CoastRI: A National Coastal Research Infrastructure Initiative

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CoastRI

Research Infrastructure connecting land and sea

Coastal Research Infrastructure (CoastRI) is an initiative of the National Collaborative Research Infrastructure Strategy (NCRIS)

NCRIS
National Research Infrastructure for Australia
An Australian Government Initiative

Australasian Coasts & Ports 2025 Conference – Adelaide

The Coastal Challenge

- Our climate and environments are changing at unprecedented rates.
- Over 50% of Australians live within 7 km of the coast in addition to billions of dollars of infrastructure.
- To increase preparedness, sustainable use, and improve decision-making we need more data to understand implications of change to coastal areas.
- A broad suite of end-users need data on coastal conditions and change – opportunities to work closely with industry and others.

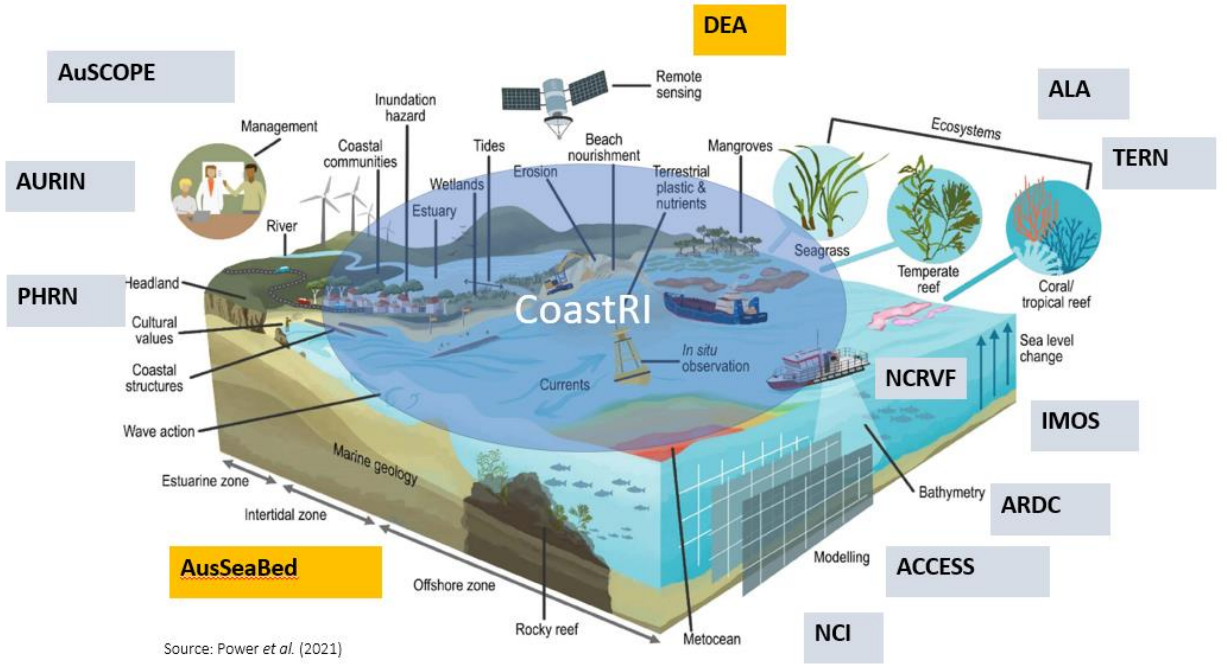
Australia lacks a national, cohesive approach to monitor, understand, predict, and adapt to these changes

Establishing a CoastRI

Vision: Research infrastructure connecting land and sea.

Objective: To gather comprehensive and integrated scientific data from diverse sources, enabling us to better understand, predict, and address the opportunities and imminent risks facing Australia's coast for all peoples.

A consortium of 13 NCRIS capabilities is working to establish national-scale coastal research infrastructure to address these issues.



Initial Funding (2023-27)

Proposals identified as immediate needs for the coastal zone (Stage 1)

1

COASTAL OCEAN MODELING COMMONS: ***(ACCESS-NRI, AusScope, NCI)***

- establishing a coastal ocean modelling commons in partnership with the University of New South Wales (UNSW).
- enhancing Australian ice sheet modelling capacities

2

COASTAL WAVES AND ESTUARINE CONDITIONS: ***(IMOS)***

- establish observing platforms will provide baseline data to understand conditions and trends in key coastal areas.

3

MONITORING SEA LEVEL IMPACTS ON COASTAL ECOSYSTEM RESILIENCE: ***(TERN, AuScope)***

- OzSET network
- integration of remote sensing combined with LiDAR to provide information about wetland vegetation characteristic.

4

SHORELINE OBSERVING: ***(AuScope, TERN, IMOS)***

- Establish drone and fixed camera/LIDAR infrastructure
- innovative citizen science and outreach components, providing complimentary, low-cost observations and critical community engagement.

