



Australia's National Science Agency

Innovations and Future Directions in the AuScope Virtual Research Environment

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I would like to begin by acknowledging the Traditional Owners of the lands that we're meeting on today, and pay my respect to their Elders past and present.

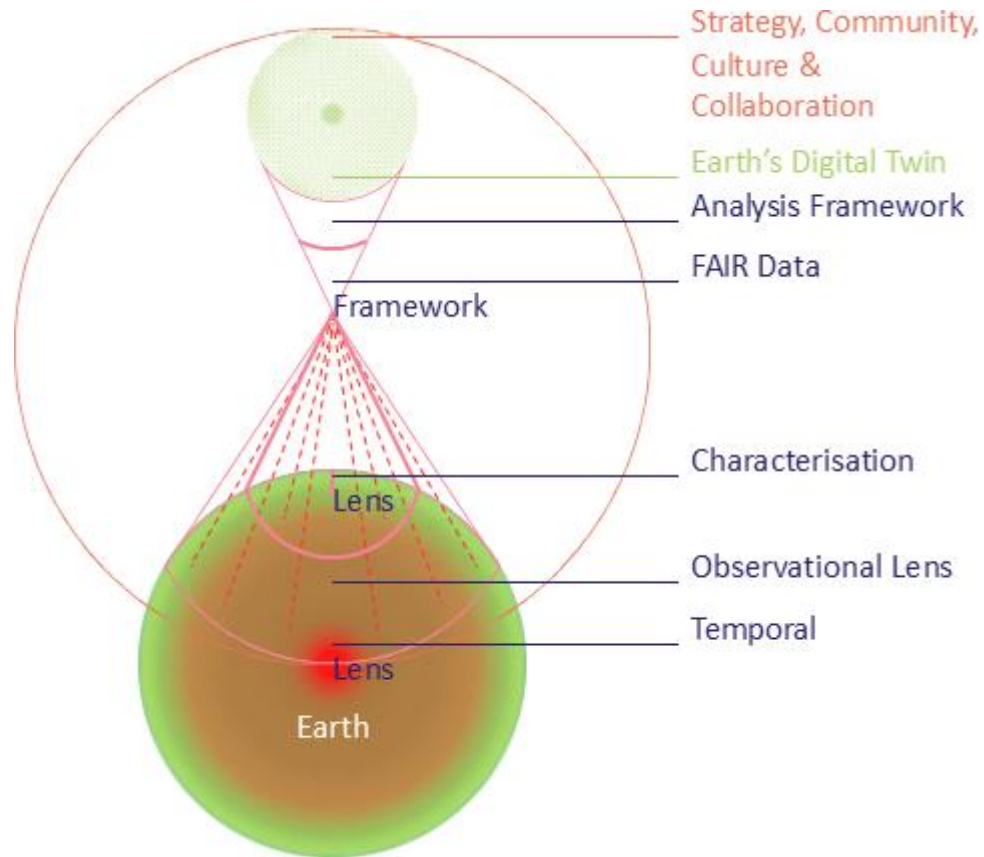


'Eternal Wisdom, Infinite Innovation'
artwork by Rachael Sarra, working with Gilimbaa.



AuScope and AuScope Virtual Research Environment (AVRE)

