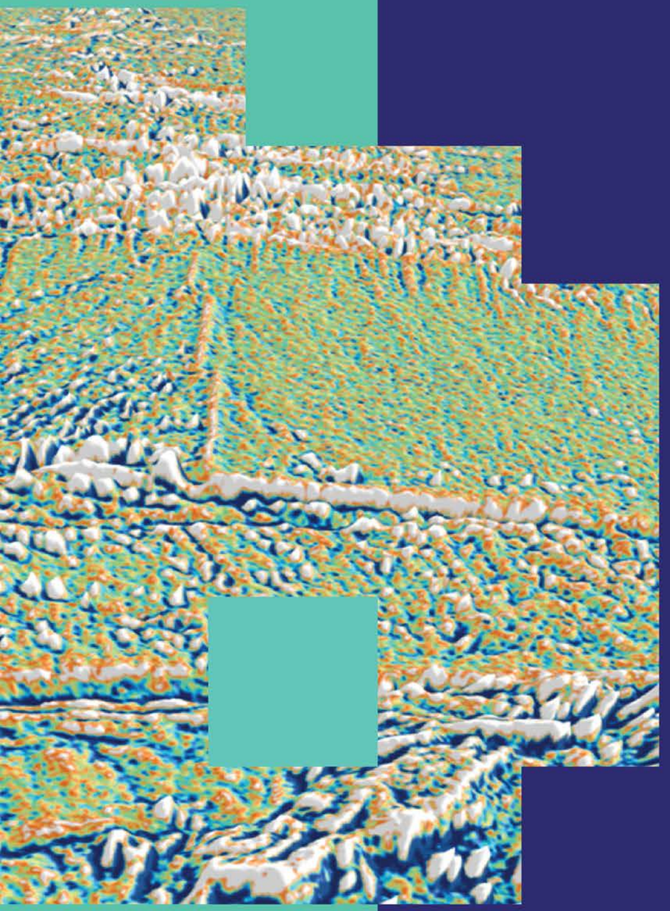
AuScope

Answering Australia's Geoscience Questions



AuScope infrastructure providing a 'telescope' looking into the Australian continent.

Dr. Tim Rawling, CEO, AuScope

NCRIS
National Research Infrastructure for Australia
An Australian Government Initiative

Contents

Introduction

What is AuScope?

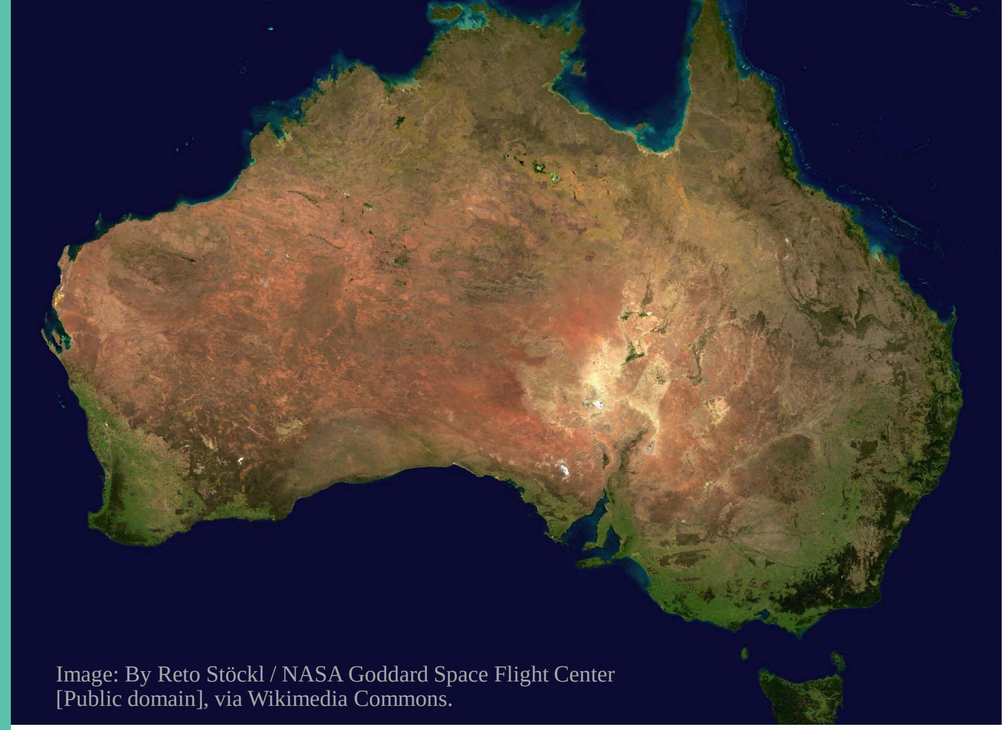
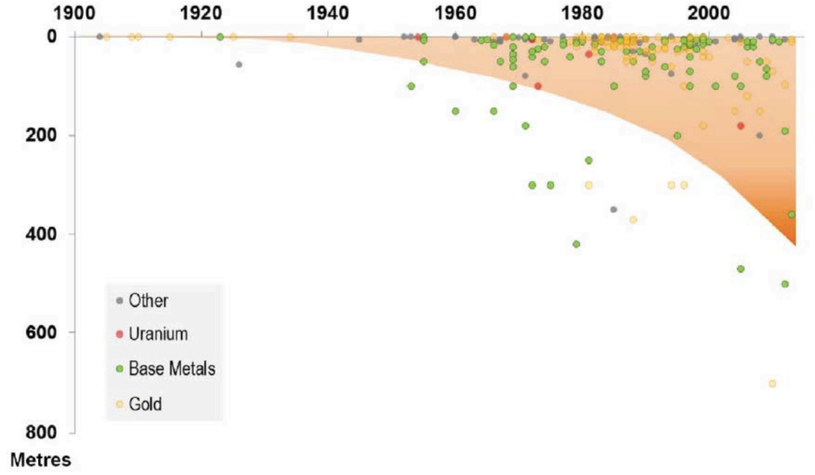


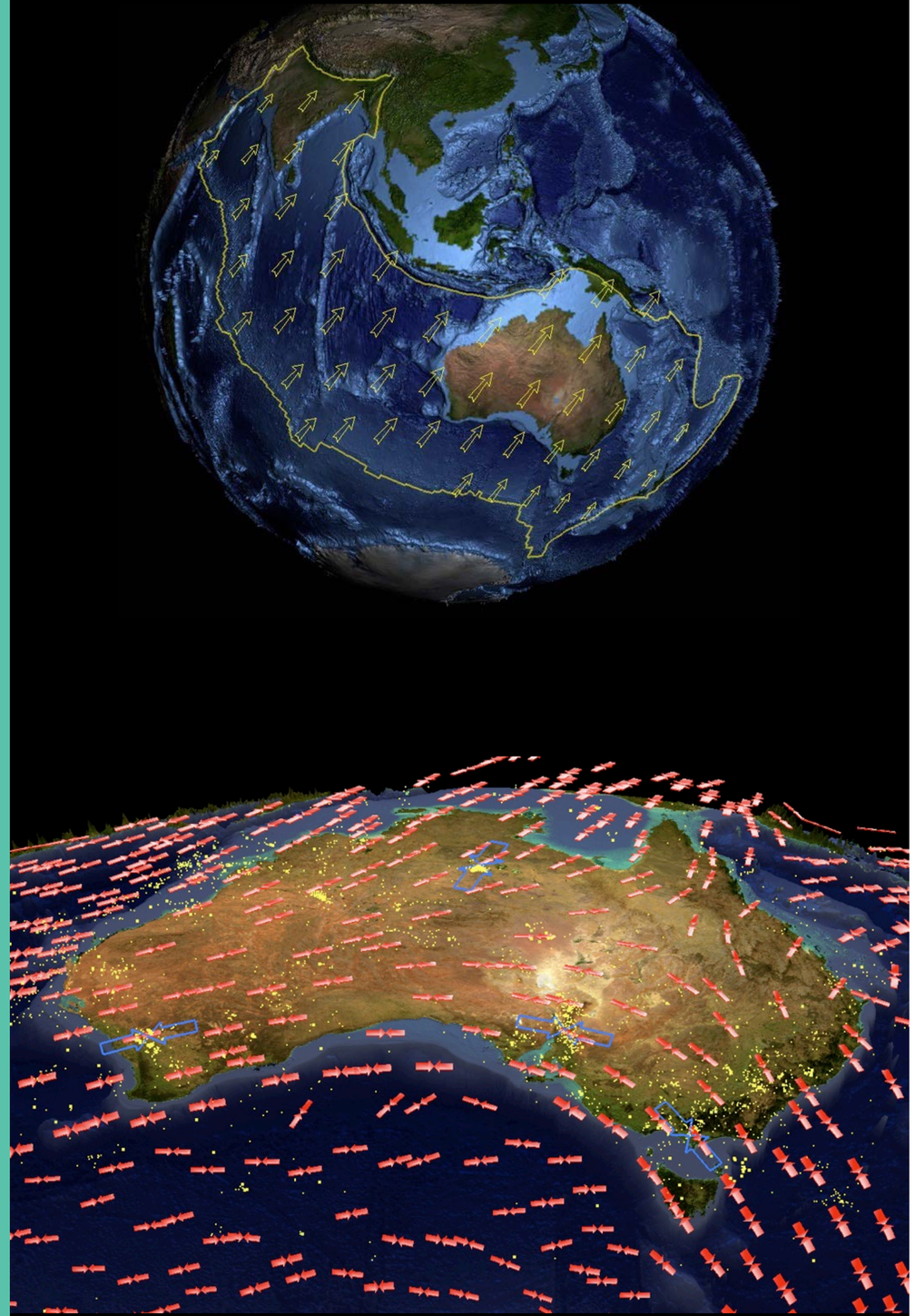
Image: By Reto Stöckl / NASA Goddard Space Flight Center [Public domain], via Wikimedia Commons.