5

UNDERGROUND INFRASTRUCTURE IN CRITICAL COASTAL AREAS: ***(AURIN)***

- access to currently unavailable and hard-to-get urban infrastructure data assets, such as subterranean utilities

6

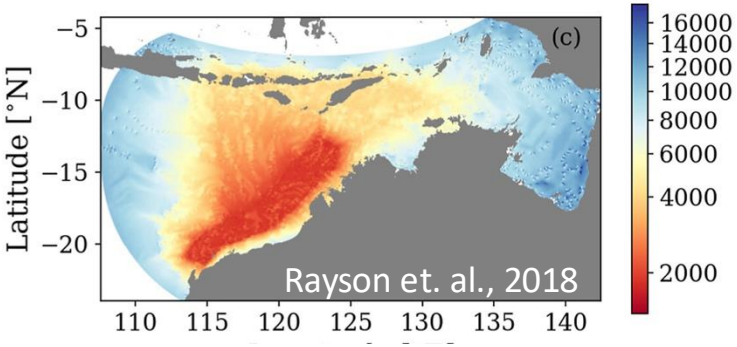
PLANET RESEARCH DATA COMMONS: ***(ARDC)***

- infrastructure for environmental prediction, trusted data spaces, models, storage, synthesis activities, indigenous data, and data sharing between sectors.
- data and modelling platforms for research & decision making

1

Coastal ocean modelling commons

Existing models and project aims

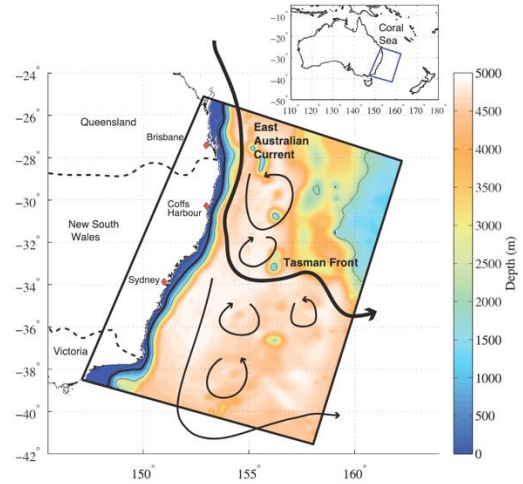


Existing models and challenges

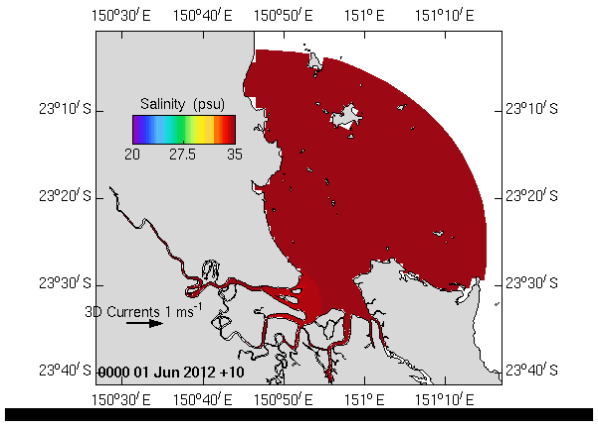
- A diversity of models developed for Australian oceans
- Coverage gaps and collaboration barriers

Project Aims

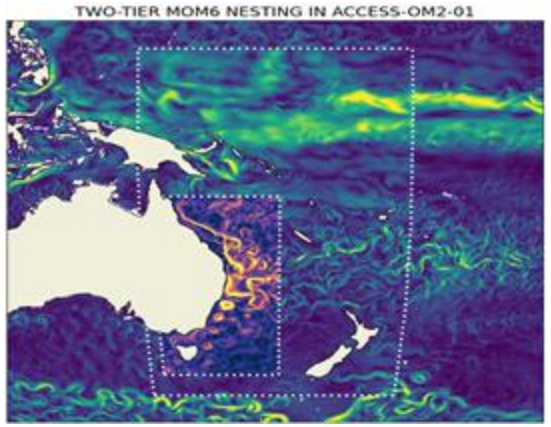
- Lower the barrier of entry and upskill existing models
- Enable collaboration, access, scales and processes, fill gaps



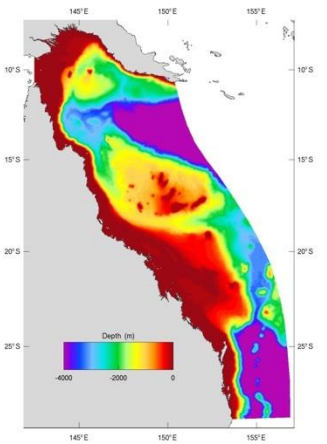
Kerry et. al., 2016



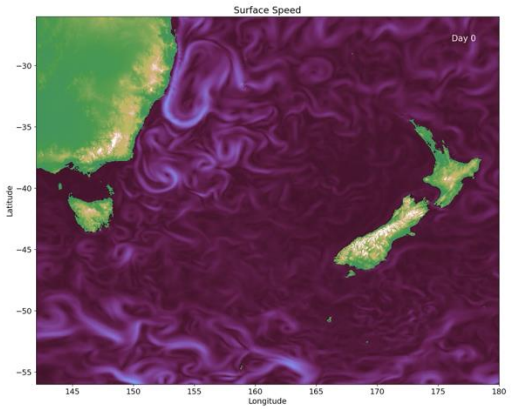
https://research.csiro.au/cem/software/ems/hydro/unstructured-compas/



