bit.ly/3eImJRA

Integrating research data across our planet: Perspectives from the data components of the NCRIS Earth & Environmental Science facilities

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All of us are Data Leads from the NCRIS NEESFF-ISAP!

2021 NRI Roadmap - Research themes and challenges

3.7 Environment and climate

Our future prosperity will be safeguarded by positioning Australia to better anticipate, manage and adapt to our changing climate.

Research that focuses on environmental observation improves the understanding of Australia's terrestrial, atmospheric, coastal and ocean environments, including the Southern Ocean and Antarctica.

- Biodiversity monitoring, collection and analysis infrastructure
- Networked environmental modelling infrastructure
- Integrated, publicly accessible environmental datasets
- Marine, coastal, freshwater, groundwater and atmospheric monitoring and observation infrastructure
- Climate modelling and adaptation infrastructure

2021 NRI Roadmap

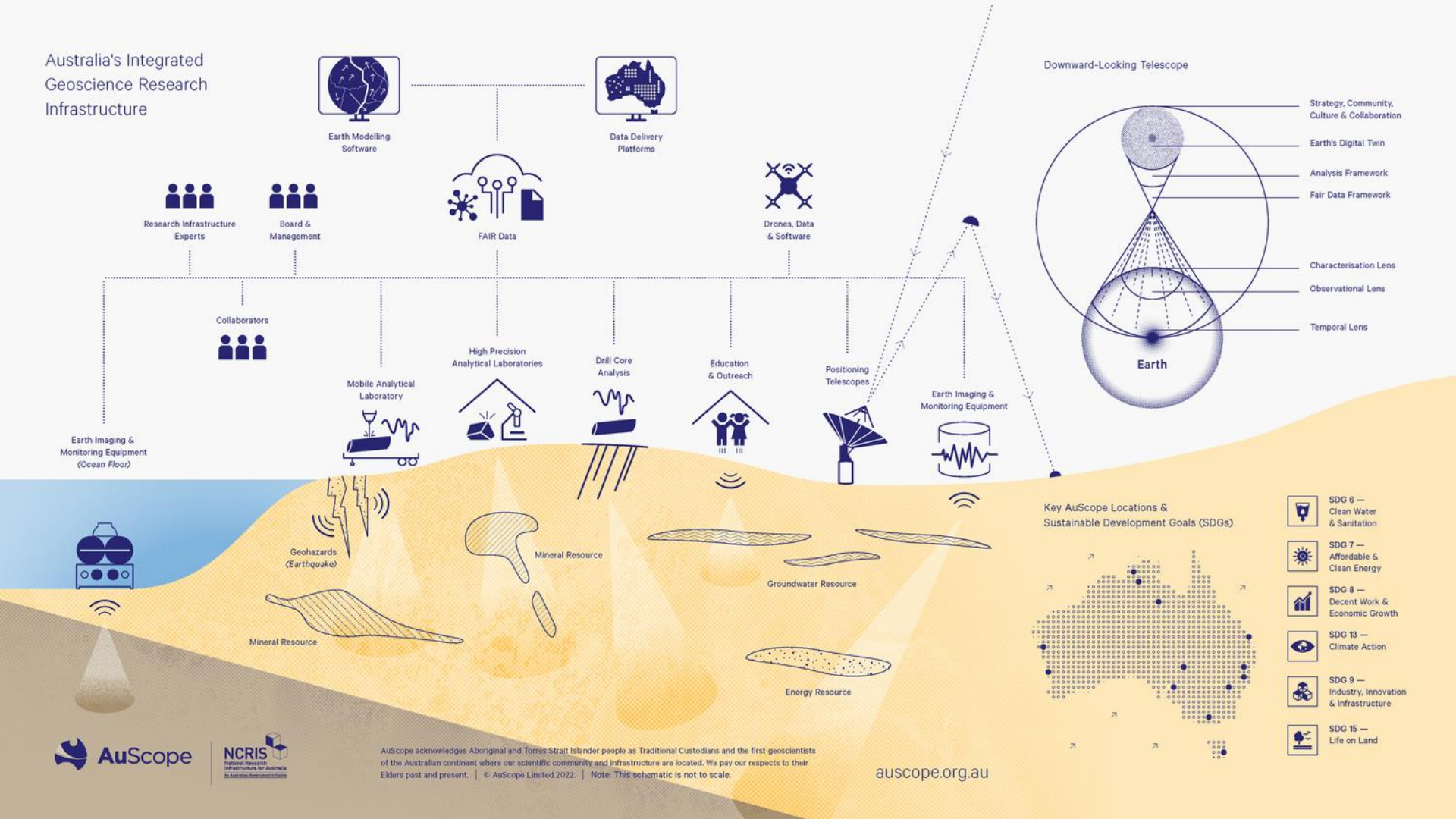
4. Opportunities for system-wide enhancements