Australian Context

- Australia is old, cold and cratonised.
- Minerals search space is maturing, and exploration is being forced deeper under transported cover.



- MinEx Consulting (Richard Schodde) 2015, “Exploration trends, inds and issues in Australia”. Excludes satellite deposits in existing camps and bulk mineral discoveries.



Australian Context

- Large, fast moving plate
- Complex active plate boundaries and geoid geometries
- Highly stressed crust – mostly in compression – and underestimated seismic hazard

AuScope History

- Established in 2006 to implement an Earth and Geospatial Science Infrastructure program
- National Collaborative Research Infrastructure Strategy (NCRIS) Program "*Structure and Evolution of the Australian Continent*"
- $75M Commonwealth investment $34M cash and $128M in-kind co-investment from partners

AuScope Purpose

To create universal access to earth and geospatial research infrastructure (equipment, data, analytics) to drive:

- Innovative Australian scientific research
- Support scientific investigations in government and industry

Australian National University

Curtin University of Technology

MONASH University

THE UNIVERSITY of ADELAIDE

THE UNIVERSITY OF SYDNEY

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

MACQUARIE University

Australian Government Geoscience Australia

THE UNIVERSITY OF MELBOURNE

State Government Victoria

UNIVERSITY of TASMANIA

THE UNIVERSITY OF WESTERN AUSTRALIA

CSIRO

GOVERNMENT OF WESTERN AUSTRALIA

Queensland Government

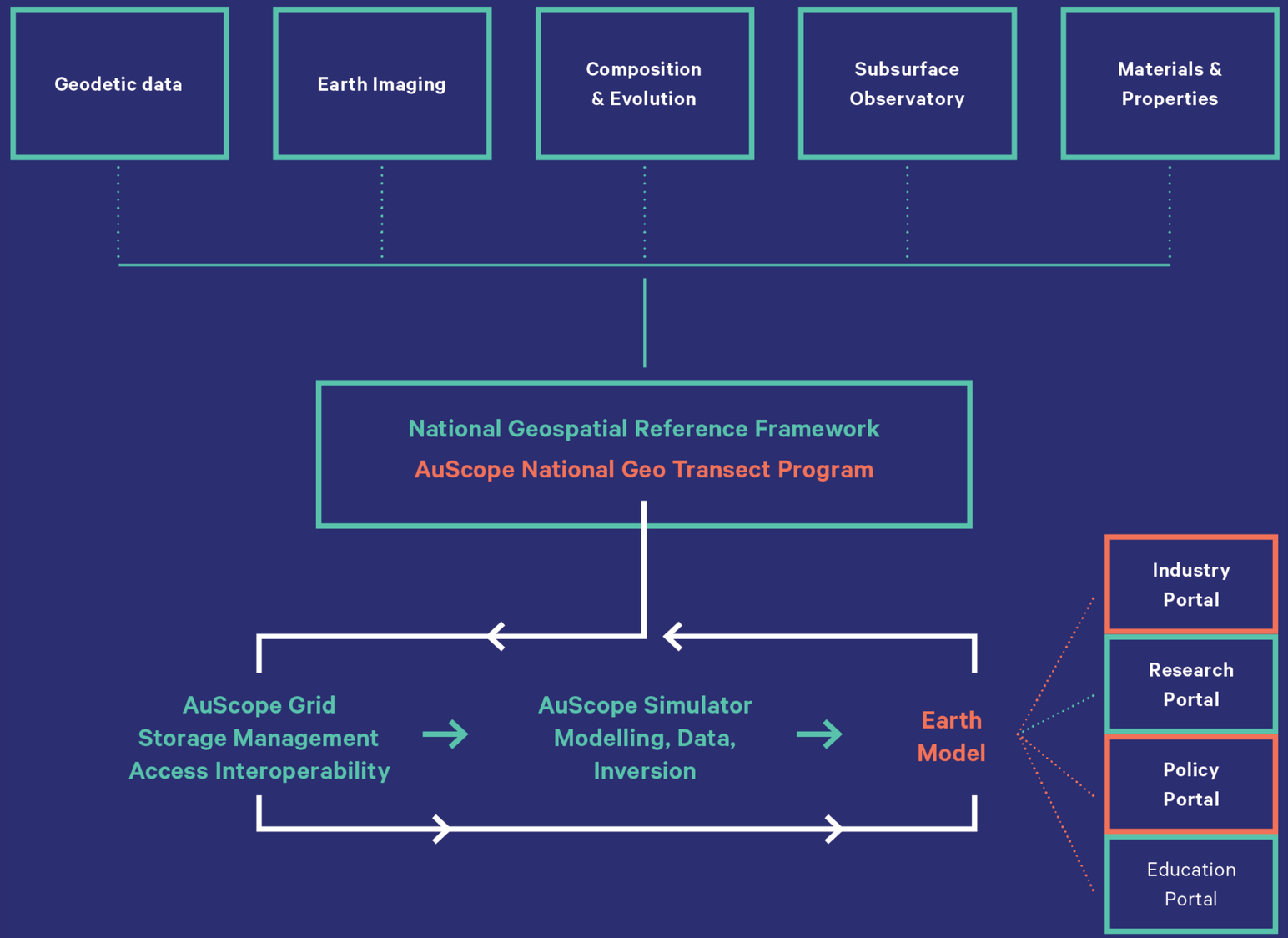
Tasmanian Government

Northern Territory Government

Government of South Australia

NSW GOVERNMENT

AuScope Model



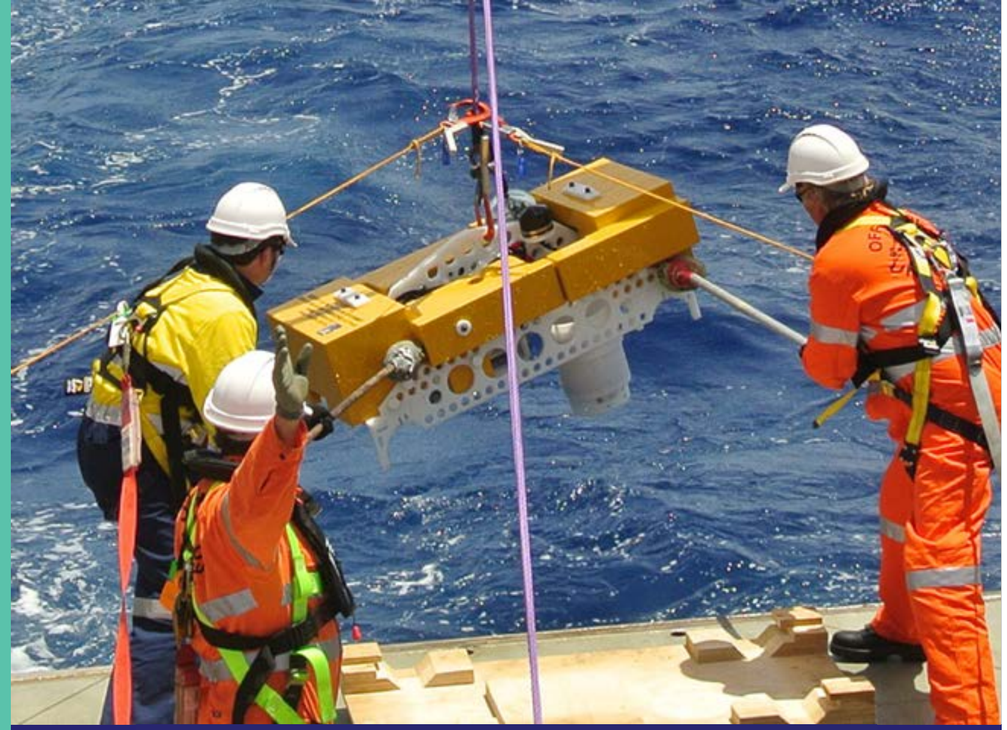
Programs

Infrastructure

Programs

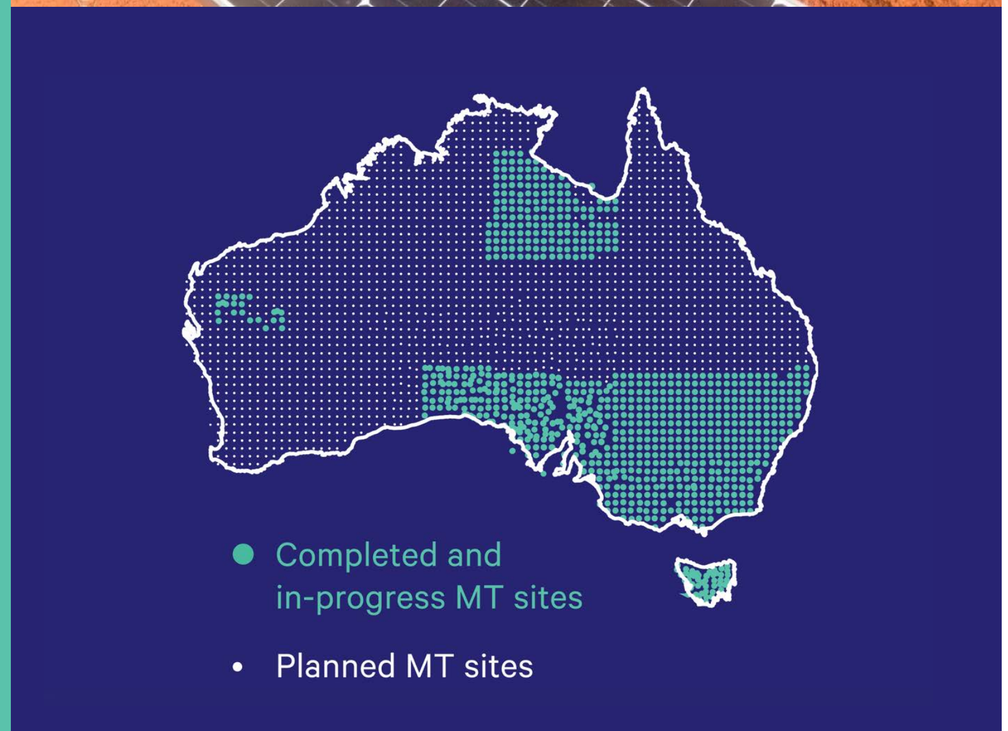
Geospatial Program

- Responsible for acquisition and deployment of VLBI telescopes, GNSS sites, absolute gravity measurement, GPS calibration robots and satellite laser ranging sites throughout Australia
- Provides data that underpins Australia’s dynamic geodetic framework: observing movement, change and deformation in the Australian plate



Earth Imaging Program

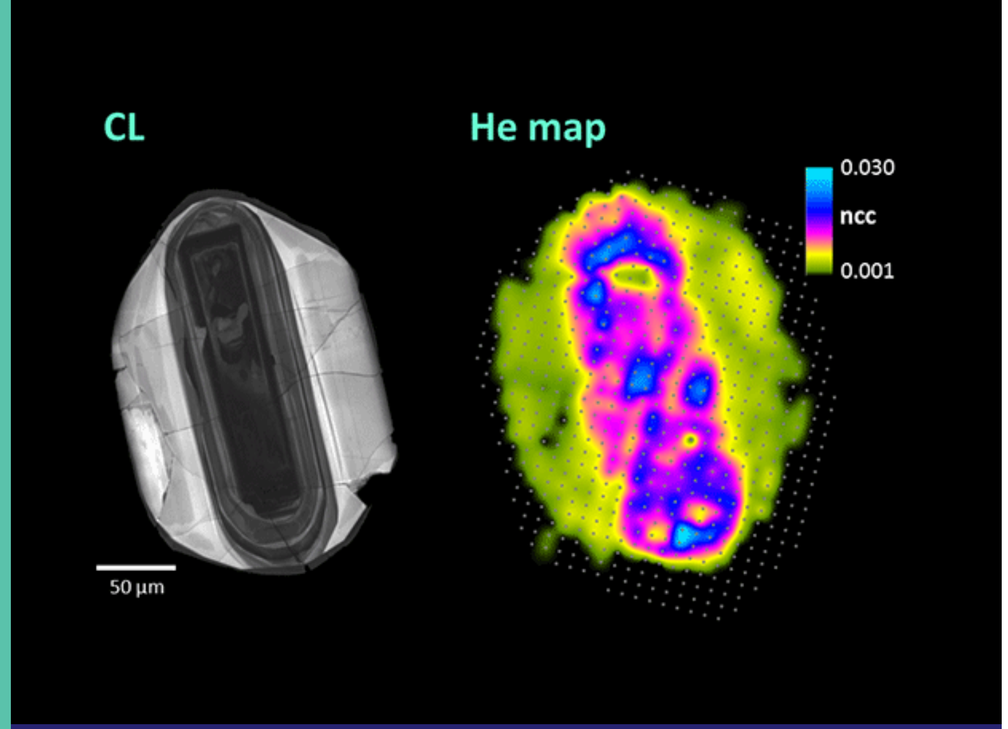
- Works with GA and state GSO’s to support deployment of AusArray Passive Seismic and AusLAMP MT Arrays
- Manages an OBS research fleet
- Supports the national reflection seismic transect program