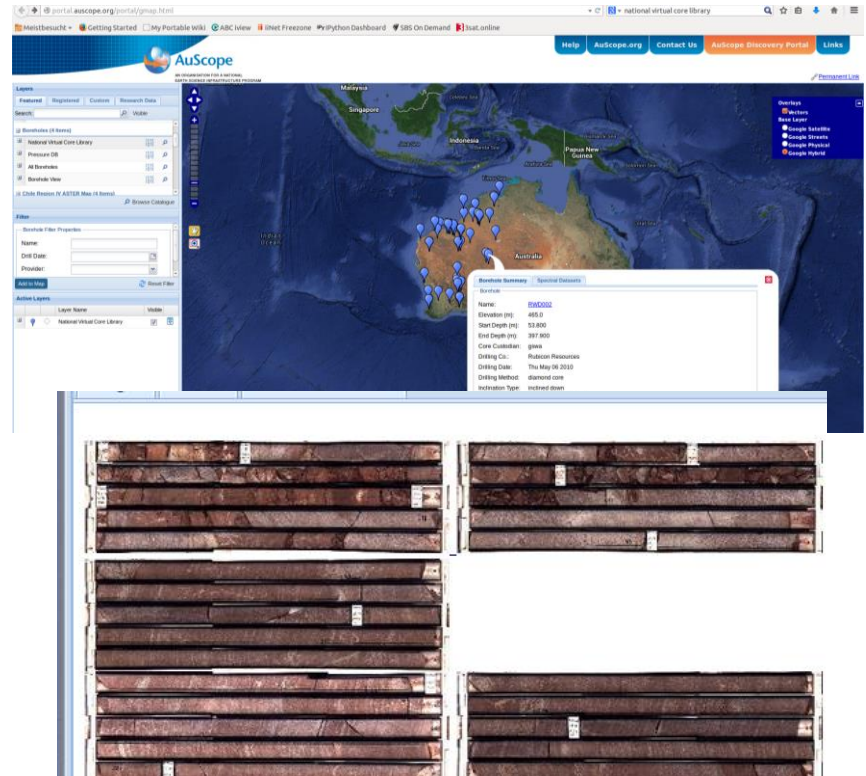
- AuScope as the Downward-Looking Telescope (DLT)
- The DLT is an integrated and augmented capability, like a telescope, to look into the Earth.
- AVRE is part of the FAIR Data Lens of the DLT





Evolution from GRID to AVRE

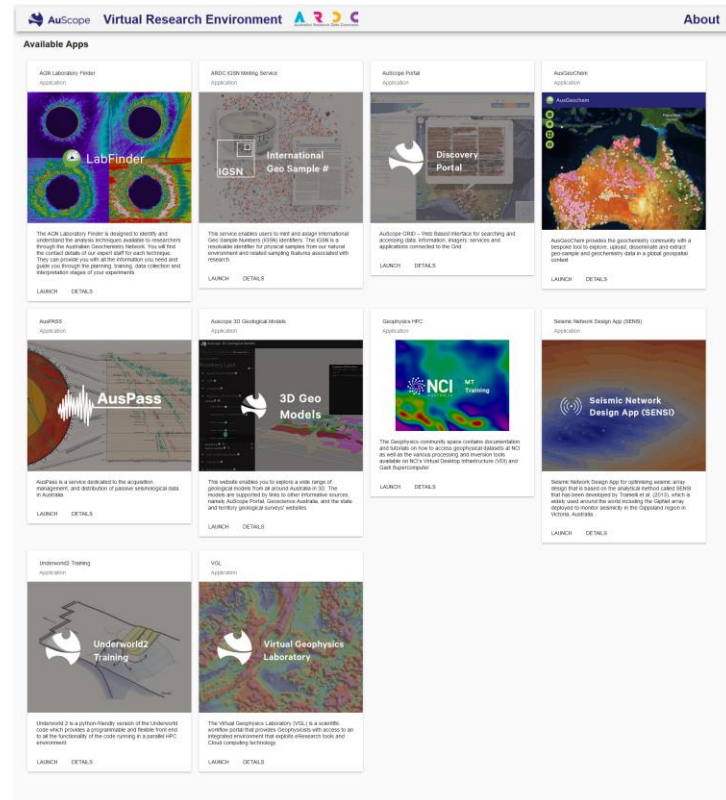
- The AuScope Virtual Research Environment started out as AuScope GRID in 2007.
- At the start, only the Government Geological Surveys could deliver data and metadata through web services.
- AuScope GRID played an important part in developing the technology stack needed for sharing data through web services (SISS).
- AVRE is still the key access point to the National Virtual Core Library (NVCL).
- Over time, the digital capabilities of other parts of the geosciences community matured.
- The publication of the FAIR Data Guidance Principles in 2016 set a new standard for data infrastructures.