- 4.1 Continental-scale observations
- 4.2 Large-scale integrated datasets
- 4.4 Software analysis tools and platforms

6. Potential for step-change

- 6.1 Cutting-edge national digital research infrastructure
- 6.4 World-leading environmental and climate infrastructure to underpin Australia’s national adaptation strategy
- 6.5 A national approach to collections

Australia's Integrated Geoscience Research Infrastructure



Downward-Looking Telescope

Key AuScope Locations & Sustainable Development Goals (SDGs)

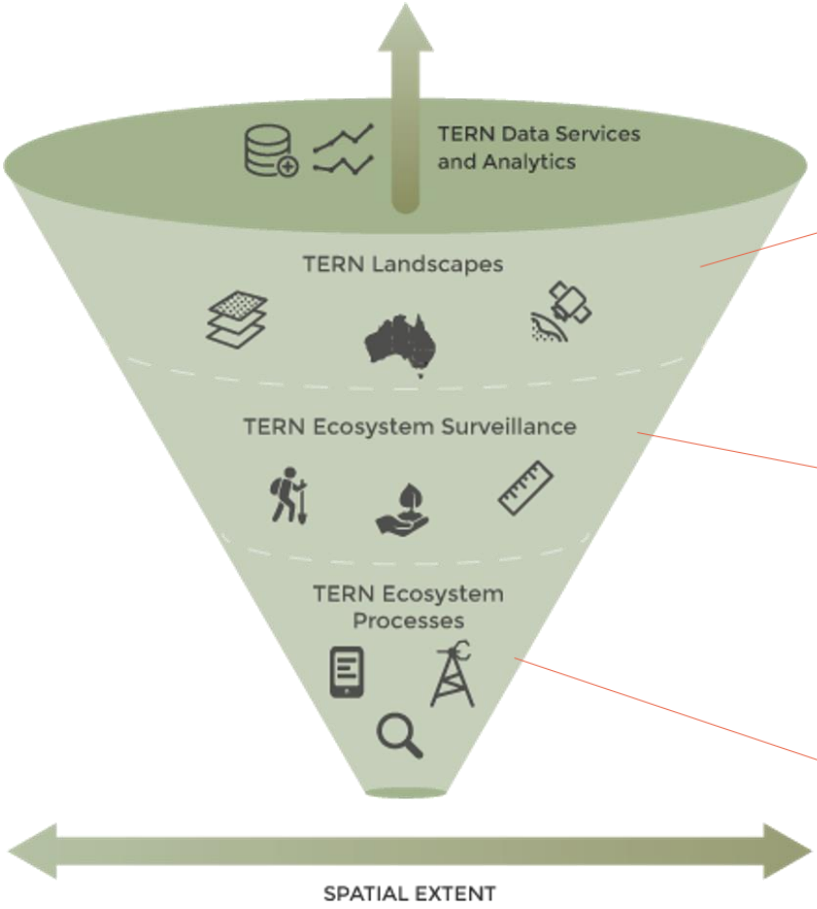
- SDG 6 — Clean Water & Sanitation
- SDG 7 — Affordable & Clean Energy
- SDG 8 — Decent Work & Economic Growth
- SDG 13 — Climate Action
- SDG 9 — Industry, Innovation & Infrastructure
- SDG 15 — Life on Land

AuScope | NCRIS National Research Infrastructure for Australia

AuScope acknowledges Aboriginal and Torres Strait Islander people as Traditional Custodians and the first geoscientists of the Australian continent where our scientific community and infrastructure are located. We pay our respects to their Elders past and present. Note: This schematic is not to scale.