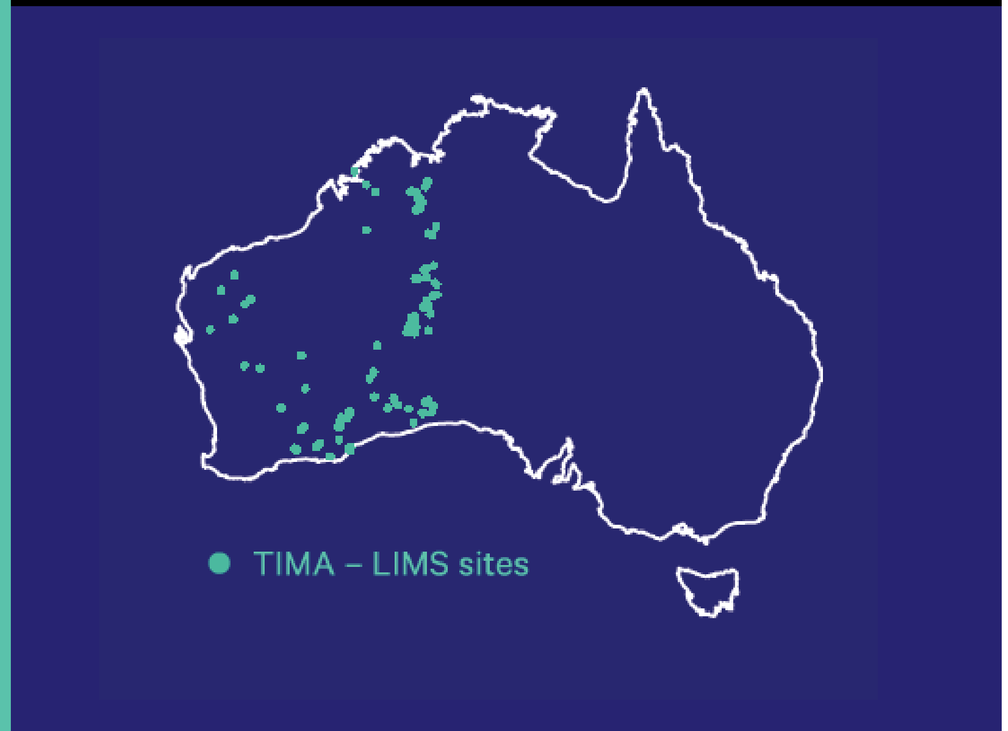


Earth Imaging Program: Magnetotellurics

- Australian Lithospheric Architecture Magnetotelluric Project (AusLAMP) program
- Collaboration with UA and GA
- National long-period MT data at approx. 2,800 sites across Australia to map electrical conductivity of the continent in three dimensions

Programs





Earth Composition Program

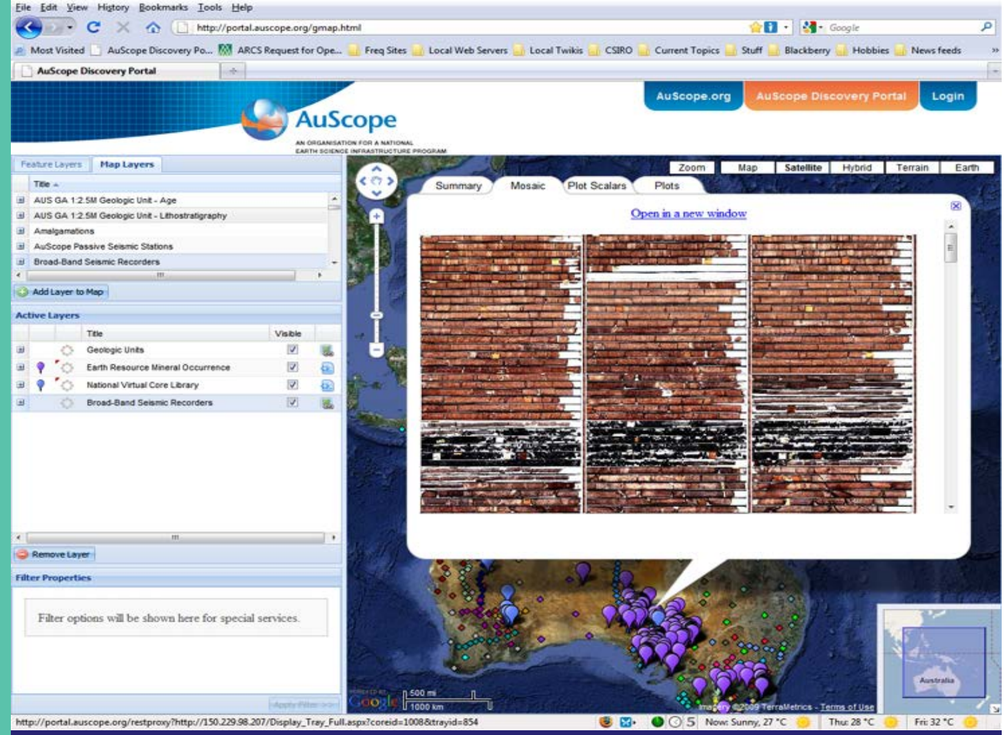
- Provides operational support for a suite of world-class analytical infrastructure
- Infrastructure is located at Curtin University, University of Melbourne and Macquarie University and includes LIMS, SHRIMP, Fission Track and TerraneChron access.
- Provides researchers with geochronological and geochemical data necessary to understand the formation mechanisms and evolution of the Australian continent

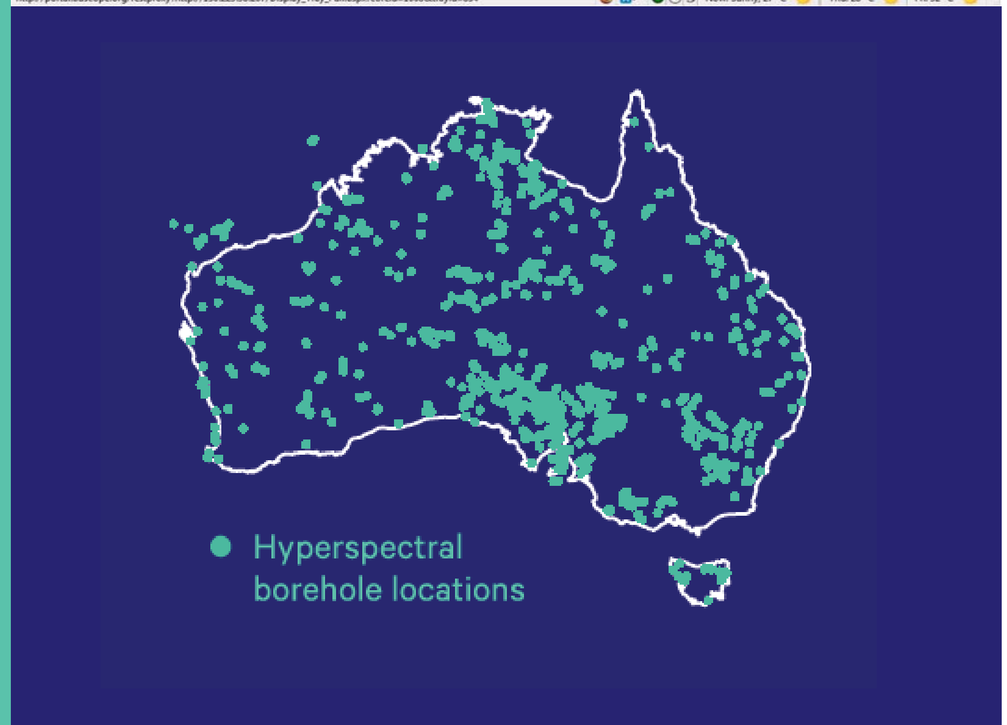
Programs

Materials & Properties Program:

National Virtual Core Library (NVCL)

- Annually, ~$600M is spent on drilling in Australian, but too often core is only partially logged, and then discarded
- This program overcomes this massive underutilisation of core for research and thus, new mineral discoveries





Materials & Properties Program:

National Virtual Core Library (NVCL)

- Facilitates collection, storage and discovery of high quality, semi-quantitative hyperspectral mineralogical data from drill core
- Over 10,000 km of historical core logged from across Australia
- 10s of research papers produced in 2016 – 2017

Image: Dr. Michelle Salmon, ANU

Outreach: Seismometers in Schools (AuSIS)

