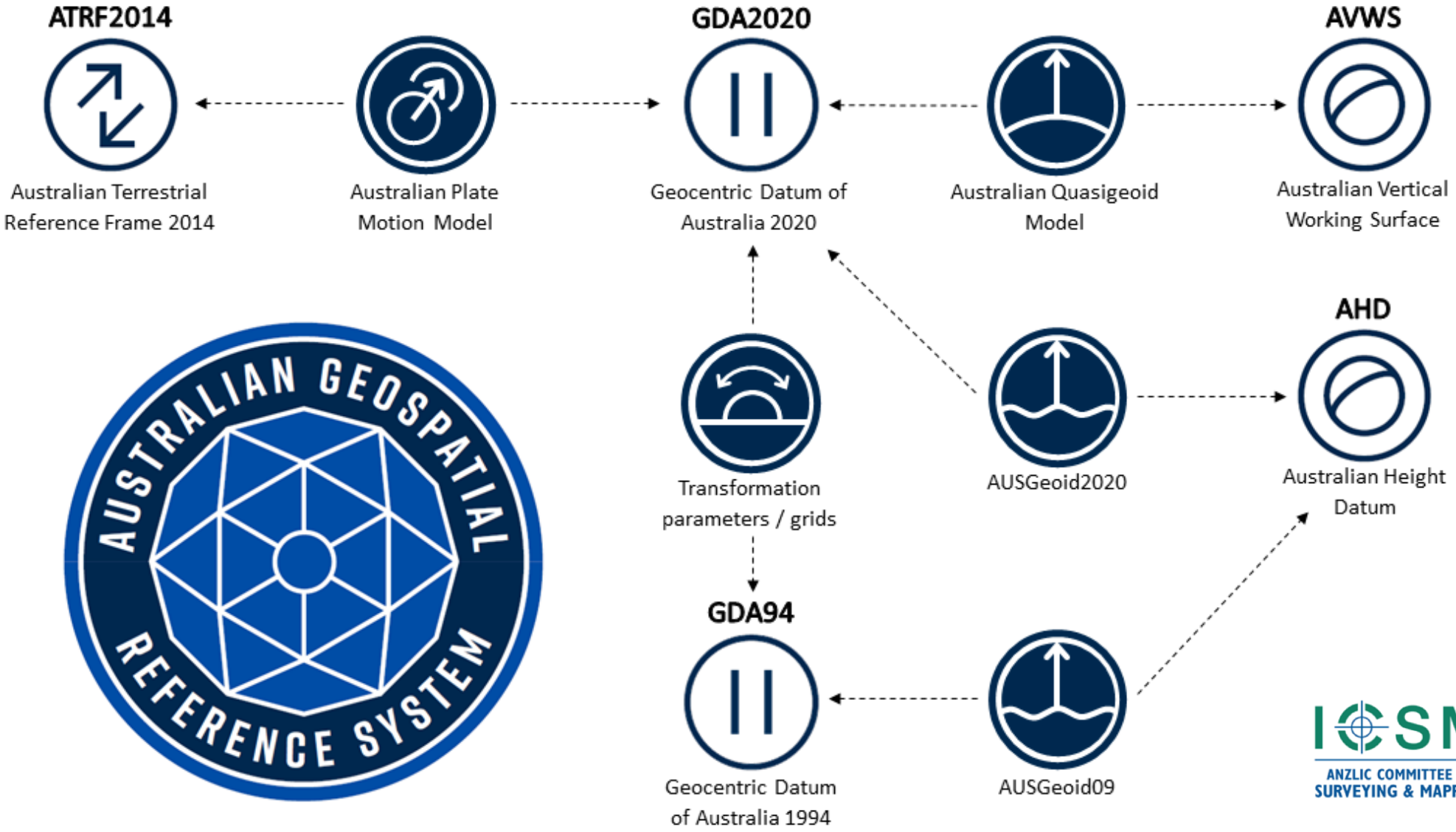
FIG WORKING WEEK 2025
AND Locate25 THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience: Championing a Digital Generation
FIG Geospatial Council of Australia
Brisbane, Australia 6–10 April

The Australian Geospatial Reference System: a modern foundation for precise positioning