AuScope Virtual Research Environment

- Since GRID, the Government Geological Surveys have evolved, providing their own catalogues and portals
- AVRE's focus has moved onto:
 - Improving access to AuScope-funded research data
 - Providing services to strengthen linkages between researchers, projects, and datasets
 - Building relationships with academia and awareness of the AVRE through its AVRE Build program
 - Custodianship of AuScope-funded data





AuScope "Build" Projects

LabFinder

Home About AuGeoChem Research Type

Crushing and Milling

Jaw Crushers

Manufacturer: Phalconite

Jaw crushers (Phalconite) are ideal for pre-crushing of hard brittle materials. The sample is crushed under high pressure between one fixed and one movable crushing jaw. A variety of jaw crushers are available depending on expected rock size.

Manual and Hydraulic rock splitter

Manufacturer: Rocklabs

Manual and Hydraulic rock splitter (Rocklabs) equipped with tungsten carbide blades and plates to maximize sample conservation are used to split large samples into smaller, manageable pieces suitable for crushing.

Milling Machines

Manufacturer: Milling Machine Manufacturer

Milling machines are used as a function of rock type, quantity and expected level of these elements to avoid cross contamination.

Ion Milling System

Manufacturer: IBA

Ion milling (IBA) removes the top atmospheric layer on a given material to reveal the pristine sample surface required for high-resolution imaging and good processing. It is providing the best results available for extremely demanding techniques such as Transmission Electron Microscopy (TEM) and Electron Back Scattered Diffraction (EBSD) studies.

Geophysics Processing Toolkit

carbonate

No.	Name	Tag	Balance	Uplift	✓	✗
1	Procedur_2102_2109.png	2102	2109	Completed	✓	
2	Procedur_2402_2409.png	2402	2409	Completed	✓	
3	Procedur_2402_2409.png	2402	2409	Completed	✓	
4	Procedur_2402_2409.png	2402	2409	Completed	✓	
5	Procedur_2402_2409.png	2402	2409	Completed	✓	
6	Procedur_2402_2409.png	2402	2409	Completed	✓	
7	Procedur_2402_2409.png	2402	2409	Completed	✓	
8	Procedur_2402_2409.png	2402	2409	Completed	✓	
9	Procedur_2402_2409.png	2402	2409	Completed	✓	
10	Procedur_2402_2409.png	2402	2409	Completed	✓	

Geophysics Processing Toolkit

Download map

Mask Image

Plot Mask Model Section

Geophysics Processing Toolkit

Black Hill Norite

True $\rho = 1.809$ True $\rho = 5.164$ True $\rho = 5.10$ **Inc: 43**

ICPR: 082: 4.6 **Inc: 18**

Grid standard deviations

True	Plot	True	Plot	True	Plot	True	Plot
329	133	371	141	536	279	165	141
76	76	76	76	76	76	76	76

Declination

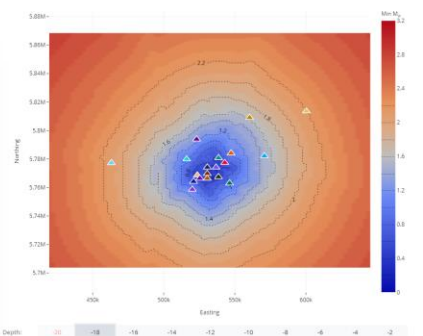
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Obs Angle: 102.2

Dec: 41

Obs: 1022
Obs Angle: 102.2

Dec: 27

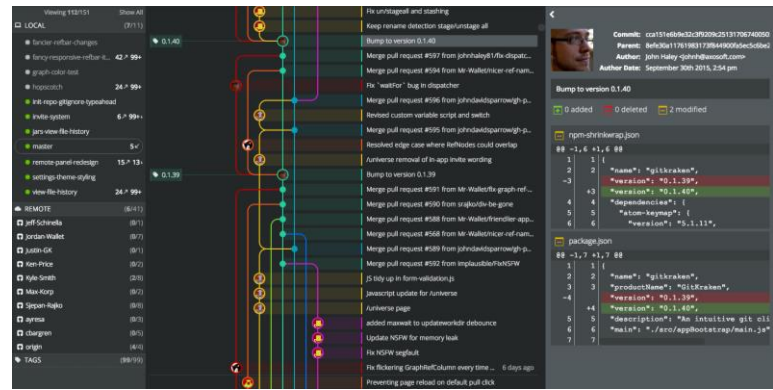
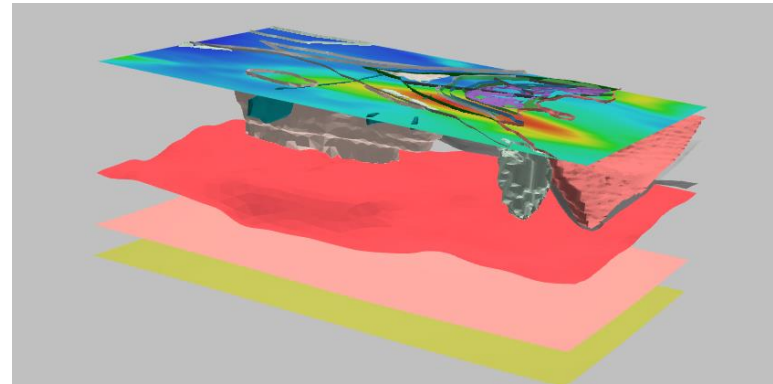
Geophysics Processing Toolkit