- Deployment of research-quality instruments into Australian secondary schools
- Provides resources for student engagement in geoscience
- Simultaneously provides data to researchers about Australian crustal movements

eResearch & Data Strategy

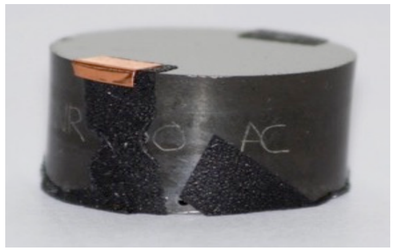
IGSN - Lims

IGSN: IECUR008F

IECUR008F.classification.png
(primary image)

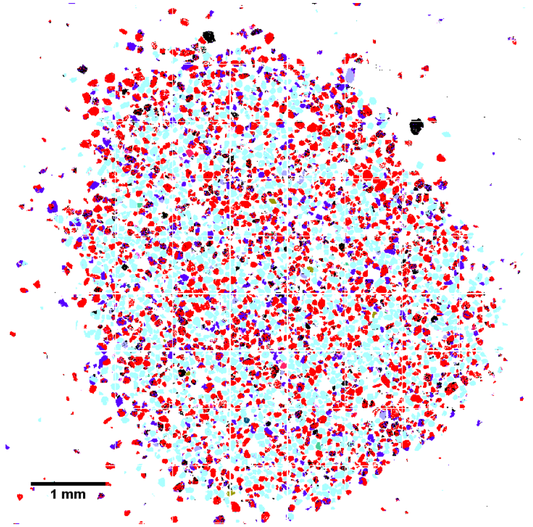
IGSN:	IECUR008F
Sample Name:	143784M
Other Name(s):	
Sample Type:	Rock Powder
Parent IGSN:	IECUR001B

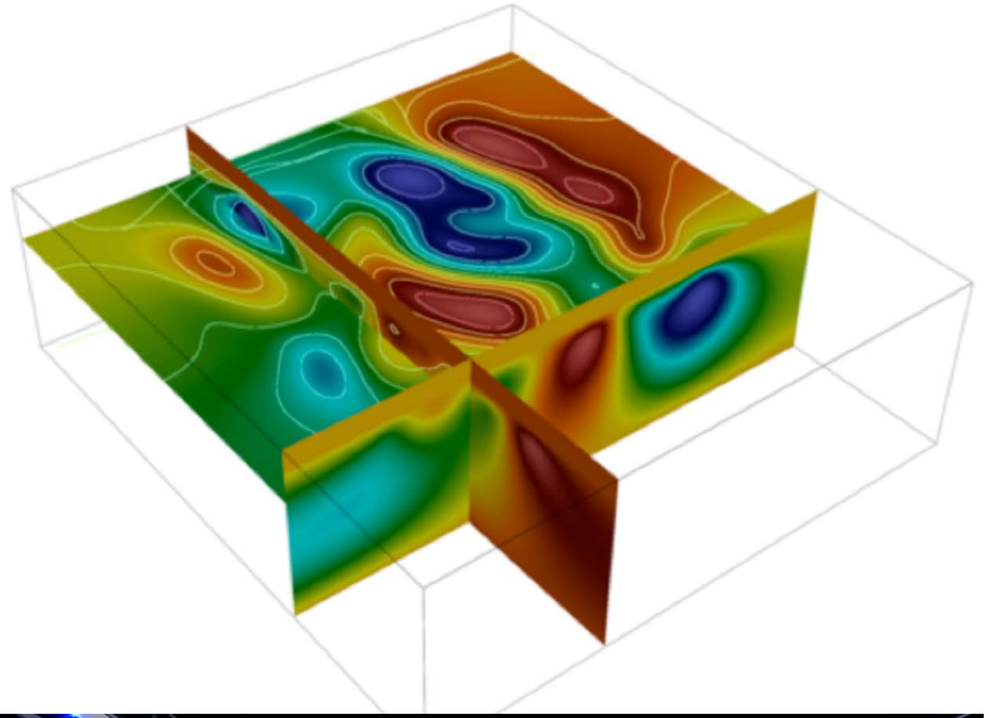
Description	
Material:	Rock
Classification:	Sedimentary>Siliciclastic
Field Name:	Dovers Hills
Description:	The sample is the magnetic separa
Age (min):	Not Provided
Age (max):	465 million years (Ma)
Collection Method:	surface collection
Collection Method Description:	Not Provided
Size:	Not Provided
Geological Age:	Permo-Carboniferous
Geological Unit:	Paterson Formation
Comment:	Not Provided
Purpose:	The maximum depositional age fo
Geolocation	
Latitude (WGS84):	-23.11865
Longitude (WGS84):	128.7915
Northing (m) (UTM NAD83):	7443330
Easting (m) (UTM NAD83):	478651
Zone:	52K
Vertical Datum:	NAVD88
Elevation:	456
Nav Type:	GPS
Physiographic Feature:	Hill
Name Of Physiographic Feature:	Dovers Hills
Location Description:	Gibson Desert North
Locality:	Dovers Hills
Locality Description:	This sample was collected from th Dovers Hills, and 1.7 km north of
Country:	Australia
State/Province:	Western Australia
County:	Gibson Desert North
City:	Gibson Desert North
Collection	
Field Program/Cruise:	Geological Survey of Western Aust
Platform Type:	Not Provided



IGSN and LIMS

- IGSN is a unique alphanumeric code assigned to specimens and related sampling features to ensure their unique identification
- GA, CSIRO and Curtn/AuScope