Barnes et al., 2024



https://www.ereefs.org.au/



Barnes et al., 2024

2 Coastal Waves

IMOS National Coastal Wave Buoy Facility

Central Facility: University of Western Australia

Australia Coastline and Coastal Hazards

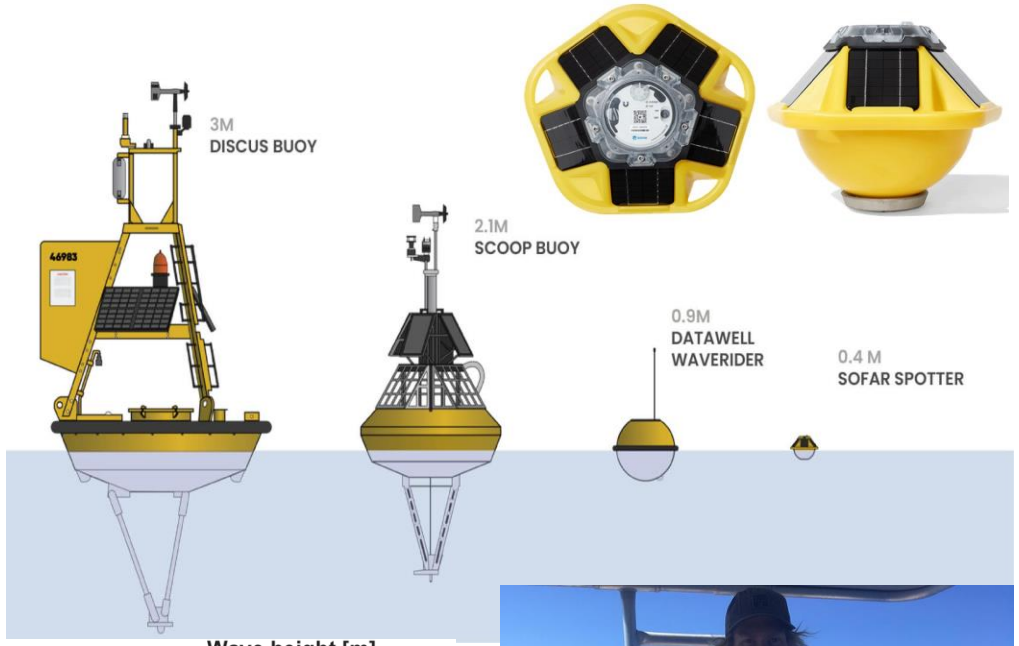
- Rising sea-level, Wave climate
- Intensification of Coastal Hazards

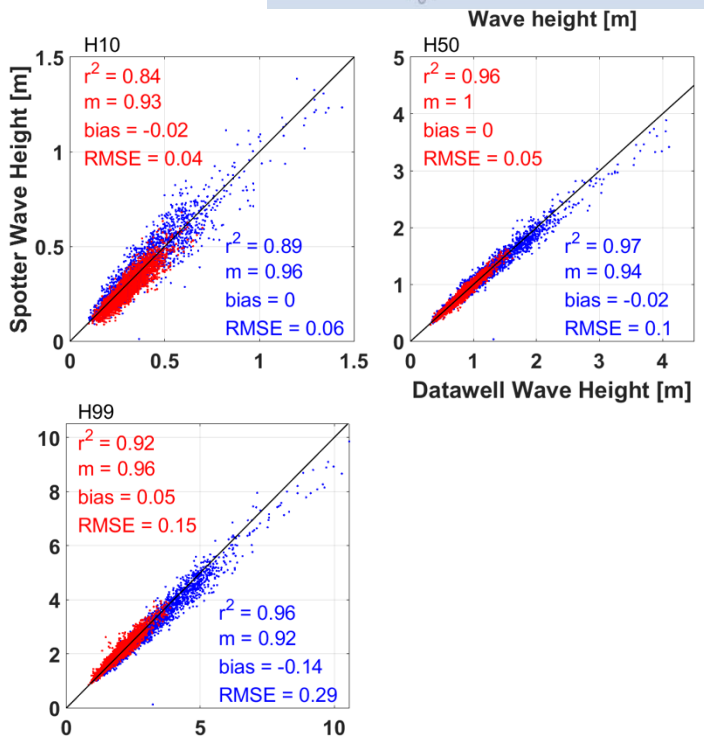
Site selection

- Model-based spatial analysis
- Regional Stakeholders input
  - Spatial gaps in existing networks
  - Co-investment opportunities
  - Needs of end-users

Instrument (~$10k AUD)

- Sofar Spotter wave buoy (0.4 m diameter, 5 kg)
- Includes a Sofar temperature sensor in hull
- Cellular/Satellite comms