auscope.org.au

TERN in Operation



- Satellite remote sensing products
- Monthly AET
- Land cover dynamics and phenology
- Vegetation composition and structure
- Fire dynamics and impacts
- Continental Soil & Landscape data
- Daily soil moisture
- Plot-based surveillance monitoring
- Soil sample, leaf tissue samples, LAI, Basal area, ground cover
- Cosmos soil moisture
- Carbon, energy, water fluxes
- Phenocams
- Acoustic sensors
- Flora population

tern

Data Management, Analysis and Visualisation

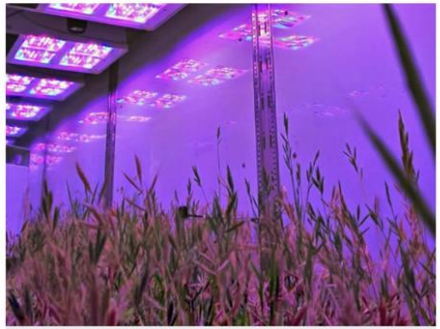
Each node of the APPF offers unique software capabilities

Australian Plant Phenomics Facility

Our multi-disciplinary team offers the full scope of data management, from statistically designed layouts at the outset through to visualisation tools on completion – all to maximise your results. We can support your research through:

- **Consultation** – on best practice protocols, project design and statistical layout.
- **Analysis** – of images, preparation of growth curves, and access to datasets and visualisations tools.
- **Bioinformatics and biometry** – by performing quality control processes on datasets, providing standard data analysis, provision of open source algorithms and access to analytical pipelines, and by assisting researchers to process and interpret complex data.
- **Data management** – including data storage and access to data sharing tools.
- **Education and training** – in plant phenomics, image analysis, bioinformatics, biometry and statistical design.