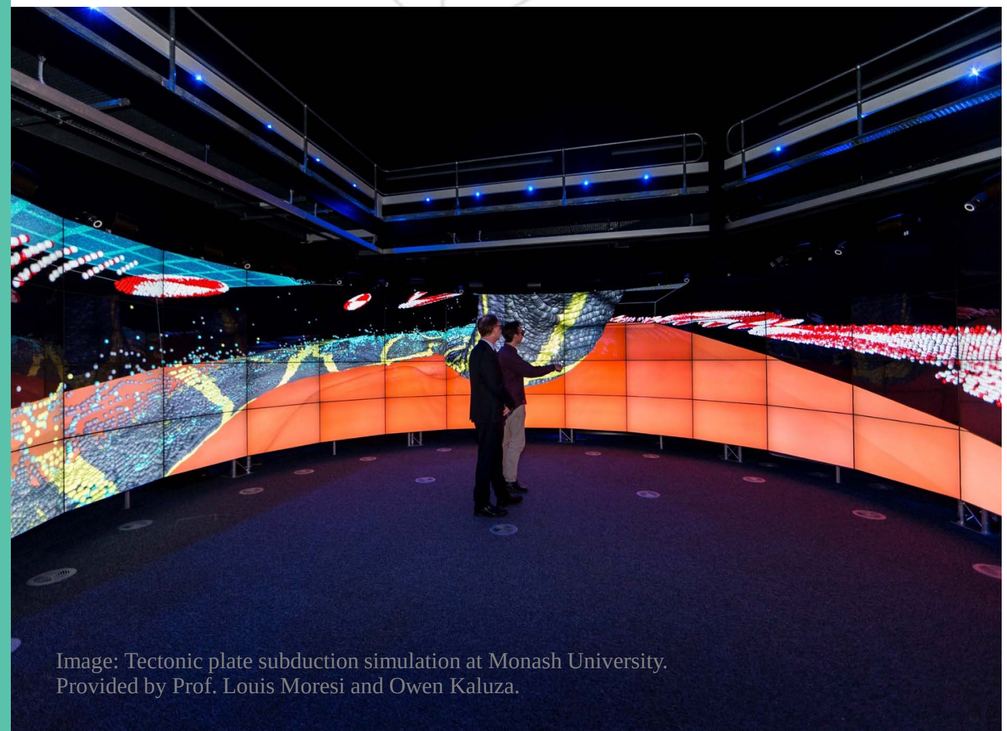
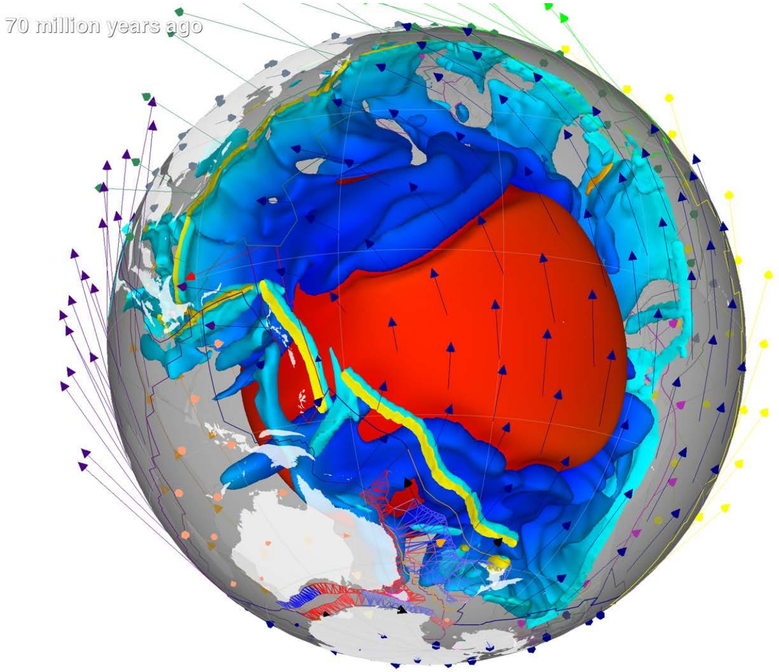
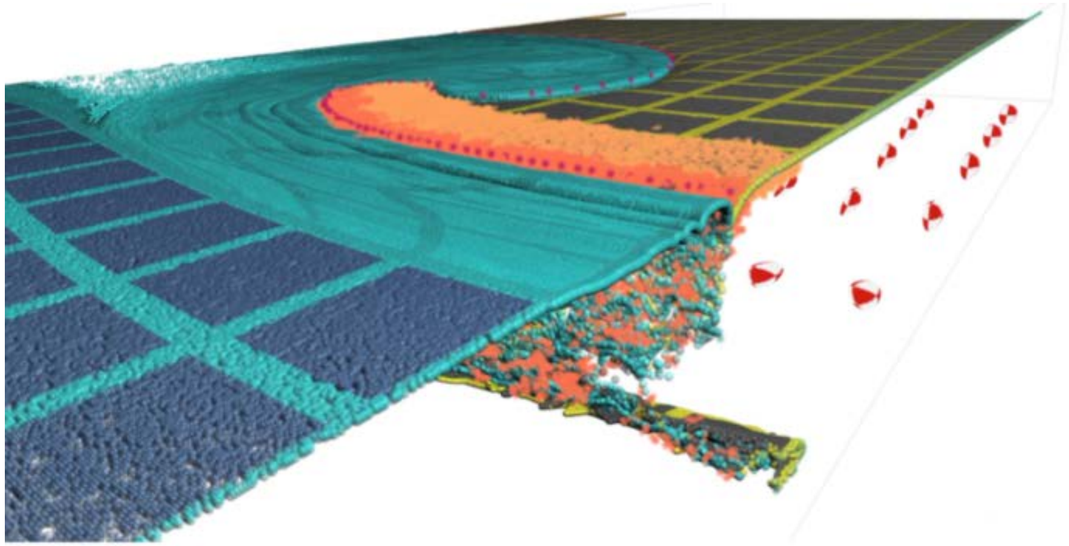


Image: Tectonic plate subduction simulation at Monash University.
Provided by Prof. Louis Moresi and Owen Kaluza.

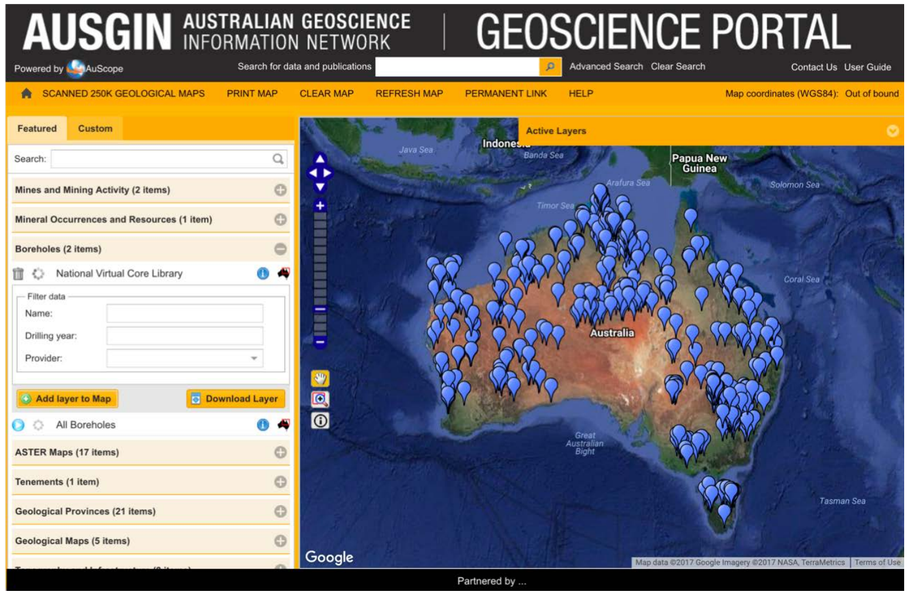
Simulation, Analysis & Modelling (eResearch) Program

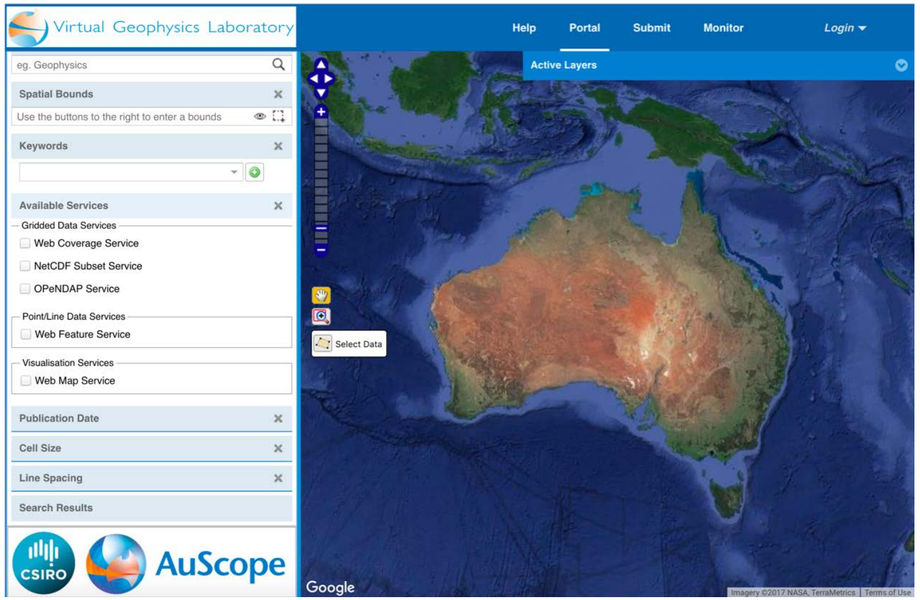
- A toolkit for 3D and 4D modelling, simulation analysis and data mining for geoscientists in Australia
- New data assimilation workflows ensure models are constrained by observational data collected with other AuScope infrastructure





- Gplates and Underworld provide tools that allow geoscientists to explore the evolution of mineral and energy systems and their hosts through deep time

