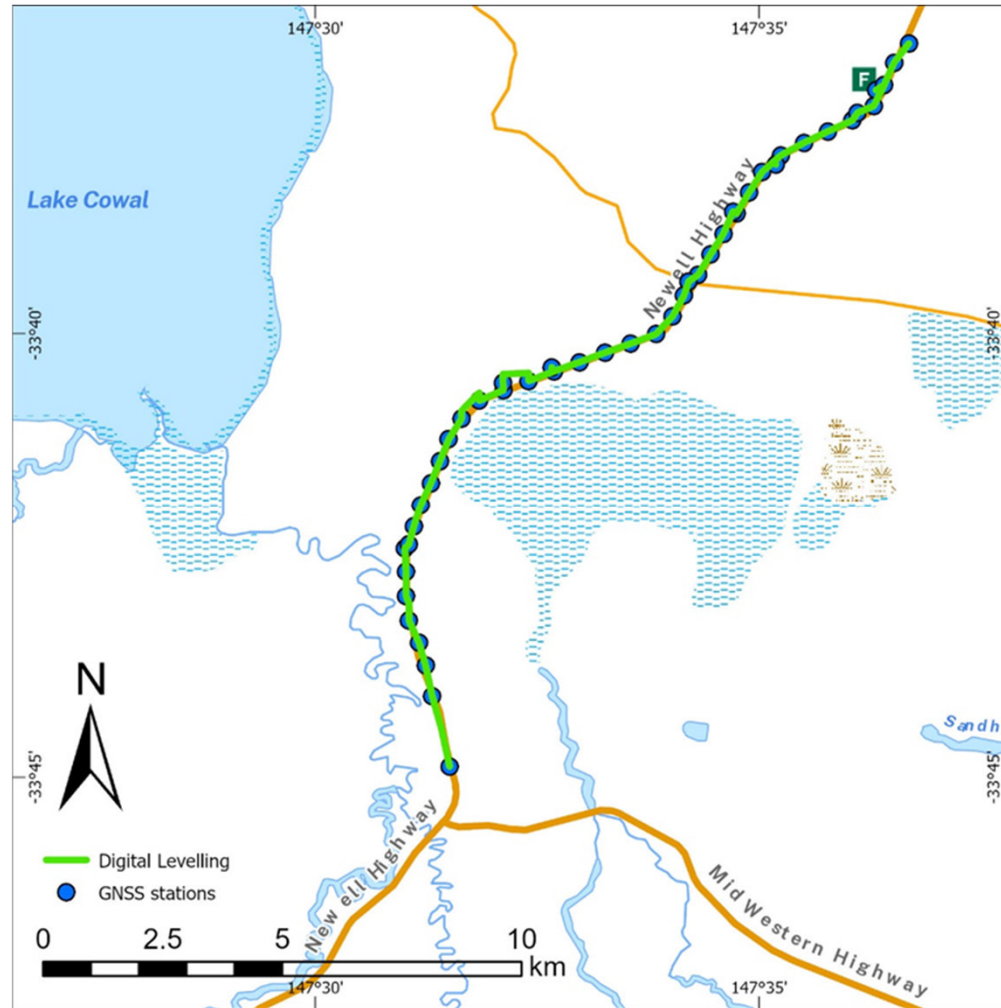
Packages

No packages published

Key features of software

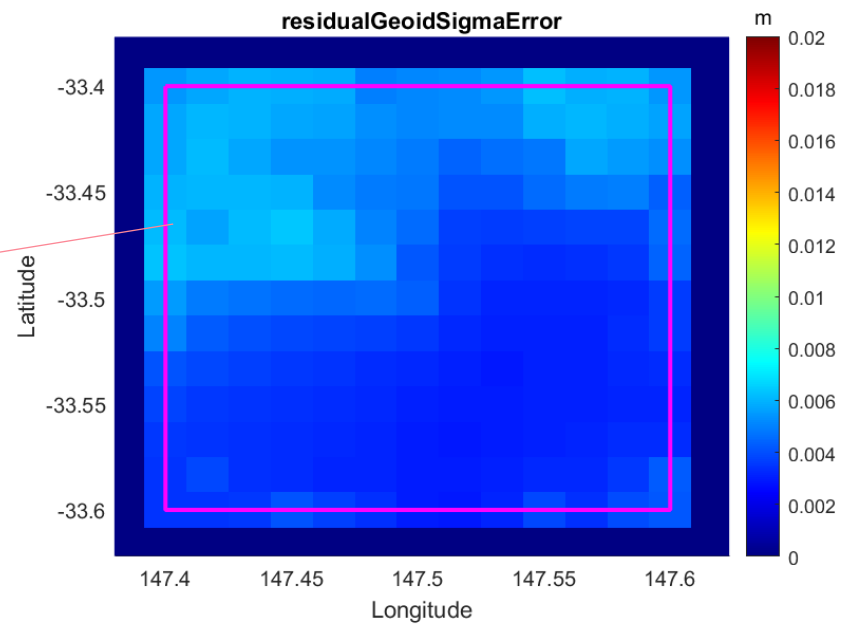