Craig Harrison, Umma Zannat, Anna Riddell, Lisa Hall
Geoscience Australia

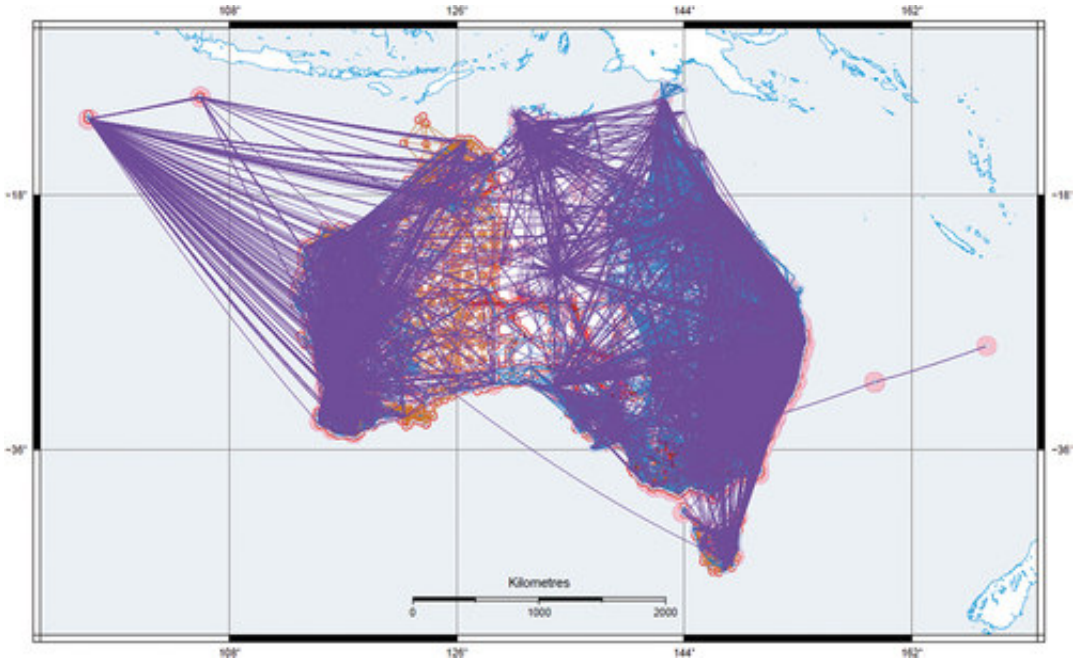
Roger Fraser
Department of Environment, Land, Water and Planning, Victoria

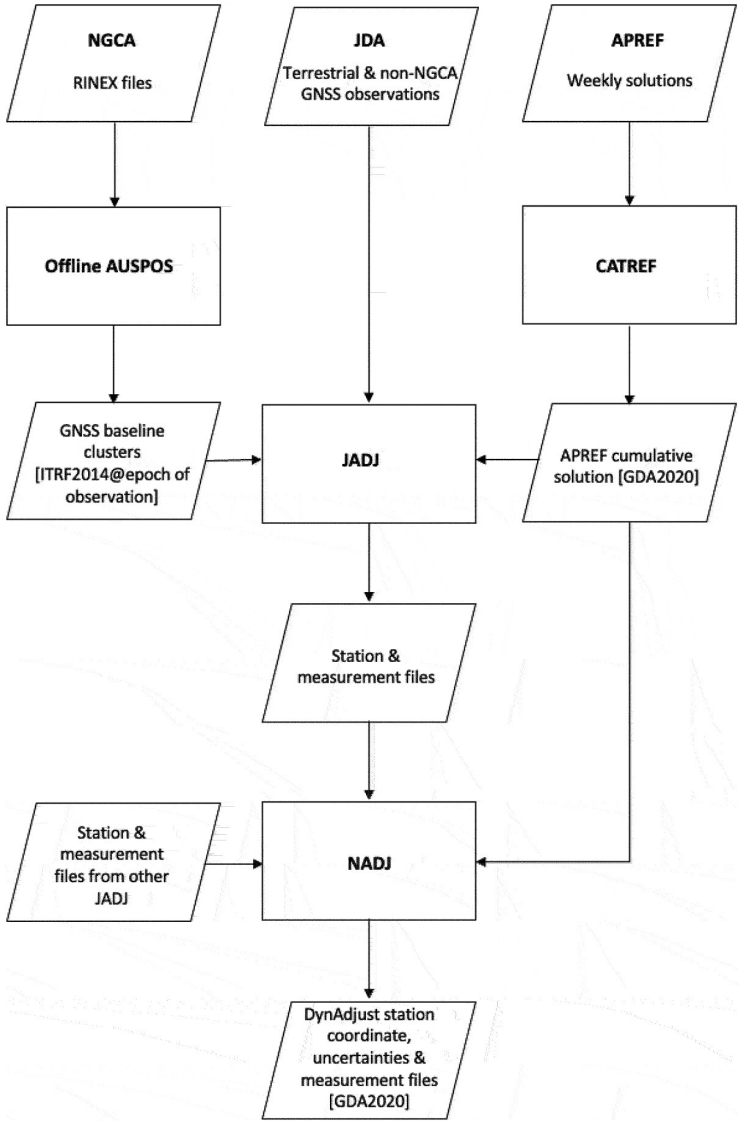
ORGANISED BY FIG Geospatial Council of Australia
PLATINUM SPONSORS Australian Government CHCNAV esri THE SCIENCE OF WHERE Leica Geosystems HiPer Meter Surveyors Australia