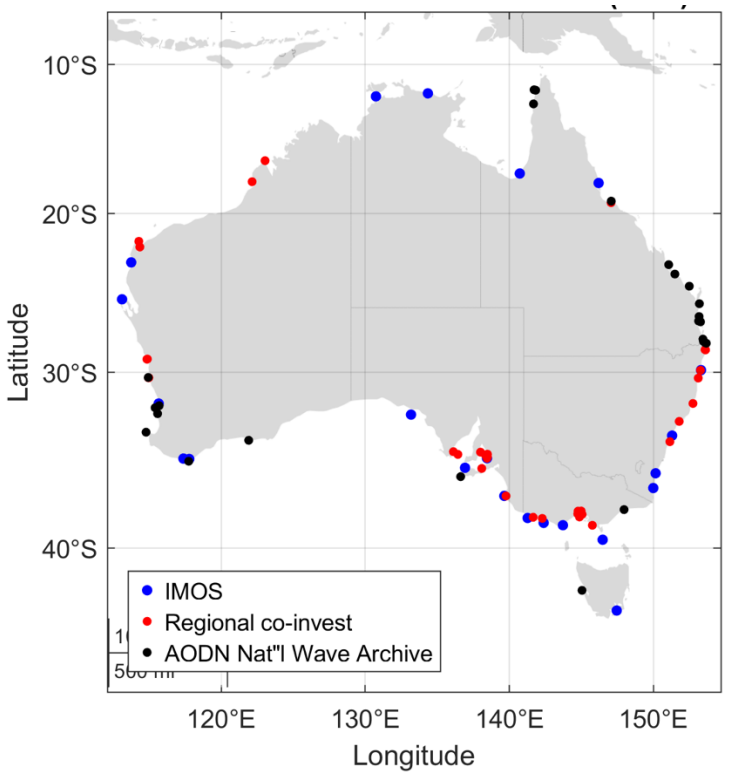


IMOS Integrated Marine Observing System

2 Coastal Waves

Wave Buoy Status

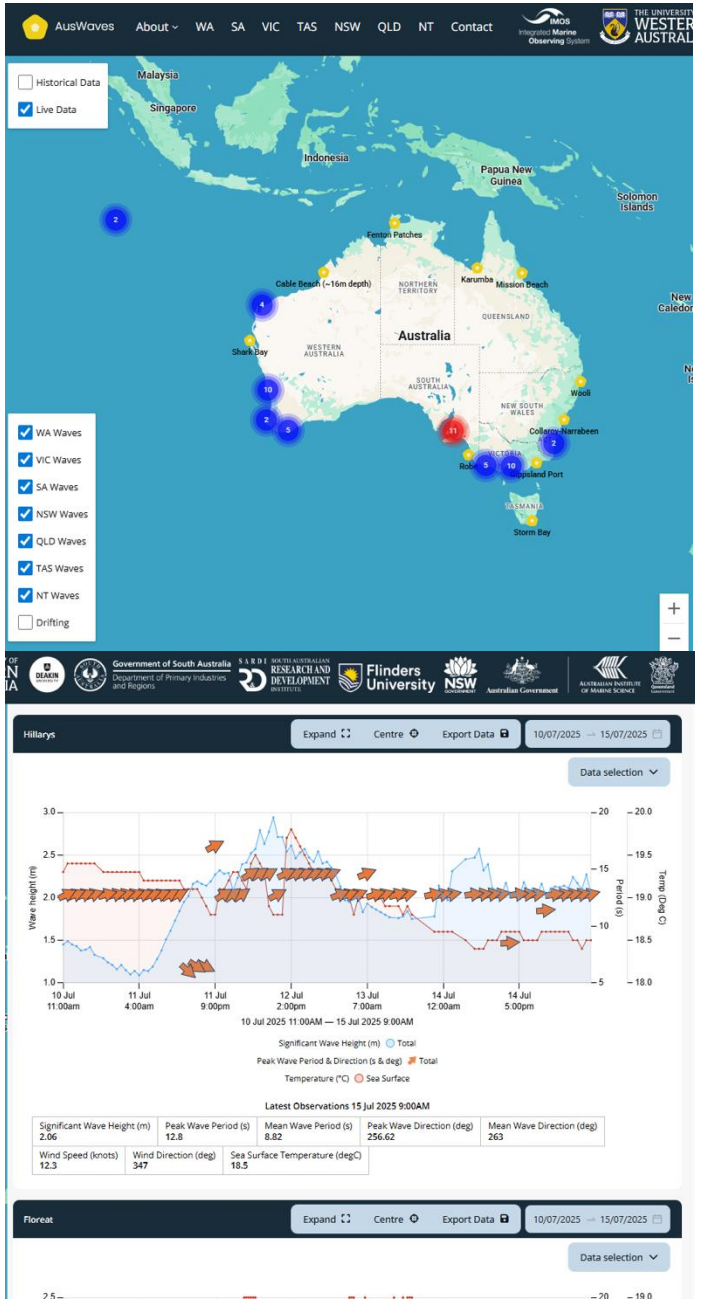
- Since March 2024, 50 deployments
  - 20/23 nationally supported
  - 30/34 regional co-investment



Data availability

- Facility collects near real-time data, provides visualisation, and data accessibility in CSV for wave parameters.

AusWaves.org



Contact ryan.lowe@uwa.edu.au

IMOS Integrated Marine Observing System

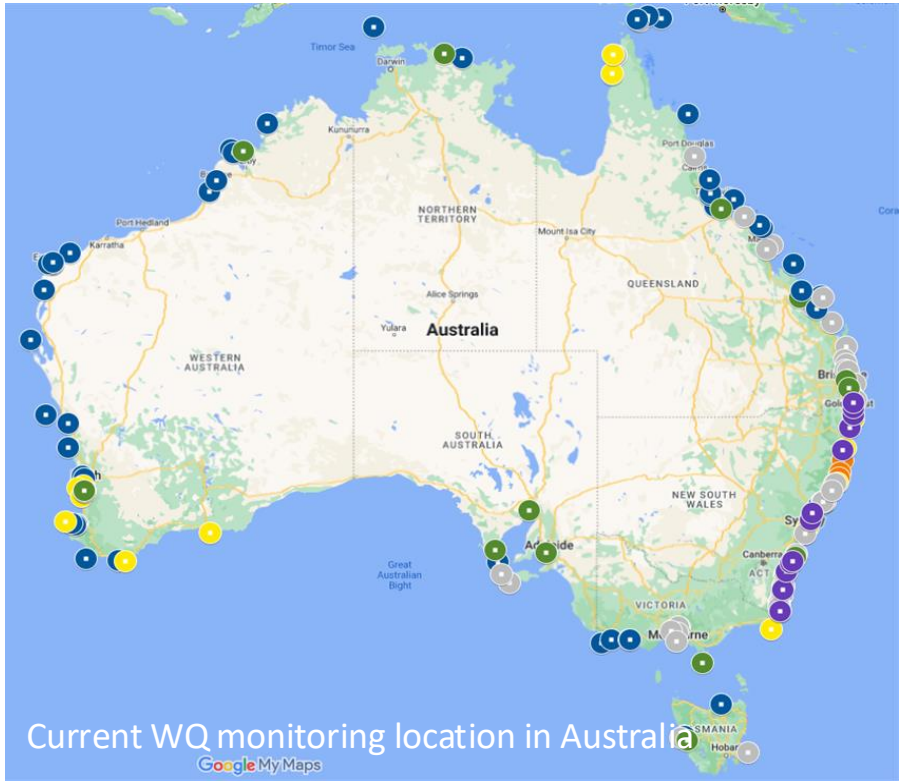
2 Estuarine Conditions

IMOS Estuarine and Coastal Mooring Facility

- **Central Facility:** South Australian Research and Development Institute (SARDI)