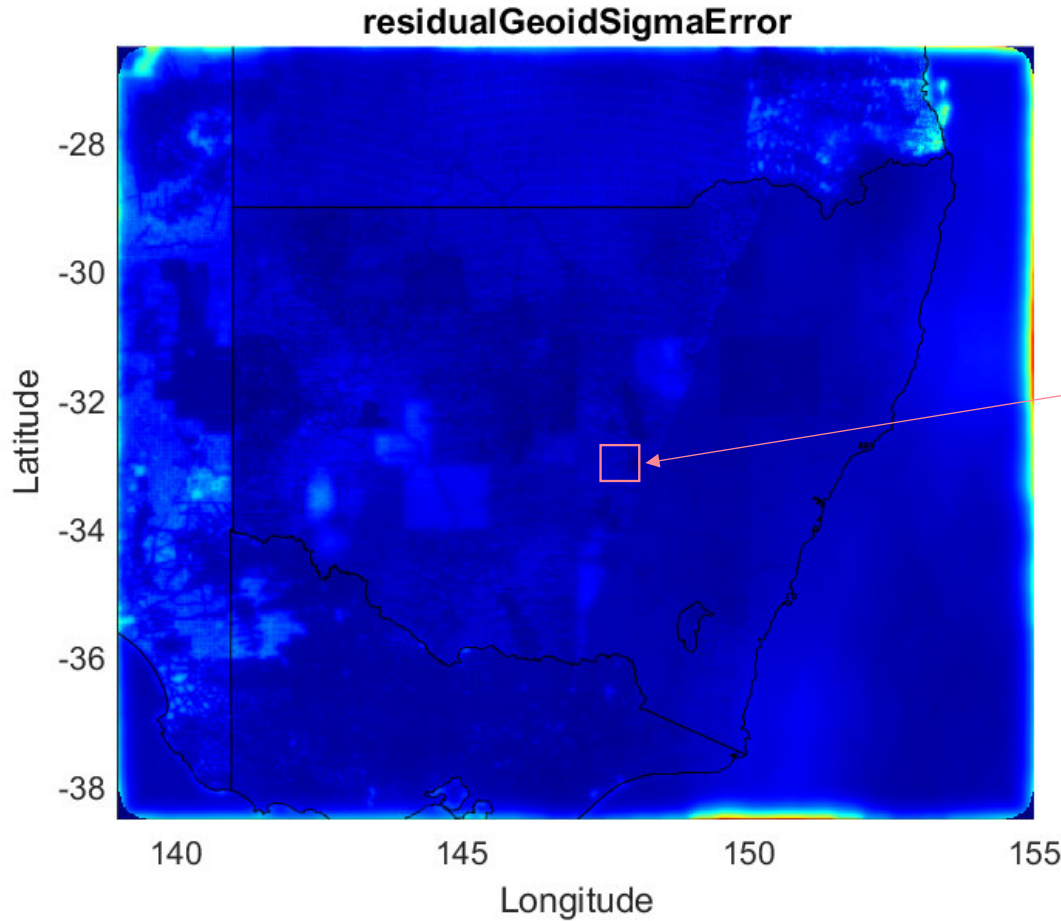


GNSS and Digital Levelling Along a 17 km Highway Section in Marsden, New South Wales