GDA2020 update process

Purpose: Produce a distortion-free, rigorous and up-to-date coordinate set for the Australian geodetic network.





National GNSS Campaign Archive (NGCA)

High-Quality Observations: NGCA is a collection of high-quality, 6-hour plus GNSS observations maintained by Geoscience Australia.

Cloud Transition: Recent work has moved the Archive to the cloud and created a user portal.

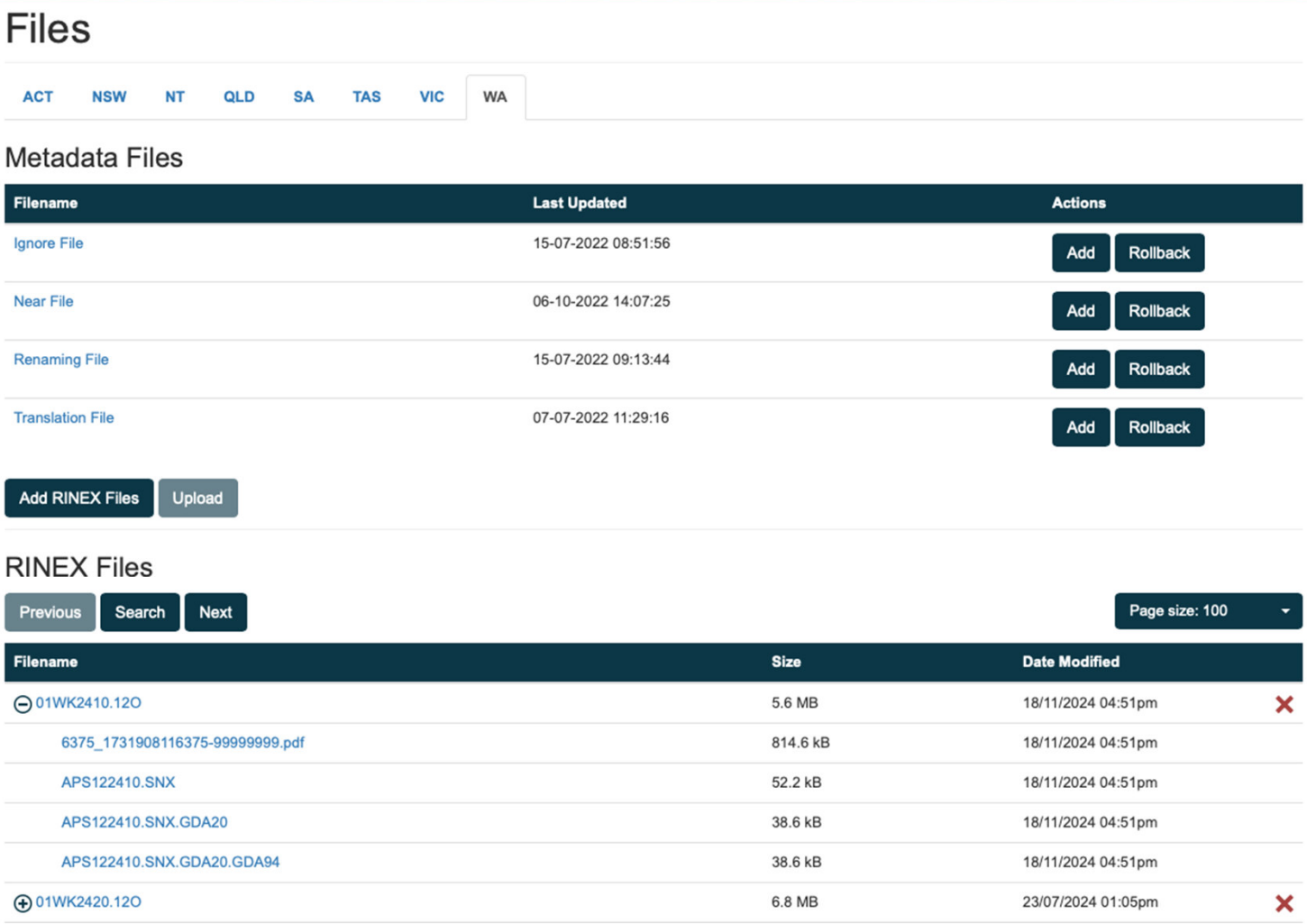
Jurisdictional Control: Jurisdictions have full control of their archive and can submit data collected by surveyors directly into the NADJ.