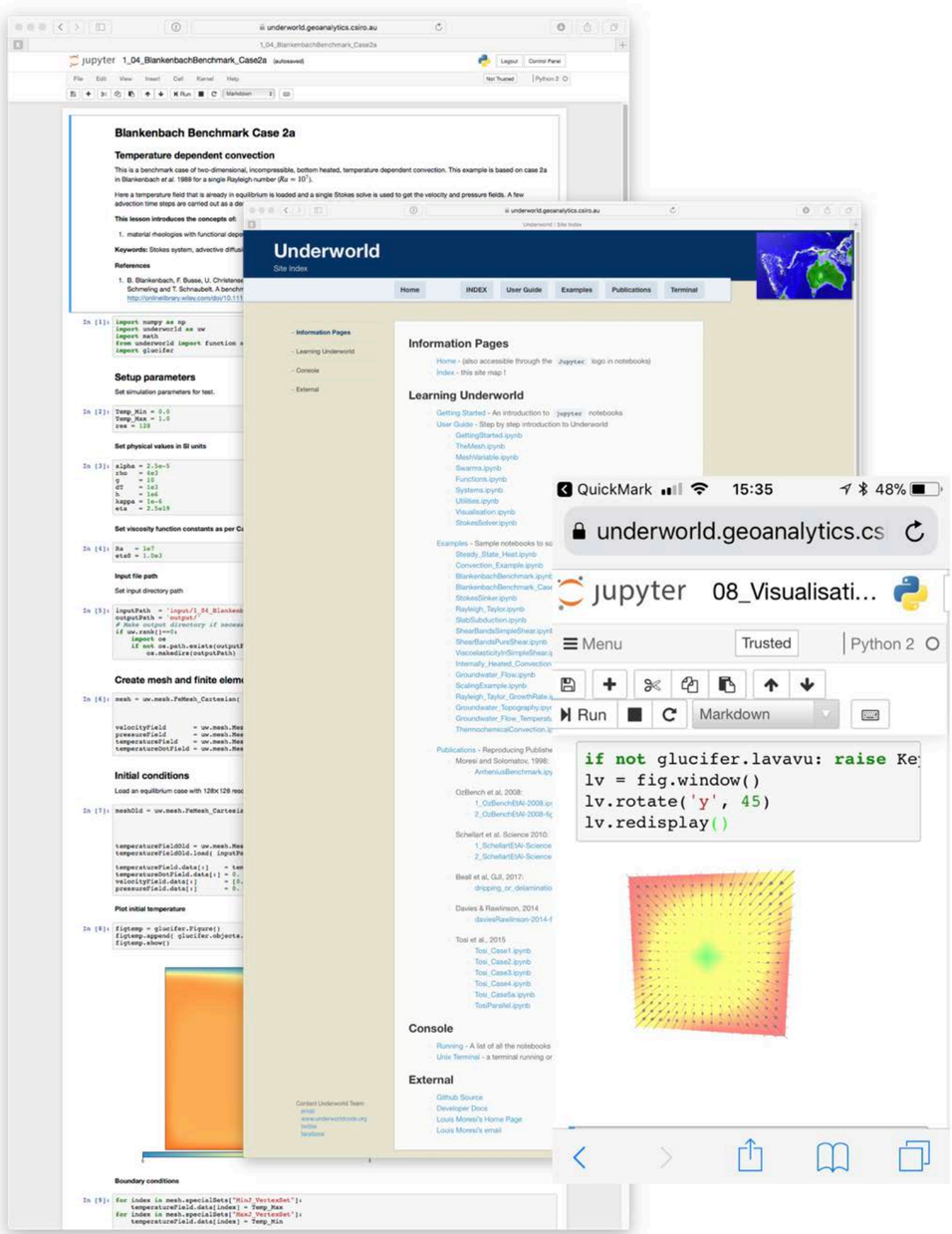




AuScope Grid

- The **AuScope Portal**, the Virtual Geophysical Laboratory (**VGL**) and the Data Enhanced Virtual Laboratory (**DeVL**) provide access to data collected or generated by both AuScope and collaborating partners
- Data is freely accessibly, findable and interoperable
- New development with DeVL will ensure data is FAIR – Findable, Accessible, Interoperable and Reusable

Programs



AuScope Grid & Research Codes

- Cloud enablement of research codes such as Underworld2, eScript and gPlates drives collaboration
- Also supports tertiary teaching and student use

SISSVoc

- Provides semantic web-based vocabularies
- RESTful interface
- Allows humans and machine readable views
- Significant contribution to the domain
- Mostly through work led by Simon Cox with NeAT, then AuScope funding
- Used by Australian Government and other high profile groups

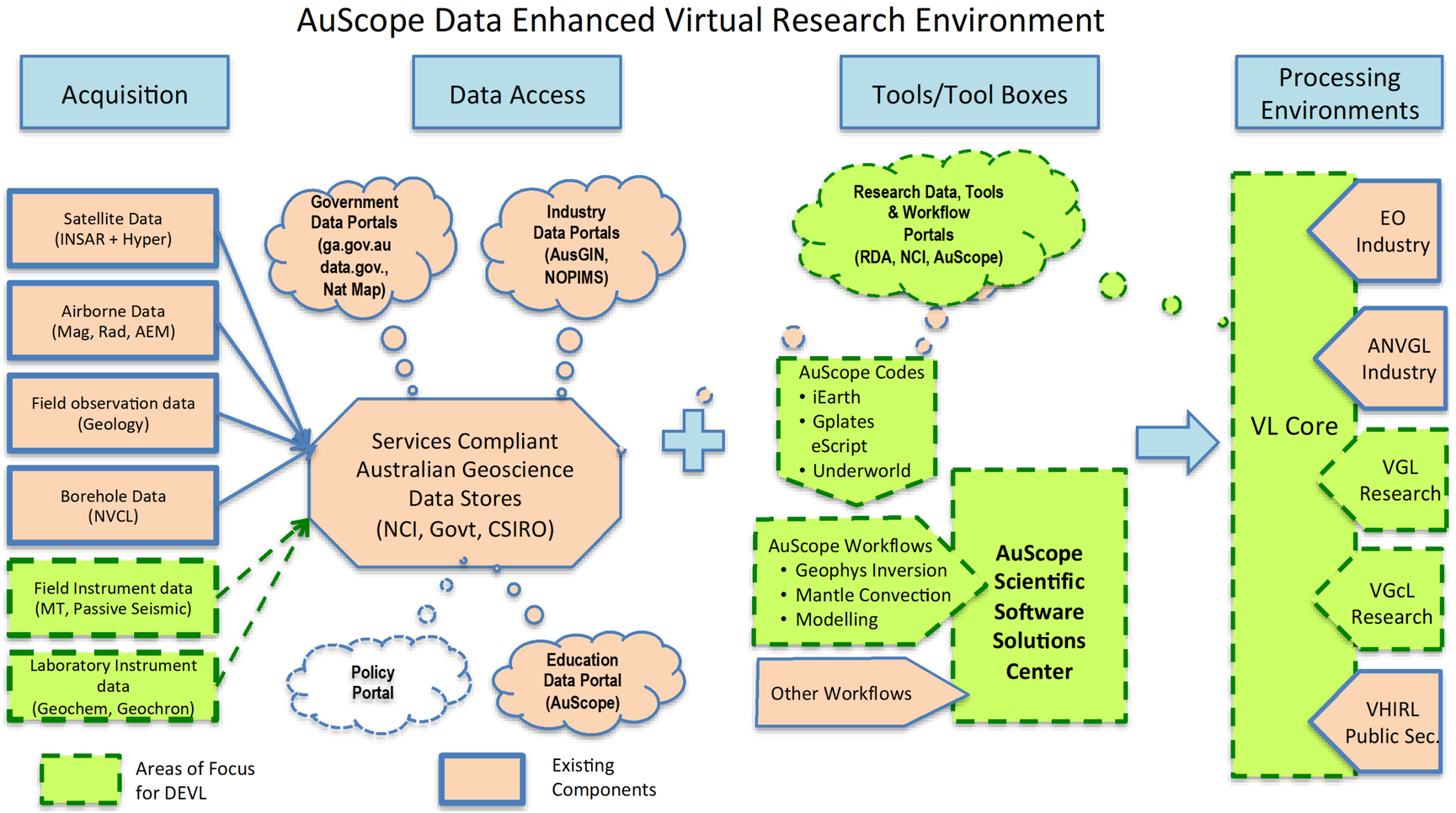
SISSPid

- Persistent Identifier Service
- Used by CSIRO, BoM, GA and internationally
- Initially under NeAT but then furthered by AuScope Grid and ANDS ASRDC project