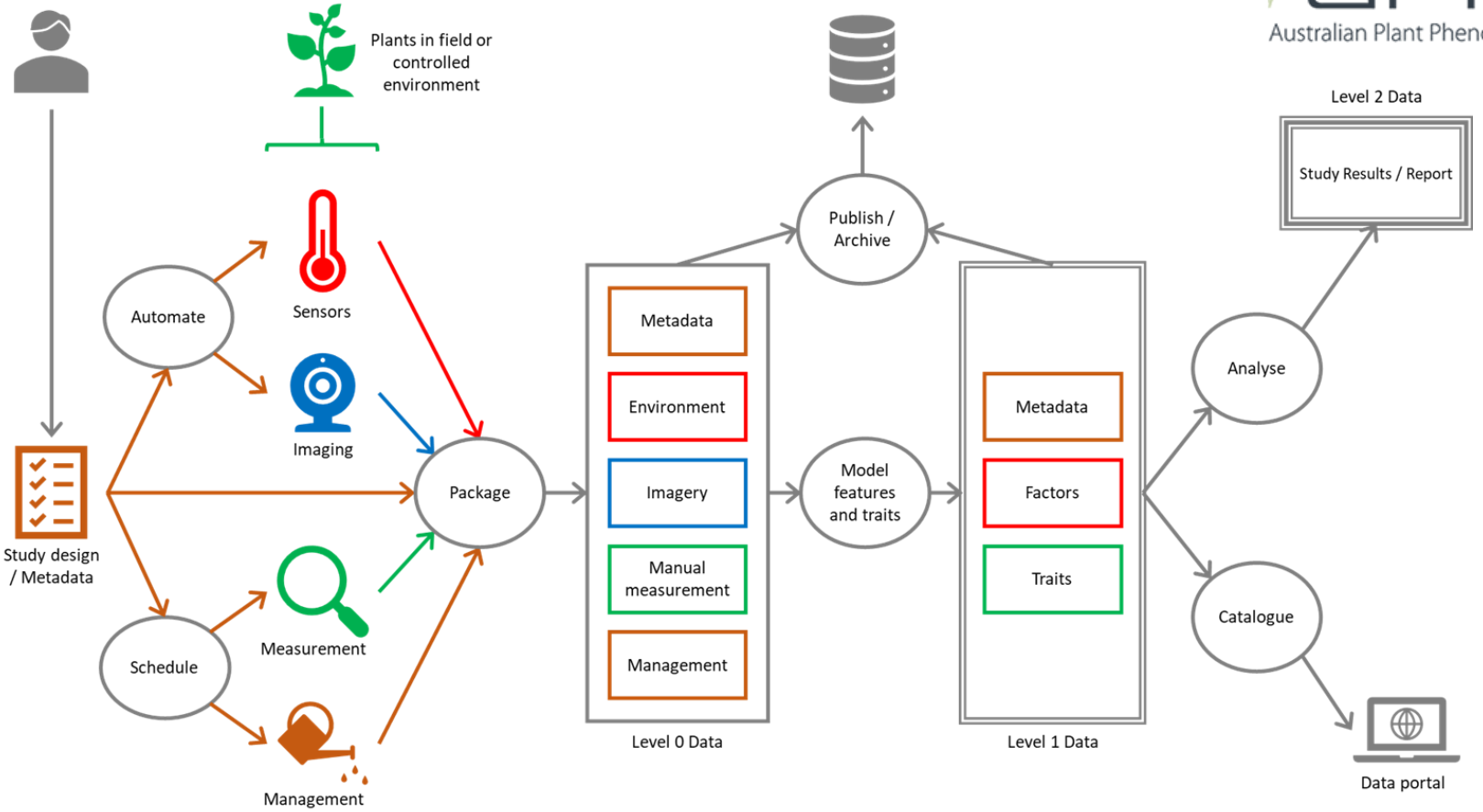
phenoSMART®



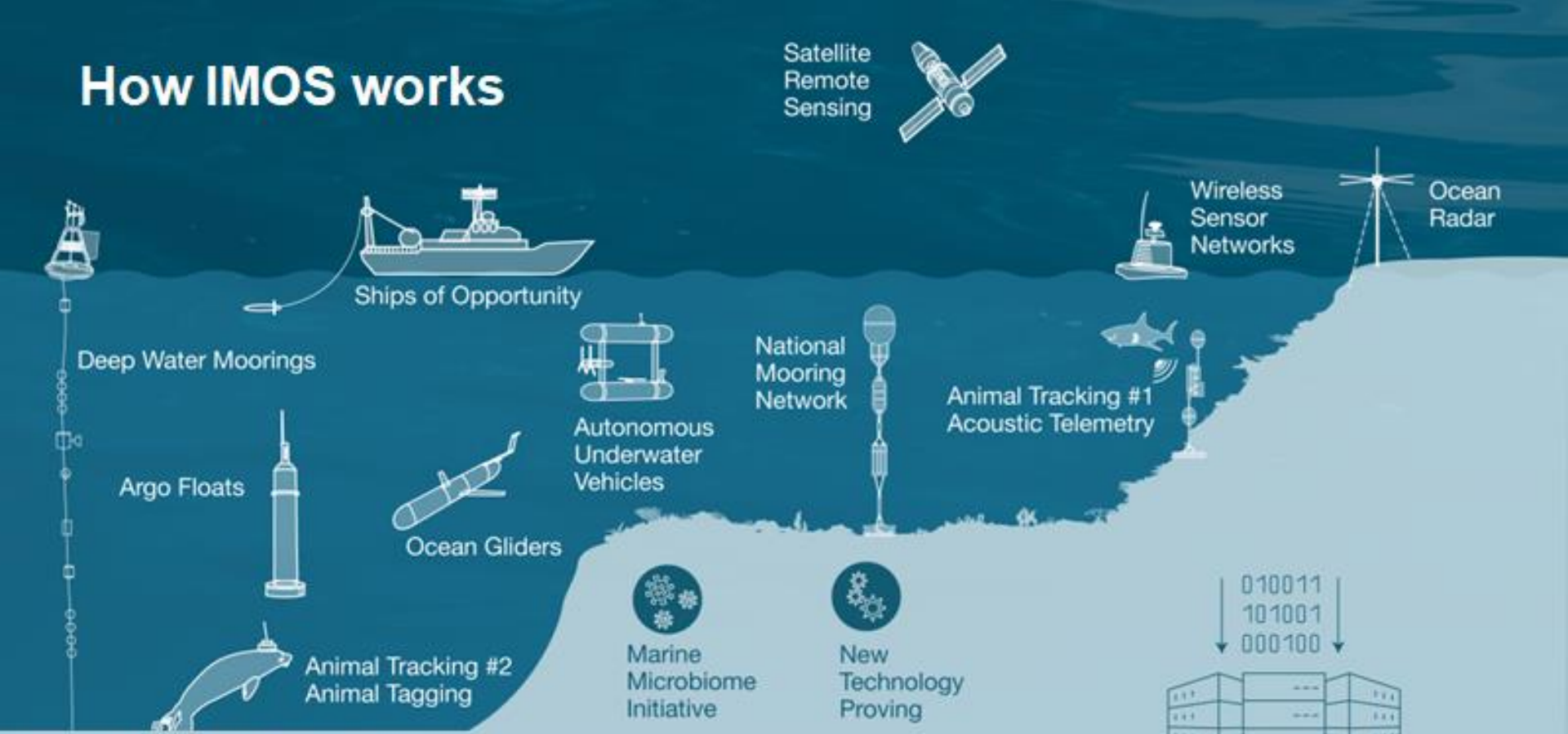
Traitcapture

Zegami

APPF strategy for plant phenotyping data



How IMOS works



Research infrastructure delivering:

- systematic and sustained observing of the marine environment
- **open data** access for scientific research and other purposes

Australian Ocean Data Network

Atlas of Living Australia
ala.org.au

The Atlas of Living Australia uses open source software solutions to provide open access to Australia's biodiversity data

Overview of the Atlas of Living Australia infrastructure, systems and applications.
Not all components are listed, for a full list visit **ala.org.au**

DATA PROVIDERS

Occurrence data

- Museums and herbaria
- Universities
- Government
- Science agencies
- NGOs and community groups
- Citizen science apps
- Industry
- Indigenous knowledge holders

Species information

- Biodiversity Heritage Library
- National checklists & taxonomies (NSL)
- Indigenous knowledge holders

The ALA is made possible by contributions from its partners, is supported by NCRIS, hosted by CSIRO and is the Australia node of GBIF.

NCRIS National Research Infrastructure for Australia
CSIRO
GBIF

BACK END SYSTEMS

Data ingests from data providers

- Species occurrence records