Workflow Integration: This service is popular with jurisdictions, who have integrated the processing into their workflows.

Australian Government
Geoscience Australia

National GNSS Campaign Archive (Nonprod)

User Portal



AGRS: National Adjustments Future work plan

Build
- Complete external-facing web portal and API development for the stakeholders for authenticated data submission and results retrieval.

Test
- Test single-mark baselines to enhance accuracy and troubleshoot coordinate issues.

Automate
- Implement automated code deployment in the AWS production environment.

DynAdjust uplift
- Refactor DynAdjust scripts, integrating open-source linear algebra and matrix manipulation tool. Optimize DynAdjust compilation speed for improved performance.

Integrate
- Build static binaries for DynAdjust to simplify cross-platform installation.

Release
- Release an updated GeodePy with a generalized transformation tool and Jupyter notebook support.

DynAdjust: least-squares adjustment application

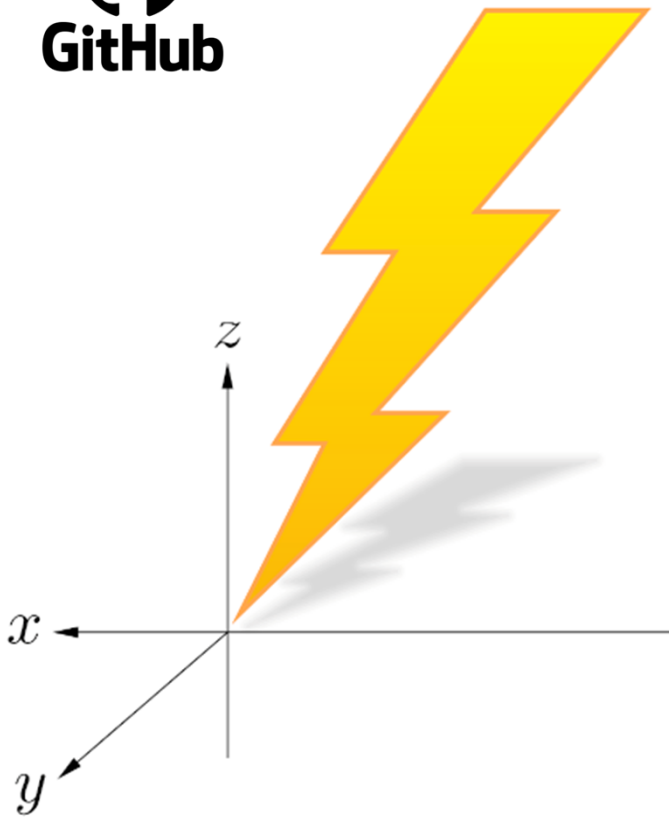
Purpose:

- Generate rigorous coordinates and uncertainties from a continental-sized geodetic network.