Site selection

- Underway



Current WQ monitoring location in Australia

Facility Objectives

- ✓ Identify and fill key national scale estuarine and coastal water quality observing gaps (e.g. T, P, S, Chla, DO, turbidity)
- ✓ Provide sustained, near real-time observations including CTD vertical profiles and *in situ* water sampling
- ✓ Provide quality-controlled water quality data following standardised 'best practices' to the wider community & support advancements in ocean modelling and forecasting.
- ✓ Expand into coastal environments (Stage 2, funding dependent)

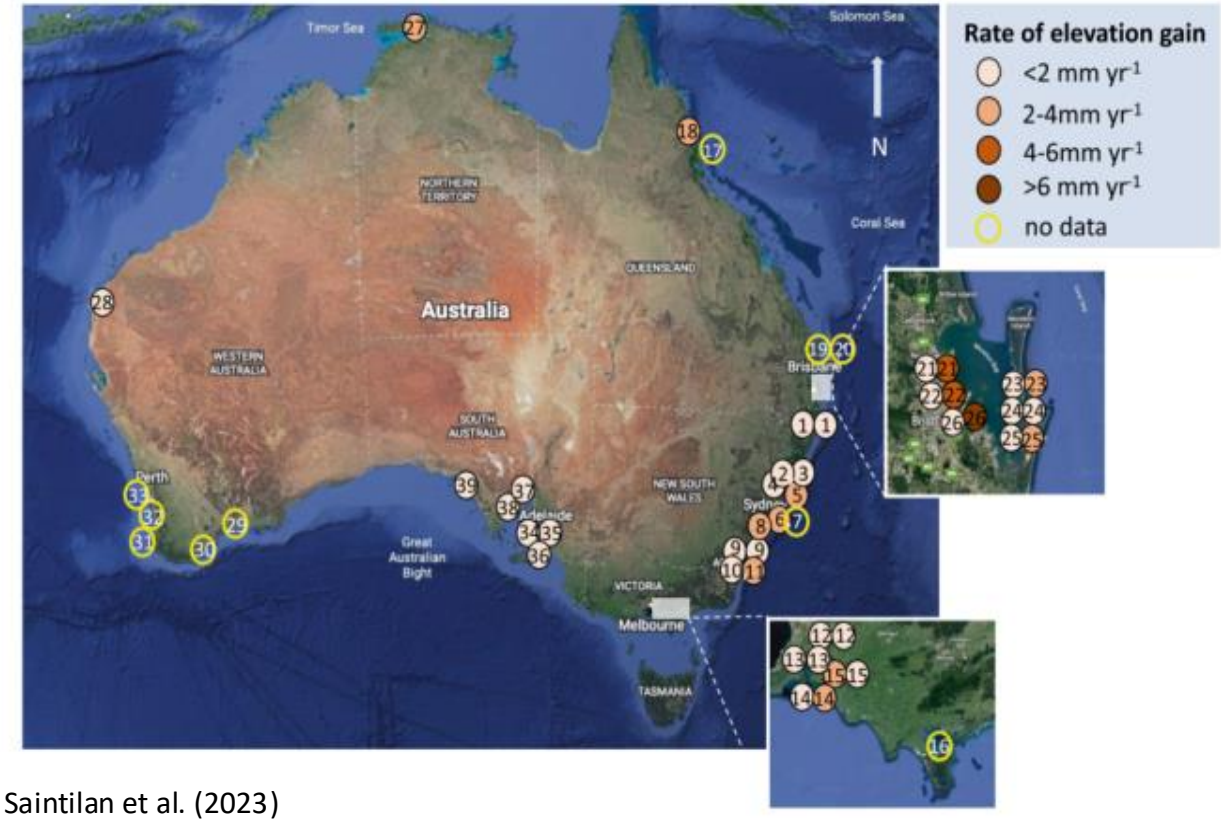

Tweed River flood, unknown source

Contact paul.malthouse@sa.gov.au

IMOS Integrated Marine Observing System

3 Monitoring sea level impacts

The Australian SET-MH network: OzSET



Saintilan et al. (2023)

- Sea-level rise threatens coastal wetland communities (mangrove and saltmarsh)
- Tracking elevation reveals:
  - Above-ground changes (eg: sedimentation or erosion)
  - Below-ground changes (eg: root growth)
- Surface elevation tables (SETs) measure these processes to calculate subsidence
- 300 + (R)SETs across Australia
- Some with 20+ years of data
- Making historic data publicly available
- Strategically expanding to fill geographic gaps and build local capacity