- Dataset metadata and data quality assertions
- National checklists & taxonomies (NSL)
- Species information
- Environmental layers
- Images, sounds, videos
- Spatial classifications
- BioCollect project data

Services

- Sensitive data service
- Occurrence search and download
- Image service
- Layer processing
- User management
- Digital Object Identifier (DOI)
- Record annotations
- Aggregated taxonomic backbone
- Application support
- Data provider metrics

Databases

PostGIS · Geo Server · MySQL · Mongo DBElastic · Cassandra SOLR

aws · NCI · CSIRO

WEB SERVICE API'S

(JSON, XML, WMS, CSV)

FRONT END SYSTEMS

Access and download species information

- Species profiles
- Download data
- Species list tool
- Data provider pages
- Australia's Natural History Collections
- ALA4R
- Search ALA: species information and occurrences

Map and analyse data

- Spatial Portal
- Explore Your Area
- Explore regions

Collect and share data

- BioCollect
- Digivol
- iNaturalist Australia
- Mobile apps
- ZoaTrack

About ALA

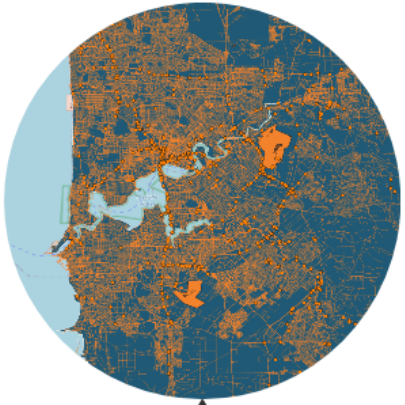
- ala.org.au
- Dashboard
- Helpdesk

POWERED BY THE ALA (examples)

- MERIT: Department of Agriculture, Water and the Environment
- Living Atlases
- Weeds Australia
- Australasian Virtual Herbarium
- The Tracks App
- IBSA and IMSA