Key Benefits:

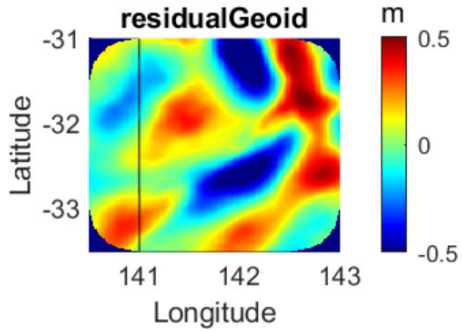
- Efficiency: Automatically segments the network into blocks, improving performance.
- Adaptability: Adjusts to continual station and measurement changes.
- Scalability: Handles 2.5 million measurements and 340,000 stations.
- Precision: Produces accurate coordinates and positional uncertainty.
- Performance: Runs on a compute-optimized AWS instance, minimizing RAM usage.

GitHub



https://github.com/GeoscienceAustralia/DynAdjust

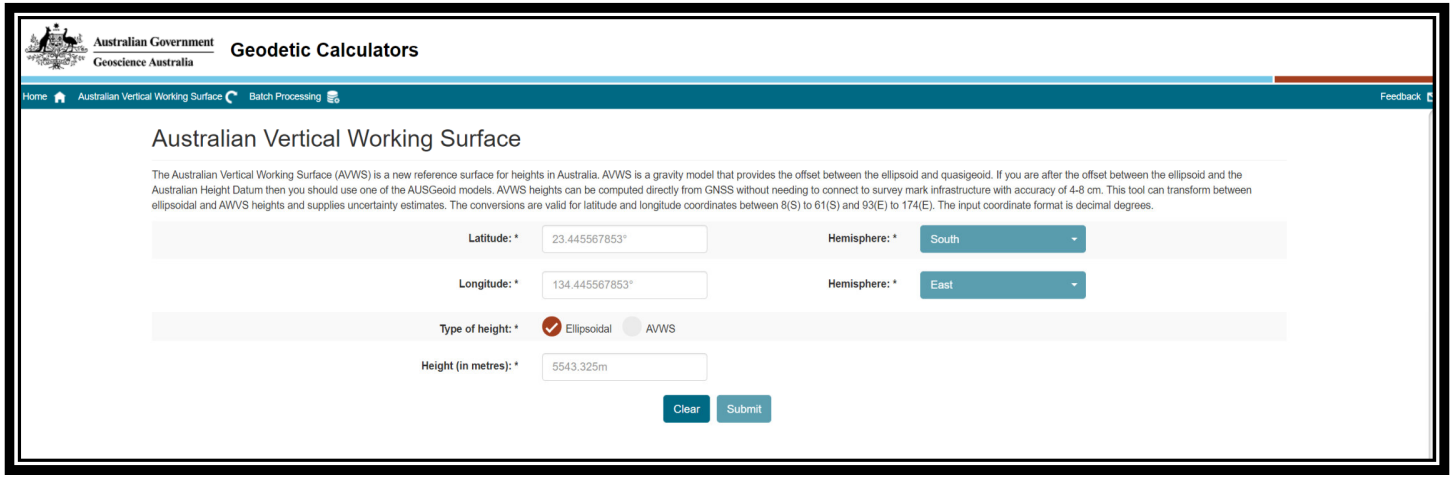
Online tools and code repositories



GitHub:

- https://github.com/GeoscienceAustralia/GeodePy
- https://github.com/GeoscienceAustralia/analysis-ready-gravity-data-workflow

AGRS online tools: https://geodesyapps.ga.gov.au/avws



Summary

- AGRS establishes parameters for latitude, longitude, and elevation throughout Australia, encompassing the necessary infrastructure, models, tools, and standards for precise positioning.
- GDA2020 updated bi-monthly leveraging cloud infrastructure & agile methodologies. Key processes:
  - National GNSS Campaign Archive (NGCA): A repository of high-quality GNSS observations that are maintained and available through a user portal.
  - National Least-Squares Adjustment (NADJ): updates the GDA2020 coordinate set utilizing 2.5 million measurements from 340,000 stations.
- Collaboration through State & Territory Governments, academia, ICSM and international communities (incl. UN-GGIM Subcommittee on Geodesy) are key.
- Future Development: AGRS will continue to evolve, making use of advanced computing capabilities and engaging with stakeholders.

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

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Australian Government
Geoscience Australia

Positioning Australia

Further information

geodesy@ga.gov.au

https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/geodesy/australian-geospatial-reference-system

https://www.icsm.gov.au/australian-geospatial-reference-system