https://tern.org.au/ozset

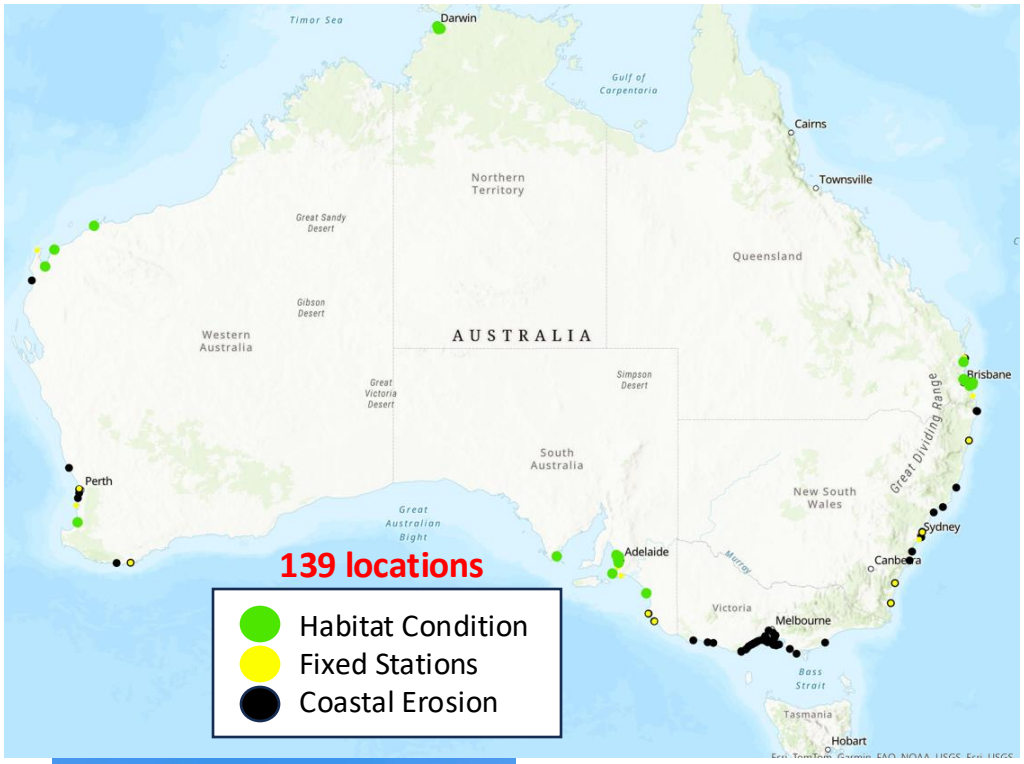
Contact: madeline.goddard@uq.edu.au

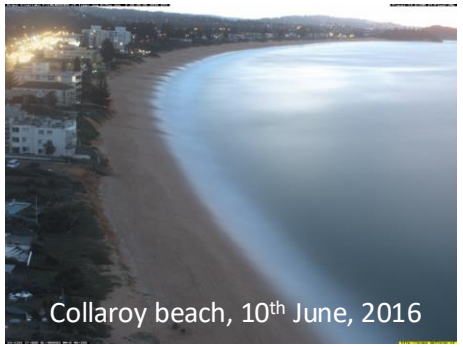
4 Shoreline Observing

Long range drones and fixed cameras

- Working with the community to prioritise site locations for coastal erosion & habitat condition monitoring
- Expansion of Citizen science through CoastSnap and drone mapping protocols

Bridge gap between traditional remote sensing and field observations





CoastSnap
community beach monitoring

Contact iero@deakin.edu.au

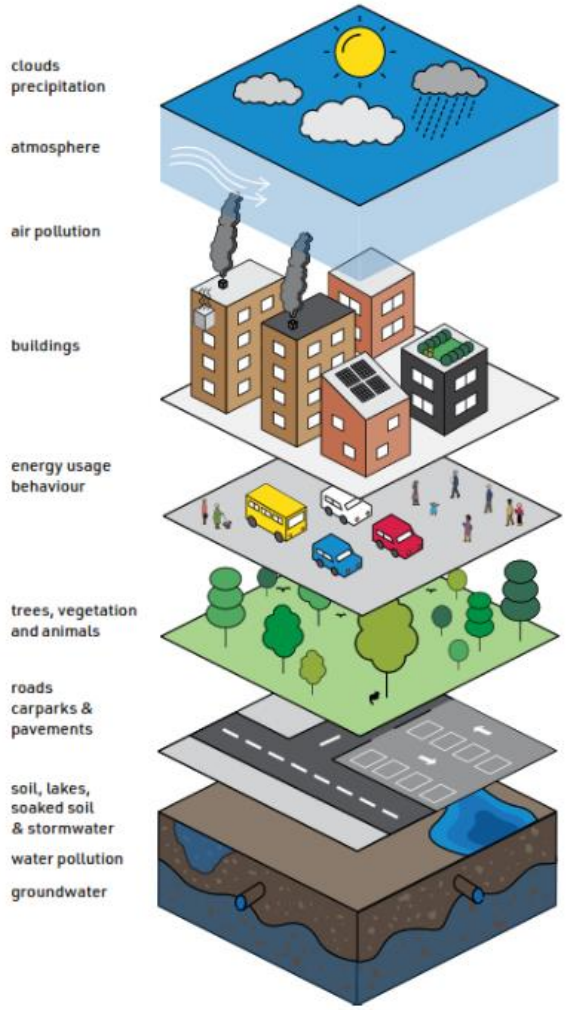
5 Underground infrastructure in critical coastal areas

CityGML extension - Scoping 3D underground data integration

- Collaboration with Bahram Saeidian (CSDILA, University of Melbourne).
- In coastal areas, it is essential to capture the physical and legal geometries of underground assets, vulnerable to flooding and inundation.
- The proposed CityGML extension ensure that 3D models accurately represent these assets.

Australian Urban Climate RI (AUCRI) - Downscaling climate modelling outputs for urban areas

- Evidence-based policies and interventions to mitigate the impact of climate change on cities is hampered by our lack of understanding of direct interactions between urban and climate dynamics.
- The AUCRI initiative will adapt and enhance the design and implementation of Singapore's Digital Urban Climate Twin (DUCT).