Sustainability and Impact

- A system that has been running for almost twenty years has to address several challenges:
 - User requirements change over time
 - Technology changes (roughly every five years)
 - Development accumulates technical debt
- Which features are central to AVRE, which need to be added, and which are no longer used?
- A robust user analytics deployed across AVRE products to support decision-making in shaping the functionality of key AVRE products
- Provide reports and insights to different levels of stakeholders, e.g., researchers, funders, etc.





Catalogues and Data Repositories

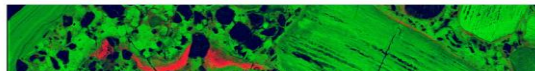
- Data repository (2025) 
- Sample Catalogue (2025) 
- Instrument Register (2026) 
- RAID Register (planned 26/27) 

Welcome to AuScope Sample Repository

The AuScope Sample Repository provides a trusted digital repository for publishing specimen metadata from AuScope communities following the FAIR Data Guiding Principles and simplifying the issuing of globally unique persistent identifiers (IGSN) for specimens. Sample metadata and links to related datasets are available openly through this repository with appropriate attributions to promote open science.



The repository is essential for geoscience research innovation in support of the AuScope 5-Year Investment Plan and Australian Academy of Science Decadal plan for Australian Geoscience: Our Planet, Australia's Future.

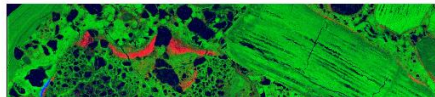


The screenshot shows the AuScope Data Repository website. At the top, there is a navigation bar with 'Datasets', 'About', and 'Help' menus, and a search bar. Below this is a large search area with a search bar containing the text 'E.g. environment'. A 'Popular keywords' section lists 'BHT', 'Borehole', and 'cloncurry'. The main content area is divided into two columns. The left column has a heading 'Welcome to AuScope Data Repository' and a paragraph describing the repository's dedication to geoscientific data. Below the text is a small image of a geological cross-section. The right column has a heading 'AuScope' and a paragraph describing it as Australia's provider of research infrastructure. Below this is a heading 'Calperum Critical Zone Observatory (CZO) Heat Needle Monitoring Program Feb...' and a paragraph describing the dataset as ground temperature and thermal conductivity data. At the bottom of the right column is a heading 'Gippsland and Murray Basin Fiber Optic Distributed Temperature Sensing Data' and a paragraph describing the dataset as raw and processed data files.

Welcome to AuScope Instrument Registry

The AuScope Instrument Registry provides a trusted digital repository for publishing specimen metadata from AuScope communities following the FAIR Data Guiding Principles and simplifying the issuing of globally unique persistent identifiers (PIDINST) for specimens. Instrument metadata and links to related datasets are available openly through this repository with appropriate attributions to promote open science.