Scanning Data Availability

Undertaking Outreach Activities



Built Environment

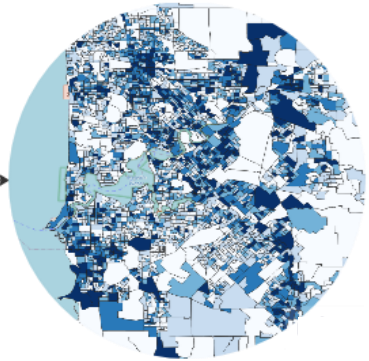
Infrastructure Services

Social Environment

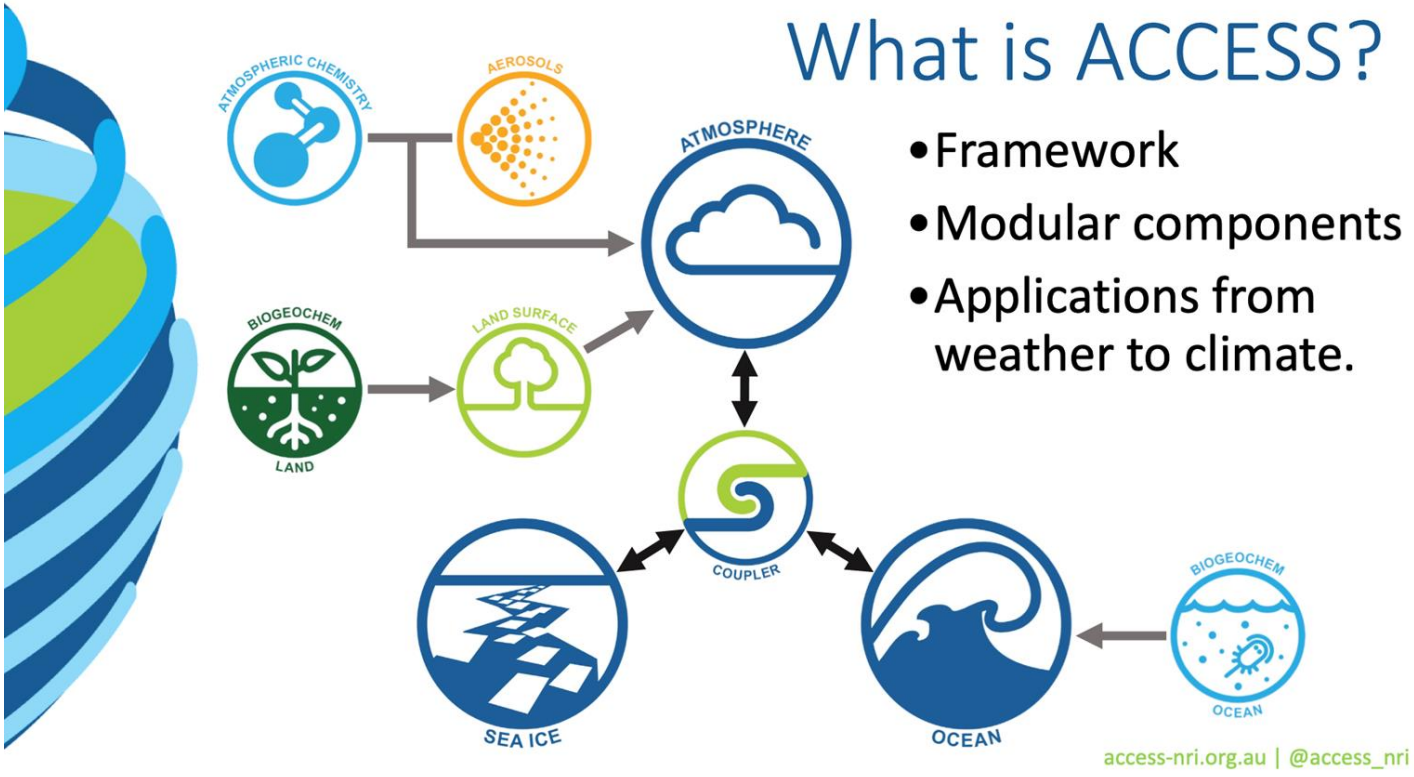
Australian Urban Systems

Providing Data Access

Making Data Research Ready



ACCESS-NRI


What is ACCESS?
•Framework
•Modular components
•Applications from weather to climate.
ATMOSPHERIC CHEMISTRY
AEROSOLS
ATMOSPHERE
BIOGEOCHEM
LAND SURFACE
LAND
COUPLER
SEA ICE
OCEAN
BIOGEOCHEM
OCEAN
access-nri.org.au | @access_nri

Suggested questions…

- How do you want to see these organisations integrate their data capability?
- How can we best share data assets and infrastructures?
- What cross-domain challenges are we facing?
- What is the innovation potential of our (soon-to-be?) interoperable data assets?
- What new transdisciplinary research could we support if ‘the world was our oyster’?