(Source: Negin Nazarian, 2025)

Contact pascal.perez@unimelb.edu.au

CSDILA THE CENTRE FOR SPATIAL DATA INFRASTRUCTURES & LAND ADMINISTRATION

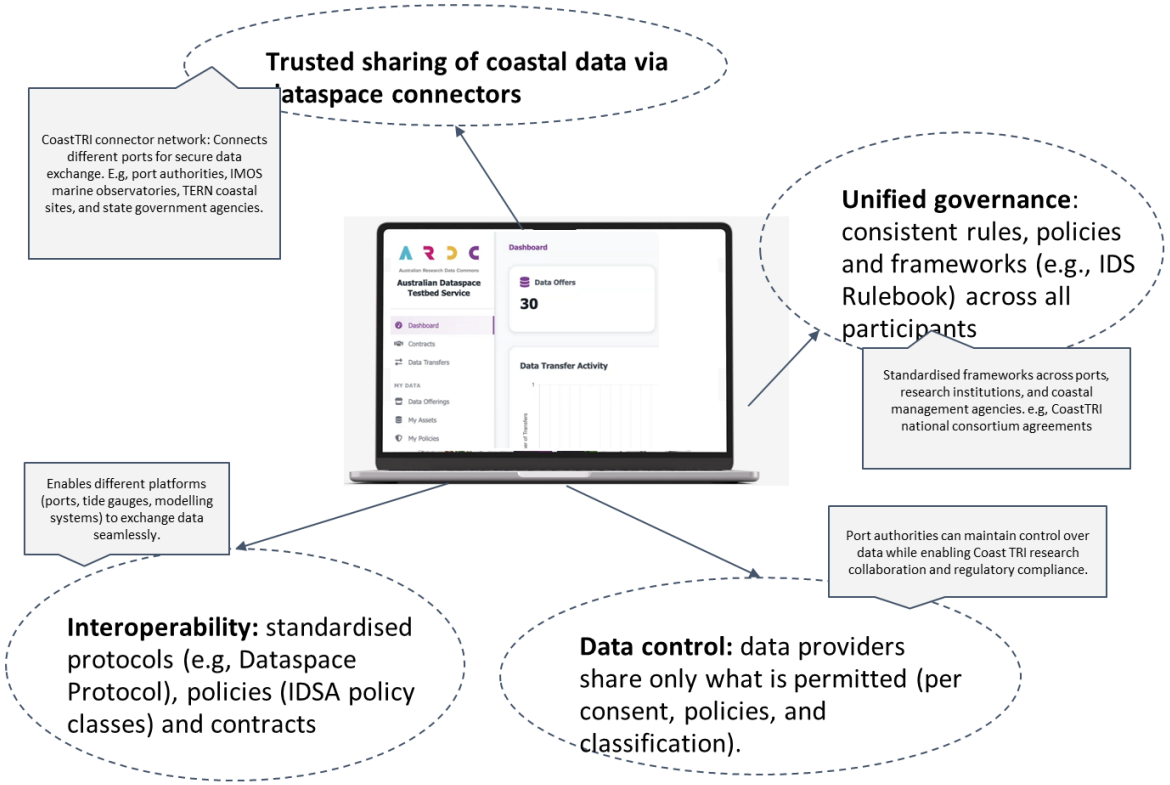
THE UNIVERSITY OF MELBOURNE

AURIN aurin.org.au

6 Planet research data commons

Working with CoastRI partners to develop a national tide and water quality product.

- Challenges: Australia's coastal data is dispersed across:
  - Marine (IMOS), terrestrial (TERN), estuarine, and socio-economic domains.
  - Held by many agencies, research groups, private industry and First Nations knowledge holders.
  - Data comes from different sensors, with different frequencies, configurations and delivery mechanisms
- Increase trust mechanisms are required to facilitate seamless data sharing between research, government, and industry
- There is a need of better alignment of effort and interoperability across sectors
- SEAF projects create exemplars (https://ardc.edu.au/project/seaf-for-pilbara-and-cockburn-sound/)