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Quick Start

To register your instruments with a new organisation in the repository:

1. Log in via (AAF)
2. **Submit a request** to create a instrument organisation
3. You will be notified via email after the organisation is created
4. Select your **organisation** and choose:
 - **Add instrument** (register individual instruments via the online form)

To register your instruments with an existing organisation in the repository:

1. Log in via (AAF)
2. Select your **organisation-of-interest**
3. Click
 - **Add instrument** (register individual instruments via the online form)



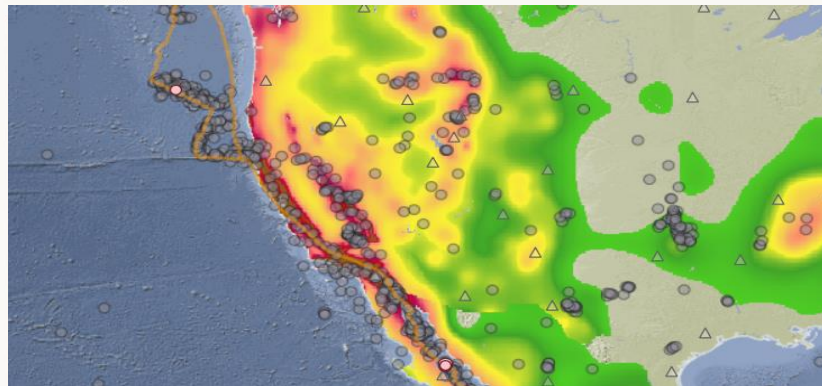
Catalogue and Portal Evolution

- Over the years, search has evolved beyond simple text search.
 - Improving the search function
 - Ongoing work on improving the Elastic Search index supporting the search function
 - Future work: Natural Language Processing
- A natural language search interface will allow users to search AVRE resources by asking questions in the way they would ask an expert for data sources.
- The natural language processing capability can also be used to support metadata augmentation.

show me earthquake data for the west coast of the united states

Search

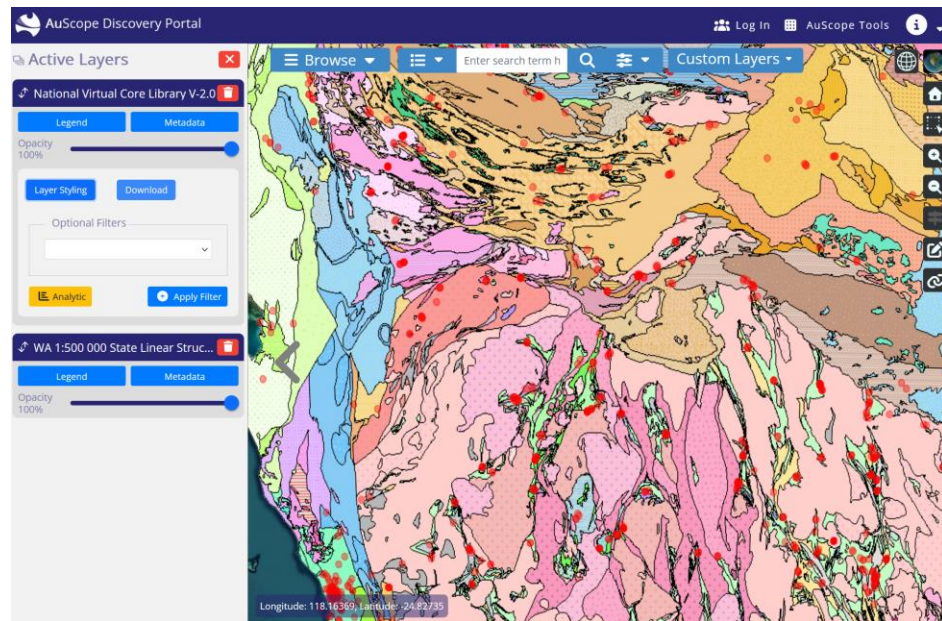
Earthquakes – West Coast, United States





Summary

- AVRE keeps evolving to meet the data and data analysis needs of AuScope researchers
 - Keeping AVRE sustainable by keeping pace with technological changes and user requirements
 - Added AuScope repositories and catalogues for data (DOI), samples (IGSN), instruments (PIDINST) and projects (RAID)
 - Improve the Findability of data through updated interfaces and natural language queries
 - Improve Access to data through the AVRE API and an AVRE QGIS plugin.
 - Improve Interoperability with other AuScope Programs and NCRIS Facilities
 - Support the Reuse of data through access to documentation of context and provenance





Thank you

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AuScope



This work was enabled by AuScope and the Australian Government via the National Collaborative Research Infrastructure Strategy (NCRIS): auscope.org.au