eResearch & Data

Virtual Laboratories

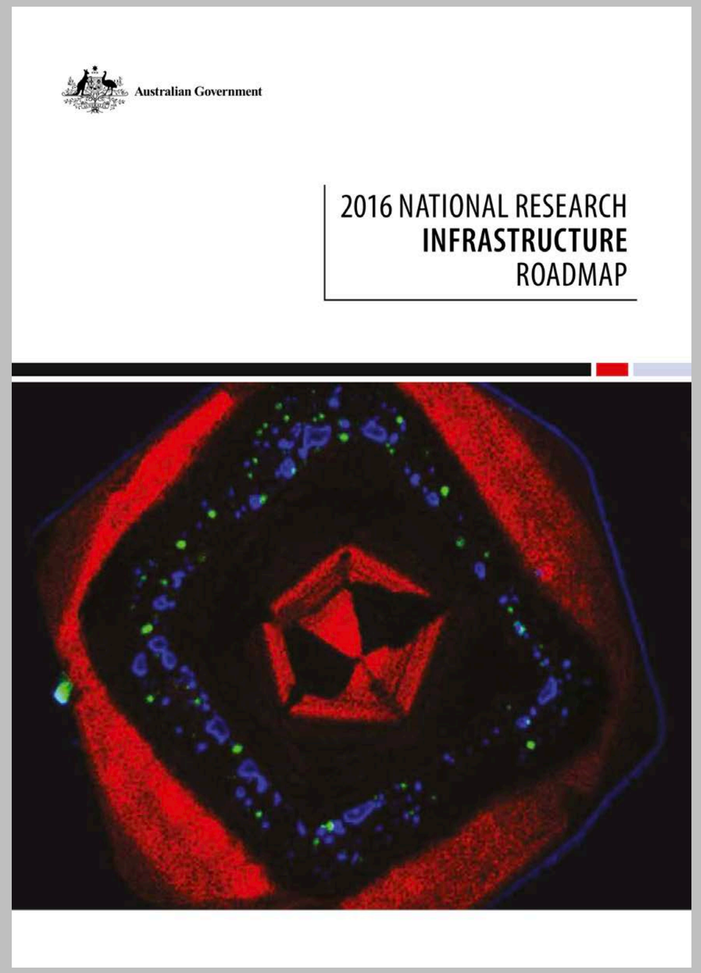
- Initially linking data to computation
- VLs now instrumental in orchestrating workflows
- Scientific Software Solution Centre (SSSC) provides registry for workflows that can be human and machine discoverable – and executable on the fly
- Collaboration


AuScope Data Enhanced Virtual Research Environment
Acquisition
Data Access
Tools/Tool Boxes
Processing Environments
Satellite Data (INSAR + Hyper)
Airborne Data (Mag, Rad, AEM)
Field observation data (Geology)
Borehole Data (NVCL)
Field Instrument data (MT, Passive Seismic)
Laboratory Instrument data (Geochem, Geochron)
Government Data Portals (ga.gov.au data.gov., Nat Map)
Industry Data Portals (AusGIN, NOPIMS)
Services Compliant Australian Geoscience Data Stores (NCI, Govt, CSIRO)
Policy Portal
Education Data Portal (AuScope)
Research Data, Tools & Workflow Portals (RDA, NCI, AuScope)
AuScope Codes
• iEarth
• Gplates eScript
• Underworld
AuScope Workflows
• Geophys Inversion
• Mantle Convection
• Modelling
Other Workflows
AuScope Scientific Software Solutions Center
VL Core
EO Industry
ANVGL Industry
VGL Research
VGcL Research
VHIRL Public Sec.
Areas of Focus for DEVL
Existing Components

Collaboration

Future Opportunities

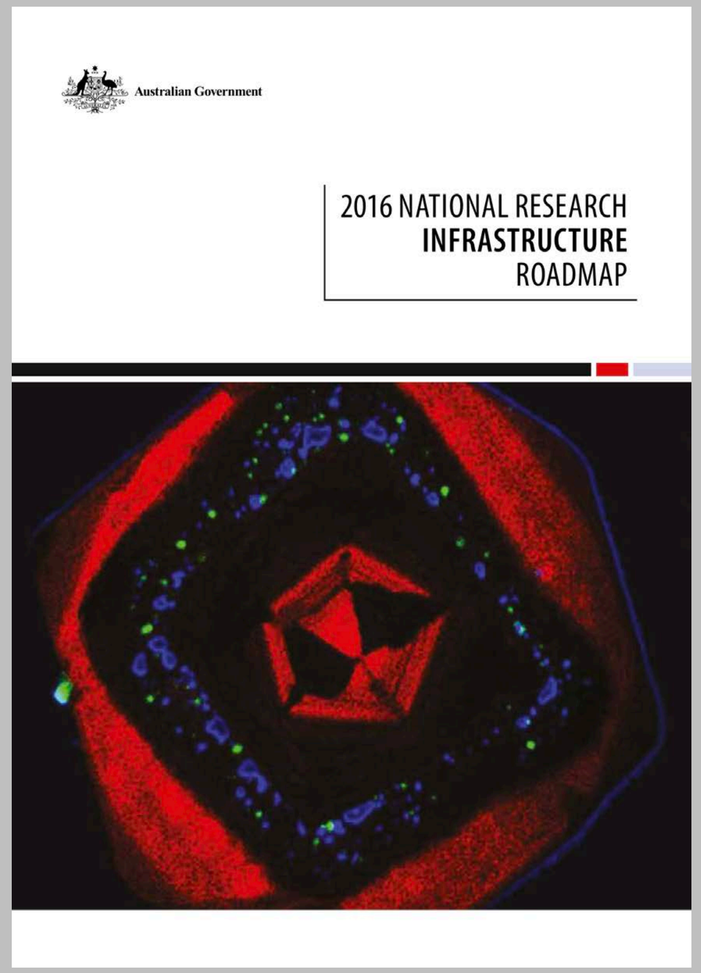
Collaboration



National Innovation & Science Agenda

- $1.5B commitment over 10 years
- Highlighted 9 x research infrastructure areas that will transform Australian research and deliver returns for community and industry partners
- Inward focussed Earth monitoring and exploration, potential development of inward-looking ‘telescopes’

Collaboration



National Innovation & Science Agenda

- Enhanced capability for AuScope to include new Earth monitoring data, and utilise new remotely sensed data and visualise data
- Key requirement for *generational shift in technology resources and interconnectivity of all facilities*
- Including establishing a virtual laboratory network to enable large data share (incl. digitised collections) and improve real-time communication

Future Investment

Future Focus

NISA and the NRIR provides an enormous opportunity for AuScope and the geoscience community as a whole

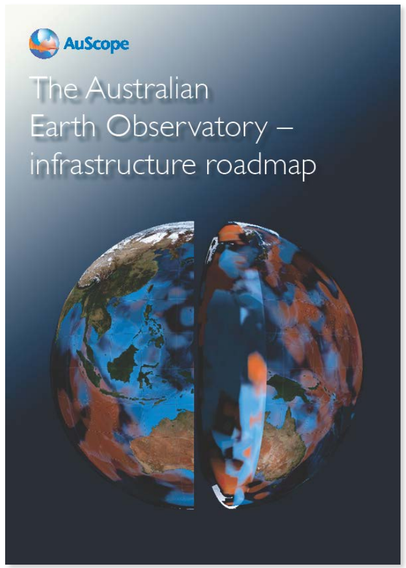
Possibility for significant new investment in national programs in support of research initiatives such as UNCOVER

Building a *Downward looking earth telescope*

AuScope has developed two investment roadmaps over the last 5 years (available from our website)

AuScope is seeking community feedback regarding investment priorities over the coming decade

We will be hosting a workshop immediately after the AGCC conference in Adelaide in October and we welcome your input at this event



Connect with AuScope

Thank you

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