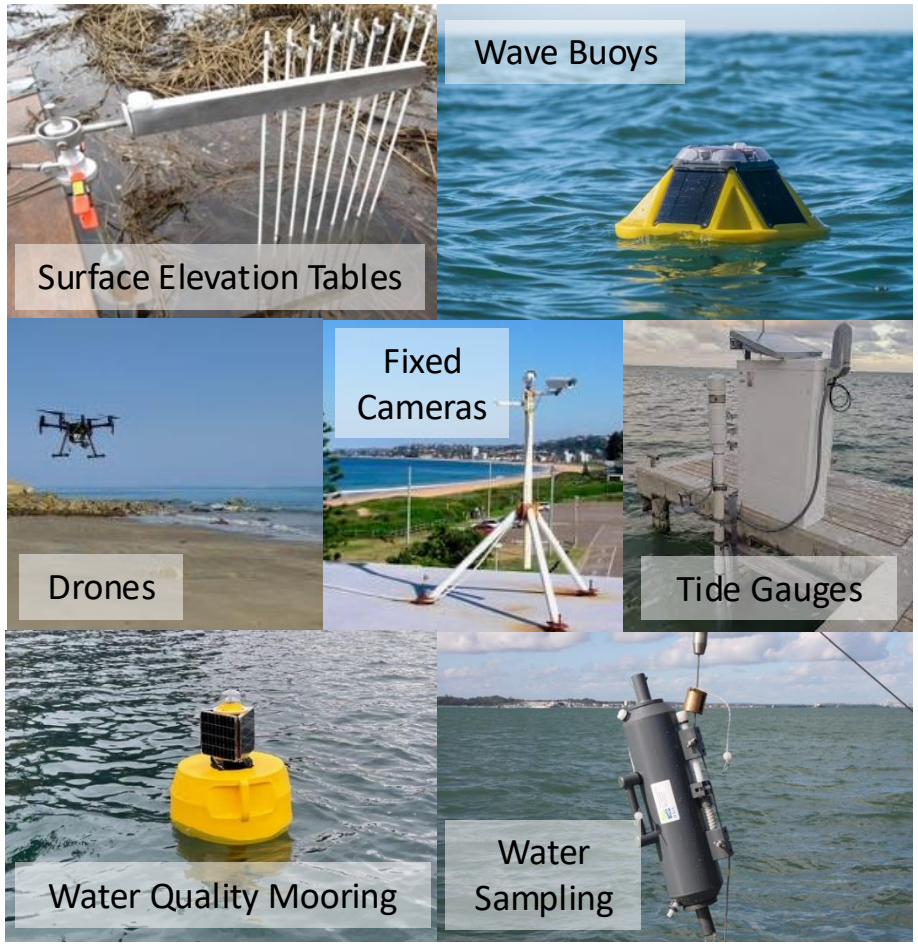


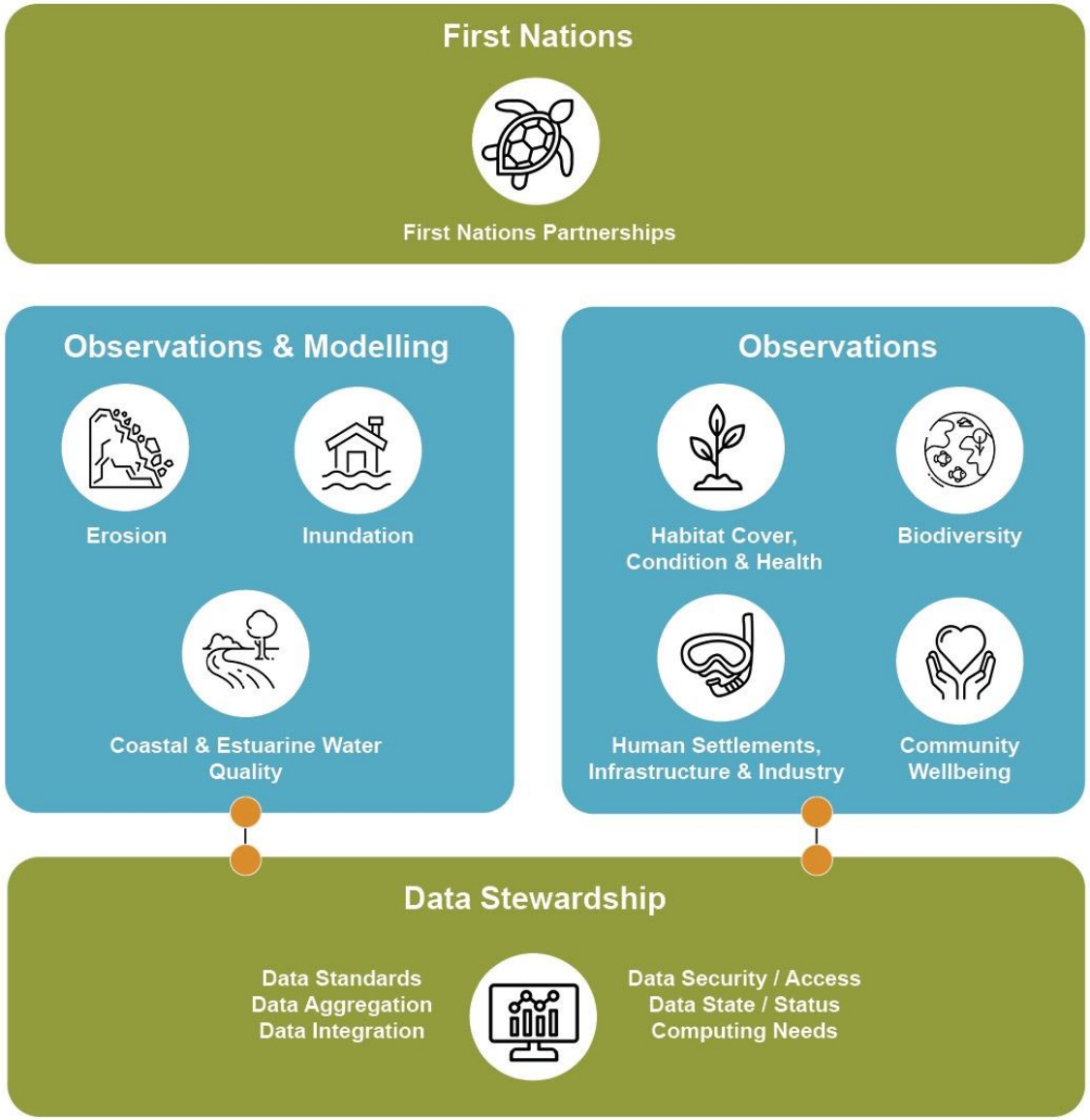
Vision: To provide trusted infrastructure for data exchange where all participants follow agreed rules and share the data.

Contact hamish.holewa@ardc.edu.au

CoastRI Elements

Stage 2





Contact Us

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Lead Scientist

Get Involved

Opportunities for Partnership/Collaboration

CoastRI

CoastRI RESEARCH INFRASTRUCTURE CONNECTING LAND AND SEA

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