Study area for GNSS-levelling test

JM

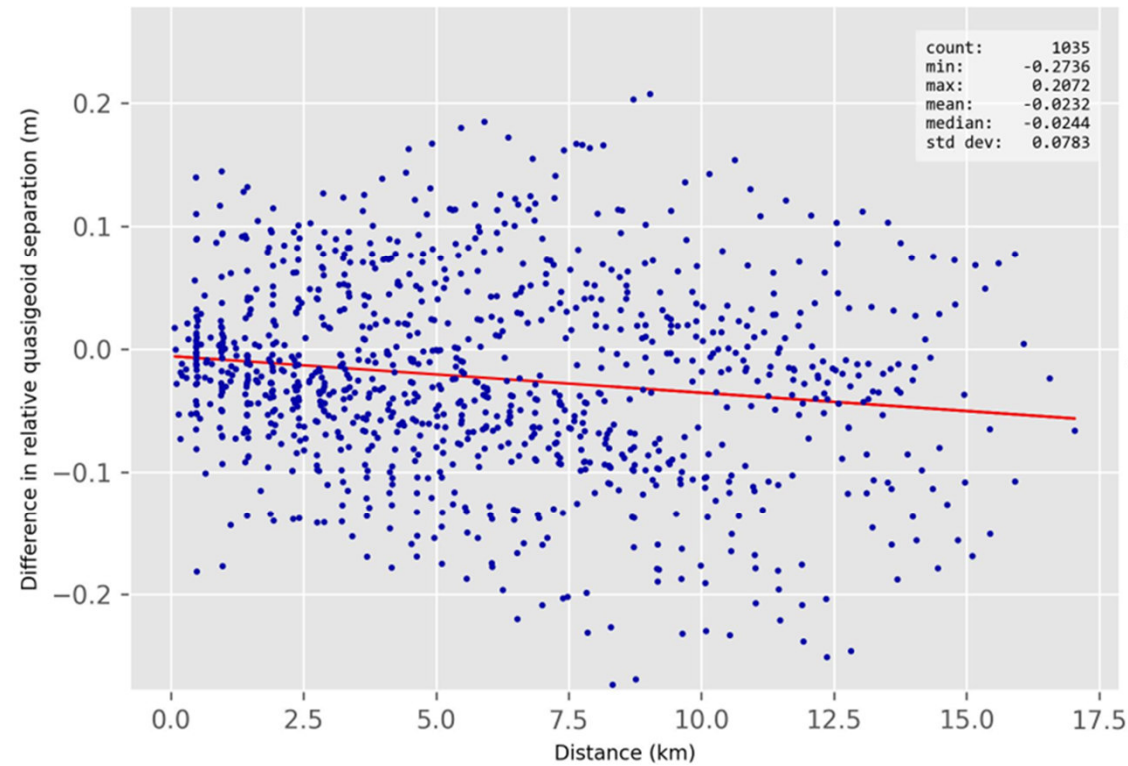


Slide nummer 14

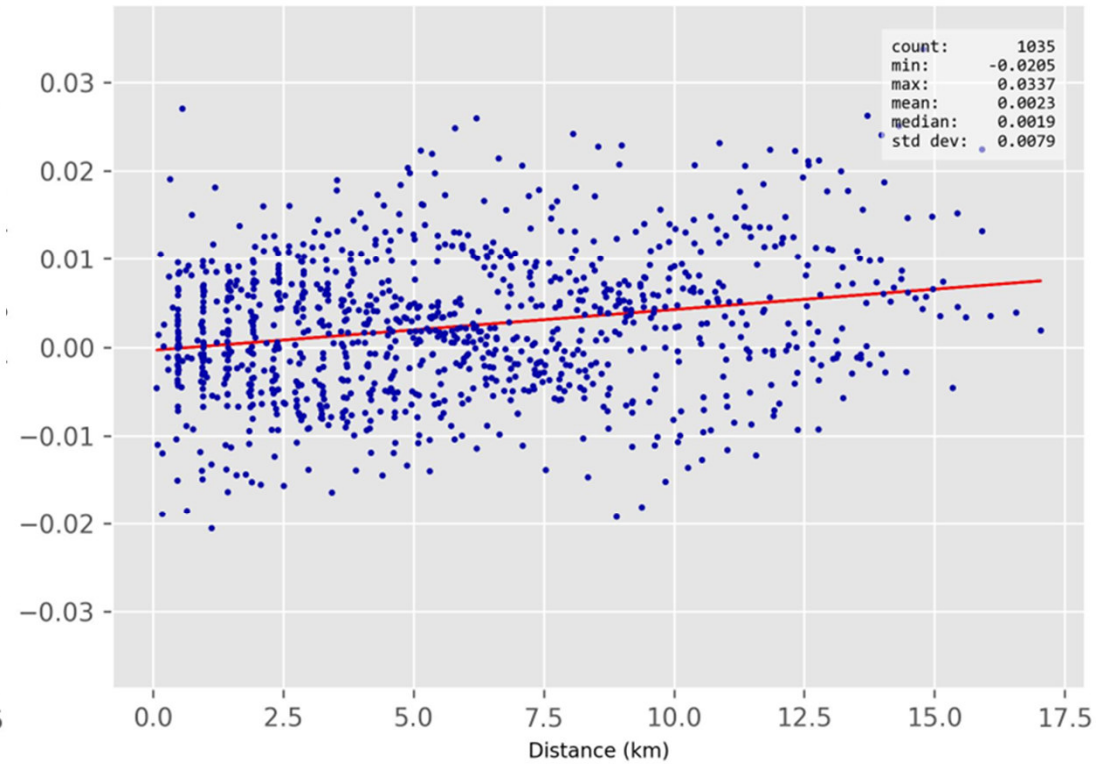
JM1 Might be good to change the colour bar so the variation in the image is a bit more apparent.

Jack McCubbine; 2025-04-01T23:17:47.870

An Order of Magnitude Improvement Over Previous Versions of the AGQG



AGQG v20201120 (Without airborne data)



AGQG v20250102 (With airborne data)

Acknowledgment

This work was enabled by:

- ❖ AuScope and the Australian Government via the National Collaborative Research

Infrastructure Strategy: auscope.org.au.  **AuScope** |  **NCRIS**
National Research Infrastructure for Australia
An Australian Government Initiative

- ❖ New South Wales State Government Spatial Services for funding the airborne data collection.

- ❖ Victoria Geological Survey and the Department of Environment, Land, Water and Planning for funding the Victoria data collection.

The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

13 CLIMATE ACTION

2nd relevant SDG

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

3rd relevant SDG

17 PARTNERSHIPS FOR THE GOALS

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals