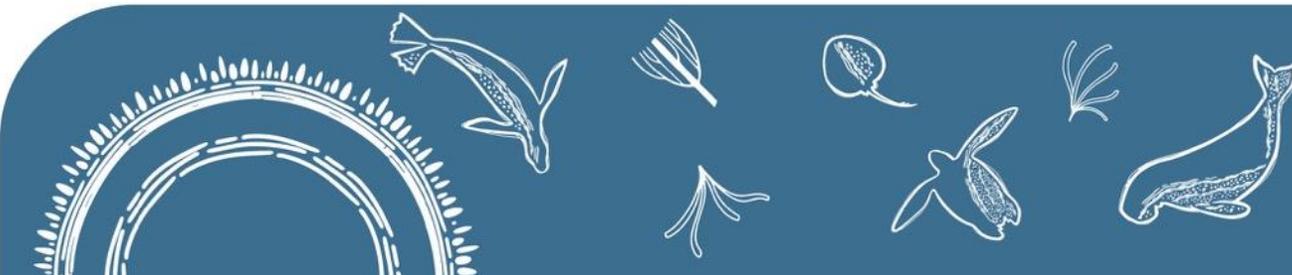




CoastRI Update



Daniel Ierodiasconou, Rebecca Zitoun, and Michelle Heupel



IMOS acknowledges the Traditional Custodians and Elders of the land and sea on which we work and observe, and recognise them as Australia's first marine scientists and carers of sea Country. We pay our respects to Aboriginal and Torres Strait Islander peoples past and present.

Establishing a CoastRI

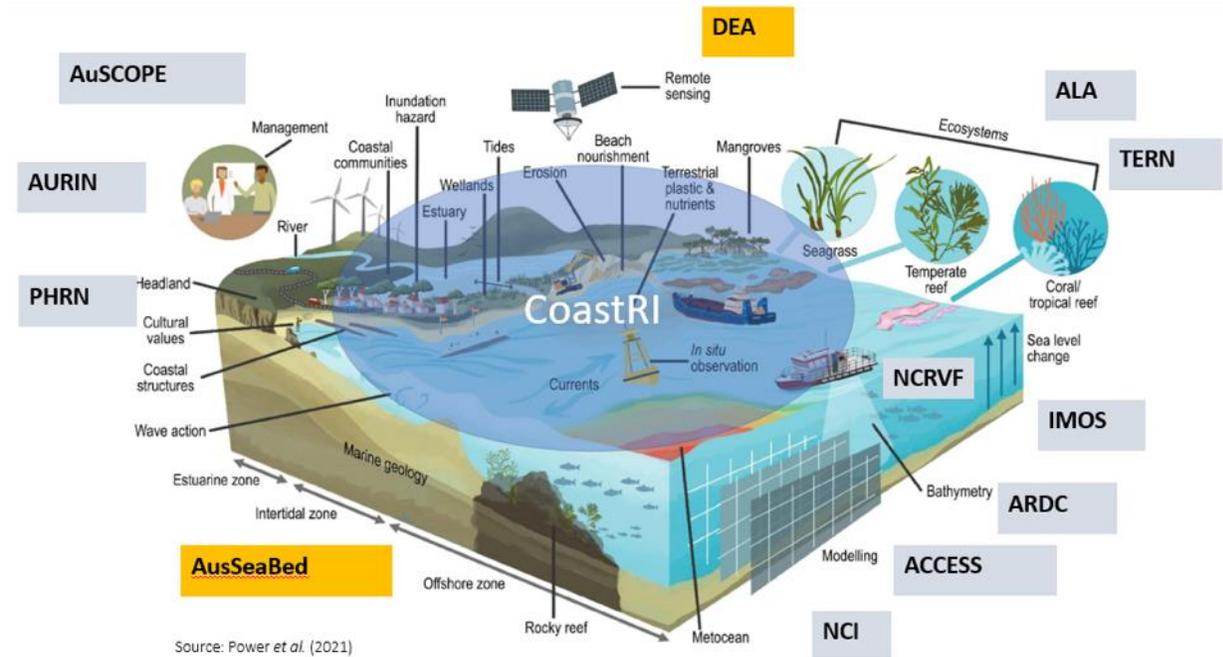
Vision: Research infrastructure connecting land and sea.

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



Australia lacks a national, cohesive approach to monitor, understand, predict, and adapt to coastal change



Staged Process



STAGE 1:

- Initial, multi-year investments
- Nationwide consultation

STAGE 2:

- Development of program description
- Implementation of CoastRI

Program description submitted to
NCRIS in October 2025



Initial Funding (2025-27)

Proposals identified as immediate needs for the coastal zone - **\$38M investment.**

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.

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

4

UNDERGROUND INFRASTRUCTURE IN CRITICAL COASTAL AREAS: (AURIN)

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

5

SHORELINE OBSERVING: (AuScope, TERN, IMOS)

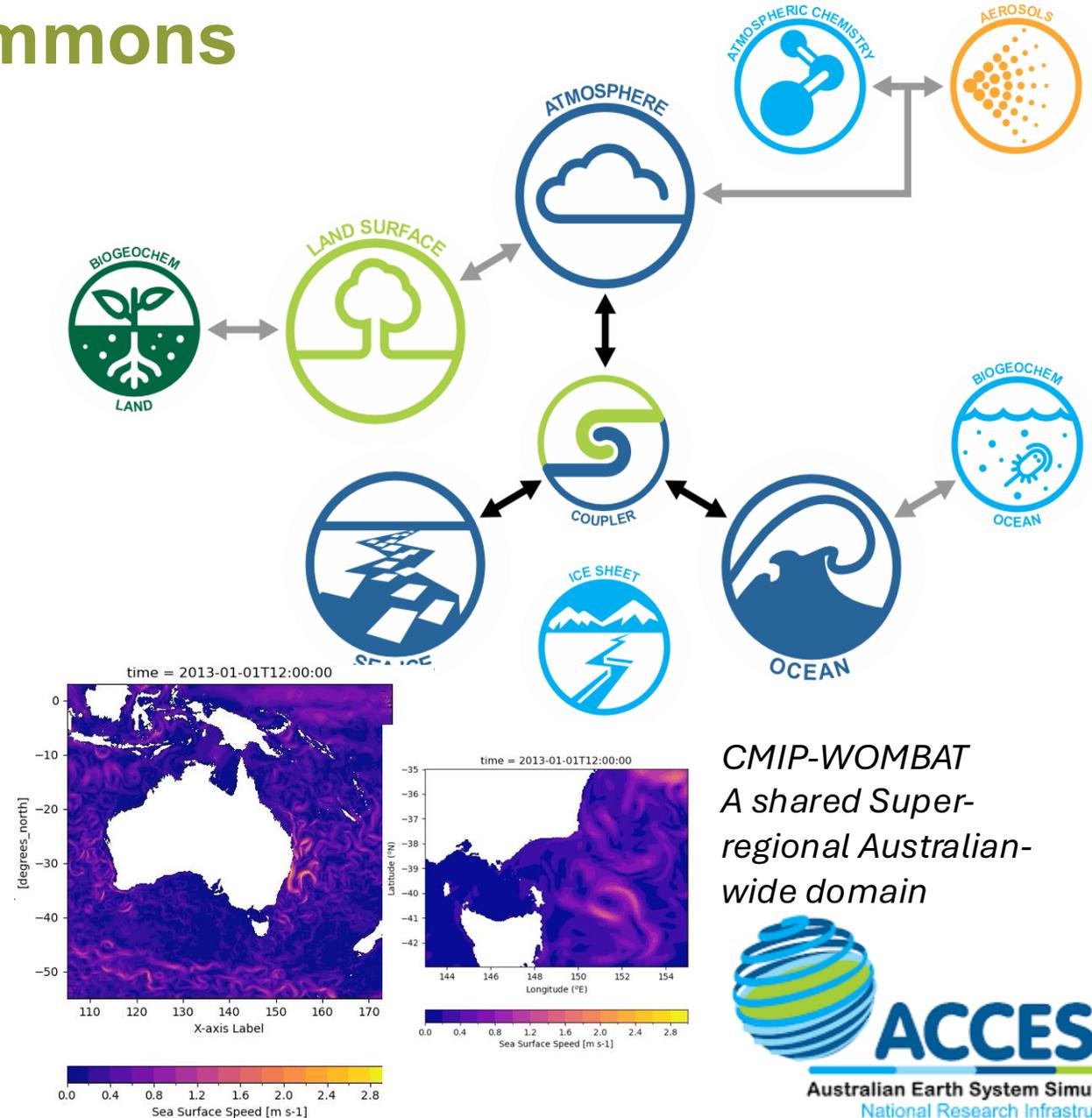
- Establish drone and fixed camera/LIDAR infrastructure
- innovative citizen science and outreach components, providing complimentary, low-cost observations and critical community engagement.

6

1

Coastal Modelling Commons

- Assessing the viability of establishing a coastal ocean modelling commons in partnership with the University of New South Wales (UNSW).
- Additional focuses on enhancing Australian ice sheet modelling capacities, with the ultimate aim of integrating ice sheets into the ACCESS framework.



2

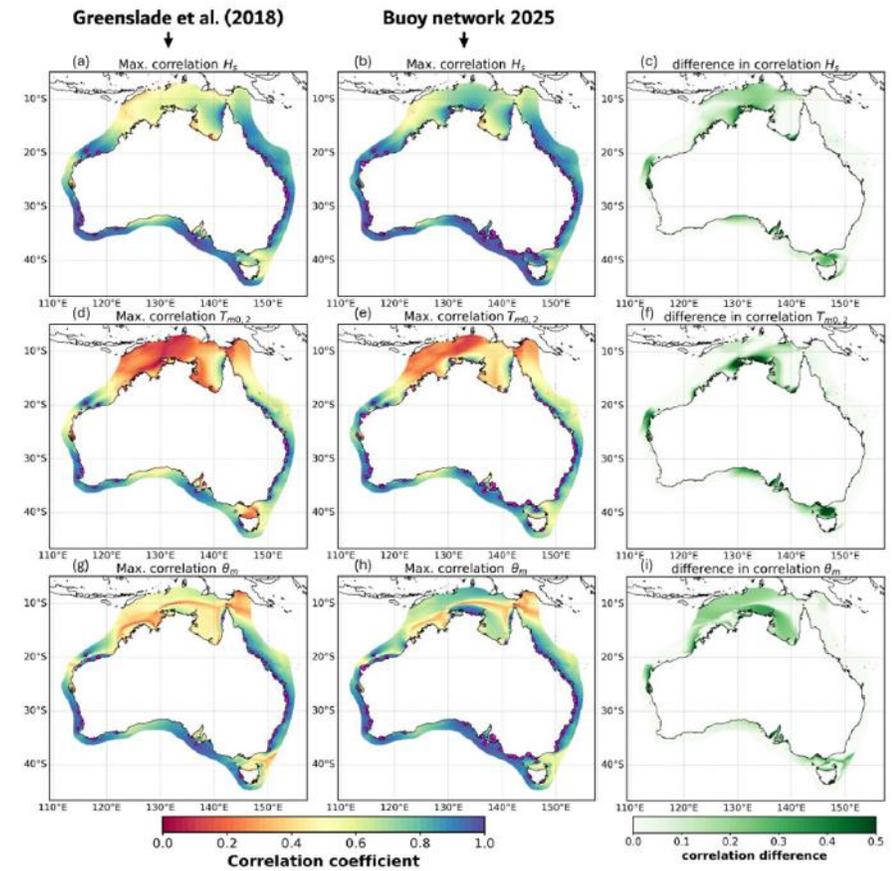
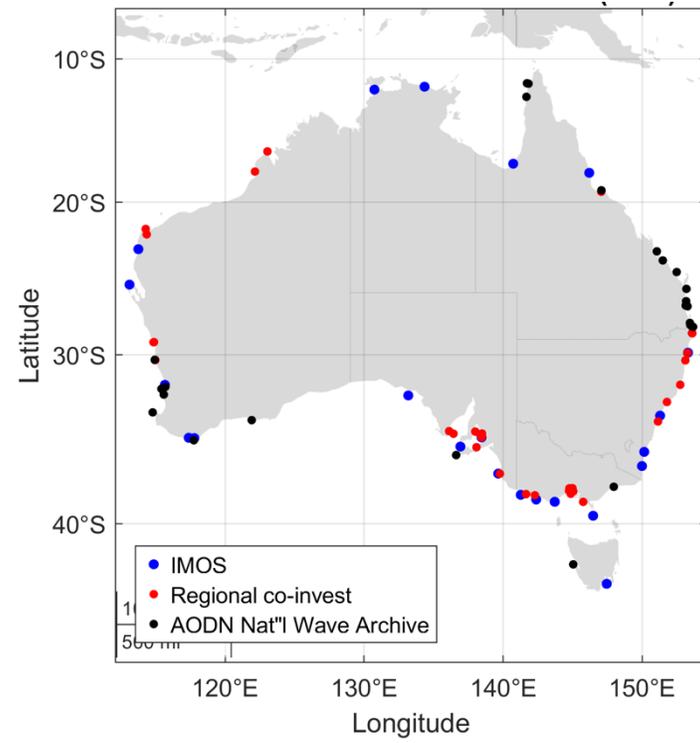
Coastal Waves

IMOS Coastal Wave Buoys

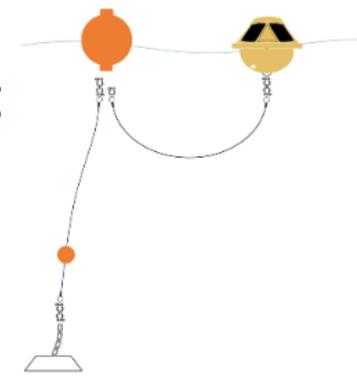
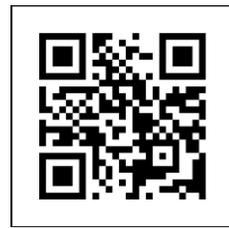
- Commenced March 2025
- Sites deployed: 59
 - 23 nationally supported (spectra RT)
 - 36 regional co-investment

Data availability

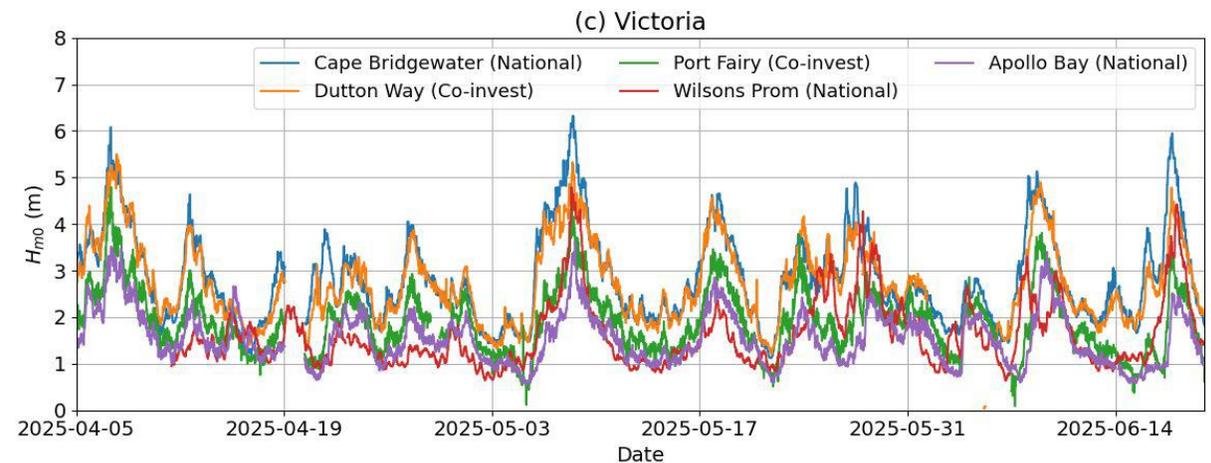
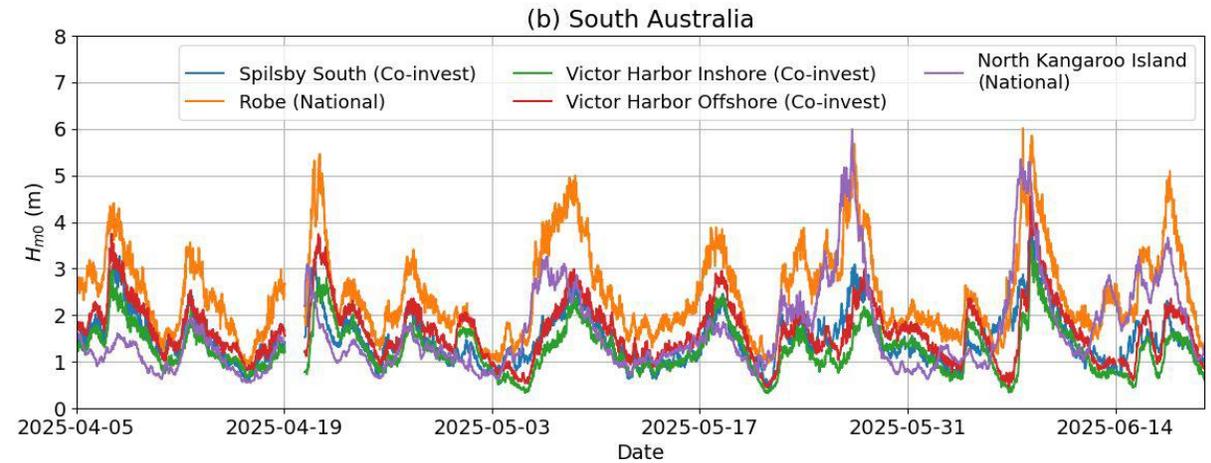
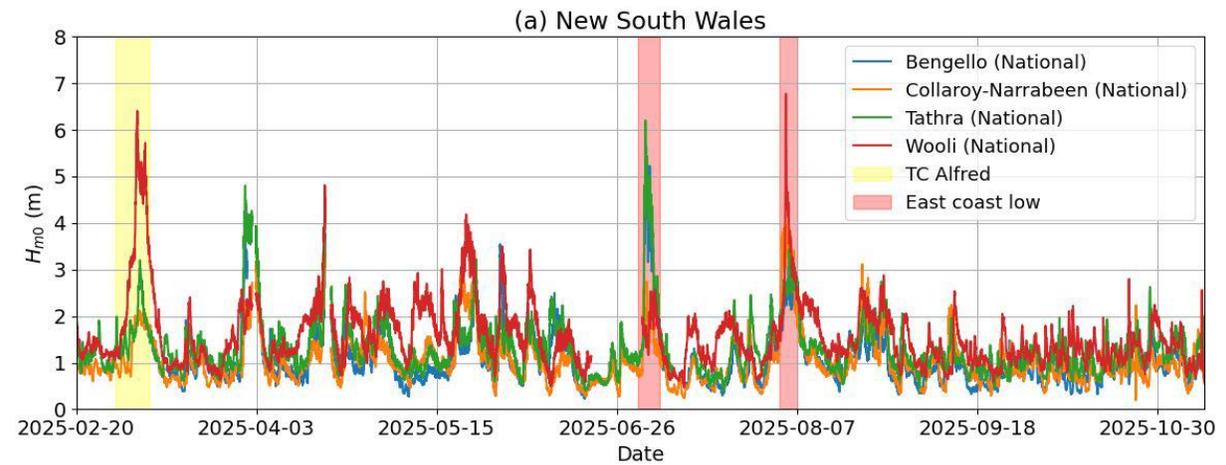
- Facility collects near real-time and delayed mode data, provides visualisation, and data accessibility for wave parameters via the AODN.



AusWaves.org

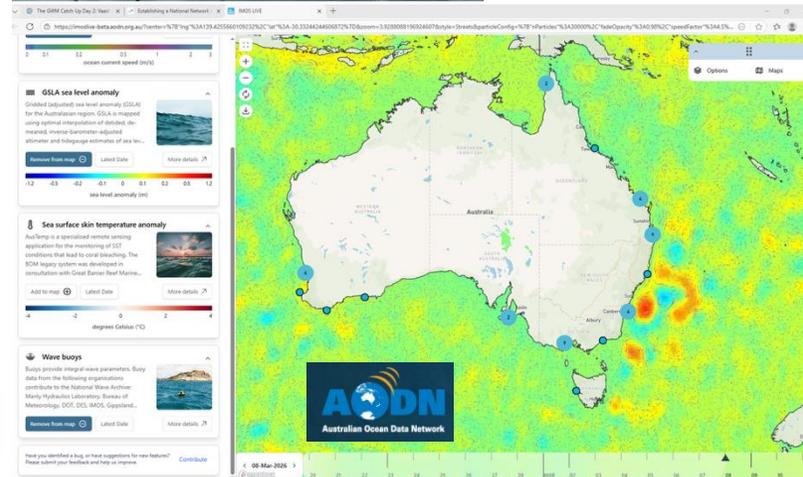
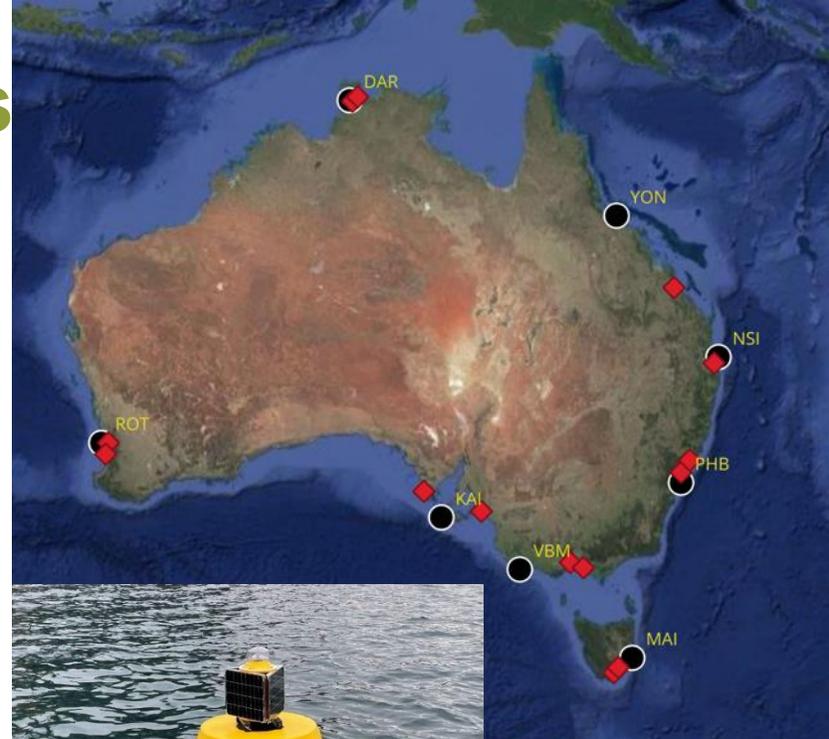


- Fully operational by July 2025 captured significant coastal wave and temperature events
- Near real-time monitoring of a severe marine heatwave in WA and a harmful algal bloom in SA
- Filling critical spatial gaps in observations and coordination of data standards.
- >26,000 days of wave obs!



2 IMOS Estuarine and Coastal Moorings

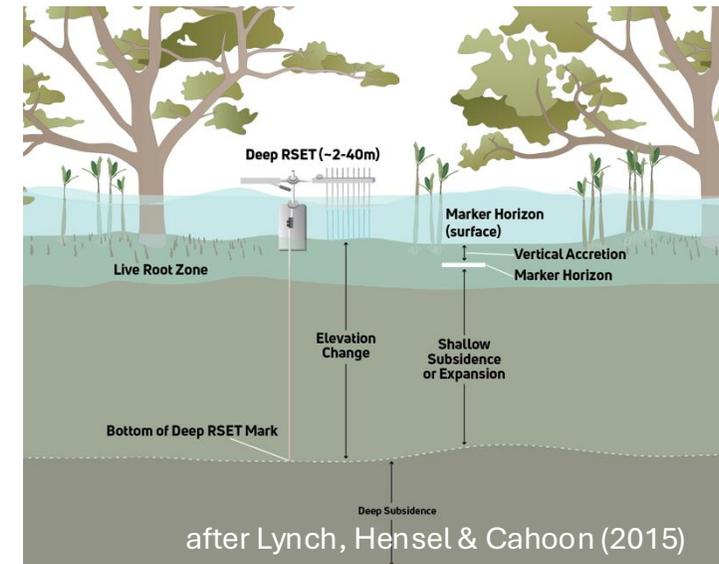
- Establishment of Central Facility for national coordination (including data quality control & delivery) [South Australian Research and Development Institute \(SARDI\)](#)
- Identify key estuarine sites and sensor payload through a [Site Prioritisation Survey and assessment process](#)
- Site assessment results indicated more than **35 key sites nationally**, 5-10 sites per state/region, of those **14 sites to receive direct IMOS funding, 2 per state** + co-investment options for stakeholders
- Xylem/YSI EXO Sondes with Temp, Cond/Sal, DO, Turb, Chl/Fl, fDOM
- July 2026-** QA/QC'd water quality data delivered in **near real-time (NRT)** and delayed mode to stakeholders through [Australian Ocean Data Network \(AODN\)](#) and the new [IMOS Live portal](#)



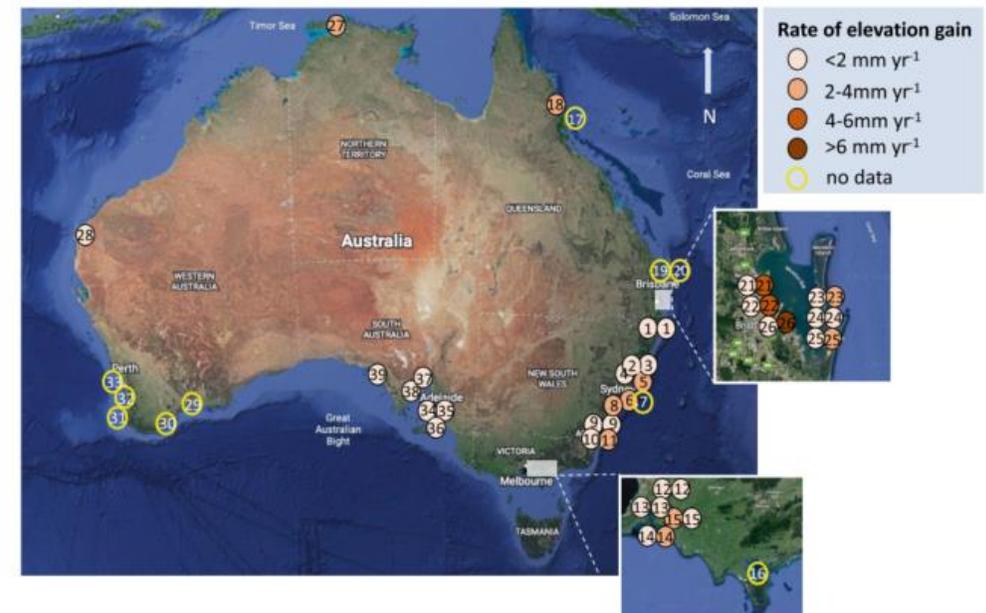
3

The Australian SET-MH network: OzSET

- Sea-level rise threatens coastal wetland communities (mangrove and saltmarsh)
- Measuring elevation through time shows how they respond to elevated sea-levels via:
 - Above-ground changes (eg: sedimentation, erosion, shallow subsidence)
 - Below-ground changes (eg: root growth)
- 300 + SETs across Australia
- Strategically expanding to fill geographic gaps and build local capacity



<https://tern.org.au/ozset>



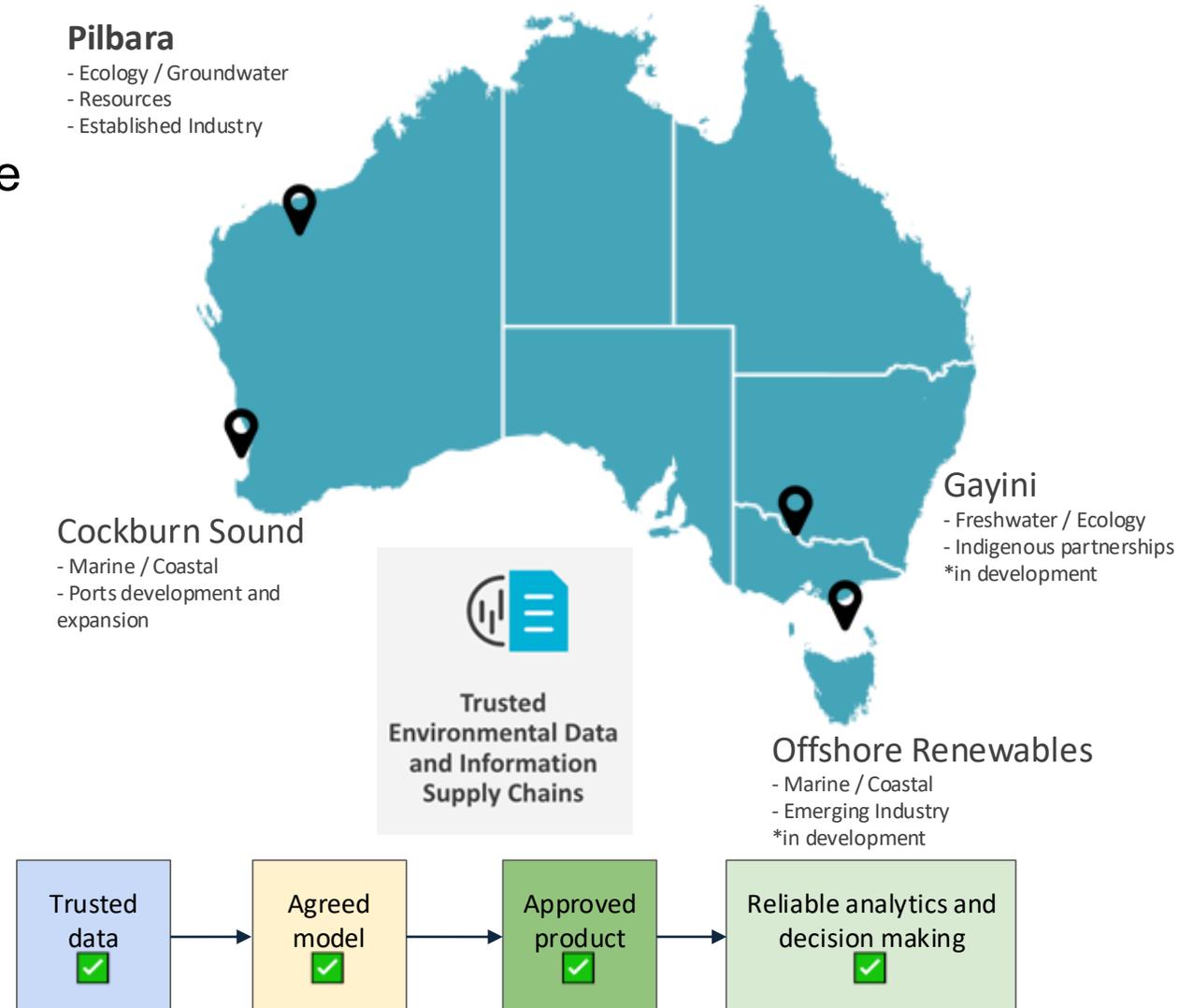
4

Planet Research Data Commons



- Challenges: Australia's coastal data is dispersed across 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 and traditional owners
- Initial focus on estuarine water quality & Tides

Exemplars: SEAF/ARDC project *Unlocking industry, Gov and Research data*

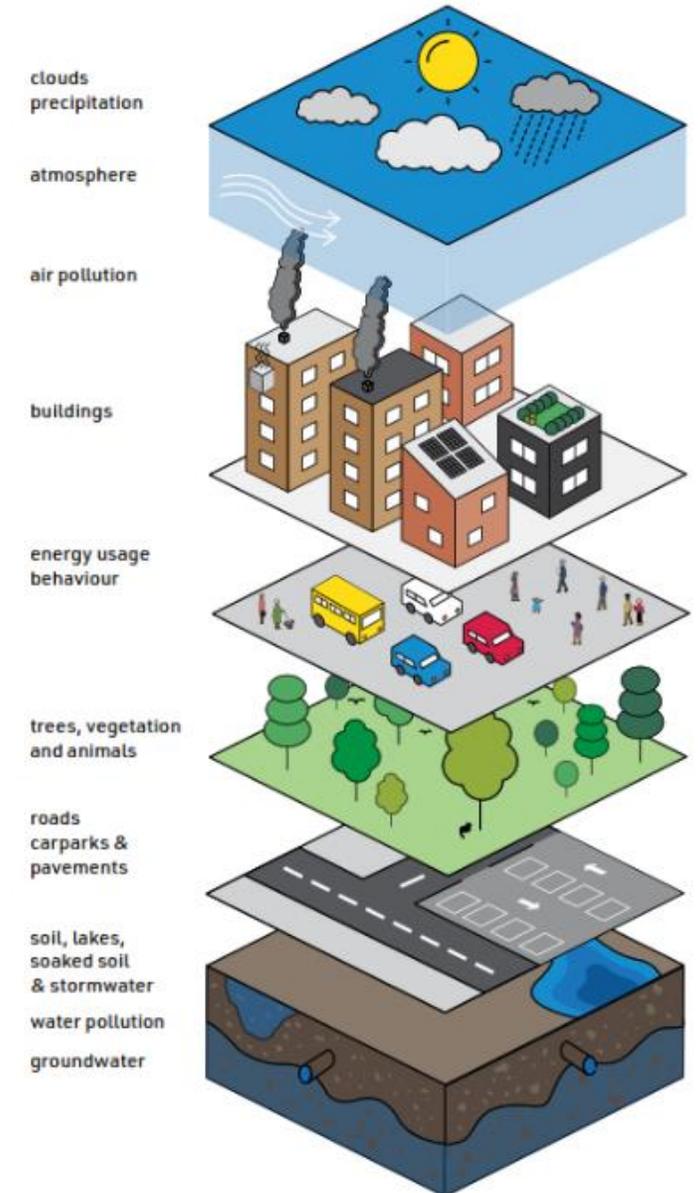


Downscaling climate modelling outputs for urban areas

- Lack of understanding of direct interactions between urban and climate dynamics.
 - Challenges in developing evidence-based policies
 - Mitigate the impact of climate change on cities
- Establishment of Australian Urban Climate RI (AUCRI)
 - NCRIS facilities (AURIN, ACCESS-NRI, TERN, PHRN and ARDC), BoM, CSIRO and the CRC for 21th Century Weather
 - Adapt and enhance the design and implementation of Singapore's Digital Urban Climate Twin (DUCT).

Underground Infrastructure

- Victorian case study
- CityGML extension expanding 3D urban models to capture the physical and legal geometries of underground assets, vulnerable to flooding and inundation..

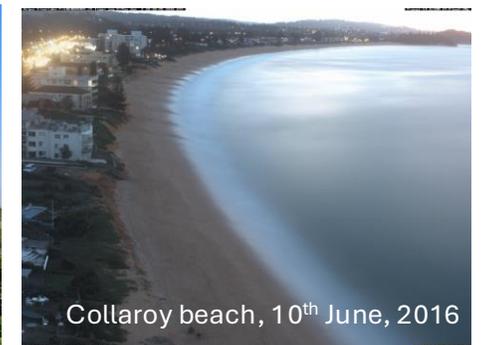


6

Shoreline Observing

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



CoastRI Elements

	Theme	Activity type	IMOS elements
WP1.1	Erosion	Observation	· wave buoy +· buoy sensors, drones
WP1.2		Data	· wave buoy data + new sensor data
WP2.1	Inundation	Observation	· estuarine water level · wave buoy smart moorings · climate tide gauges · GNSS buoys [supported by sensor mooring in EWQ]
WP2.2		Data	· wave data covered above · tide, GNSS, mooring and other new data streams
WP3.1	Coastal water quality	Observation	· sensor mooring · 'in-situ' water sampling [supported by wave buoy in erosion]
WP3.2		Data	· sensor data + manual WQ data
WP4.1	Estuarine water quality	Observation	· sensor mooring · 'in situ' water sampling [supported by wave buoy in inundation]
WP4.2		Data	· sensor data + manual WQ data
WP5.1	Biodiversity	Observation	· eDNA sampling/processing, drones
WP9	Communication/Coordination		· staff · workshops + travel
WP10.1	First Nations	Observation	TBD
WP10.2		Data	TBD

First Nations



First Nations Partnerships

Observations & Modelling



Erosion



Inundation



Coastal & Estuarine Water Quality

Observations



Habitat Cover, Condition & Health



Biodiversity



Human Settlements, Infrastructure & Industry



Community Wellbeing

Data Stewardship

Data Standards
Data Aggregation
Data Integration



Data Security / Access
Data State / Status
Computing Needs

CoastRI WP 2: Inundation



WP	NCRIS CAPABILITY	ACTIVITIES
2.1 Observations	AuScope, IMOS, SCRIV, TERN	<ul style="list-style-type: none"> • GNSS, Coastline Monitoring • Water Level, Wave Buoy Smart Moorings, Tide Gauge, GNSS buoys • Surface Elevation Tables (SET)
2.2 Data	ARDC, AuScope IMOS TERN	<ul style="list-style-type: none"> • Tide Data Aggregation • GNSS • Mooring Data, Tide Data • SET Data, Habitat Condition
2.3 Modelling	Access-NRI, NCI	Storage, Computing, Modelling Commons (-ANCOMS)



Observations: estuary water level stations, GNSS upgrades including INSAR reflectors, smart wave buoys (moorings), Climate tide gauge upgrades and leveling, Near coastal GNSS Buoys, Surface elevation tables **Data** tide data aggregation and compute, managing new data streams and storage.



United Nations Educational, Scientific and Cultural Organization



Intergovernmental Oceanographic Commission

Sea level data are vital for



Research into sea level change and ocean circulation



Coastal protection during events such as storm surges



Providing flood warning and monitoring tsunamis



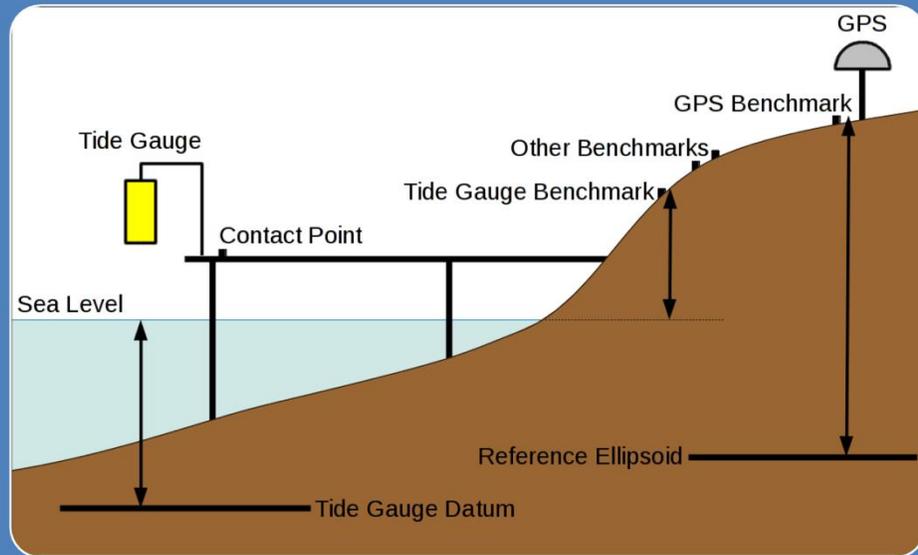
Tide tables for port operations, fishermen, and recreation



Defining datums for national or state boundaries

Sea level is one of the most useful oceanographic variables, used for a wide variety of scientific, economic and social purposes.

Global Sea-Level Observing System (GLOSS) Implementation Plan. © UNESCO/IOC 2012.



	A. Sample interval	B. Reporting interval	C. Spatial coverage	D. Datum stability
1. Sea level rise, decadal	1 month	1 year	Global, polar	High
2. Surface currents, heat	1 day	1 month	Global, choke points, tropics	High
3. Tidal processes	15 minute	1 year	Global	Medium
4. Storm surge	15 minute	1 hour	Storm regions	Low
5. Tsunamis	1 minute	1-15 minutes	Global, fault zones	Low
6. Altimeter	1 day	1 month	Global	High



Sea level much higher than assumed in most coastal hazard assessments

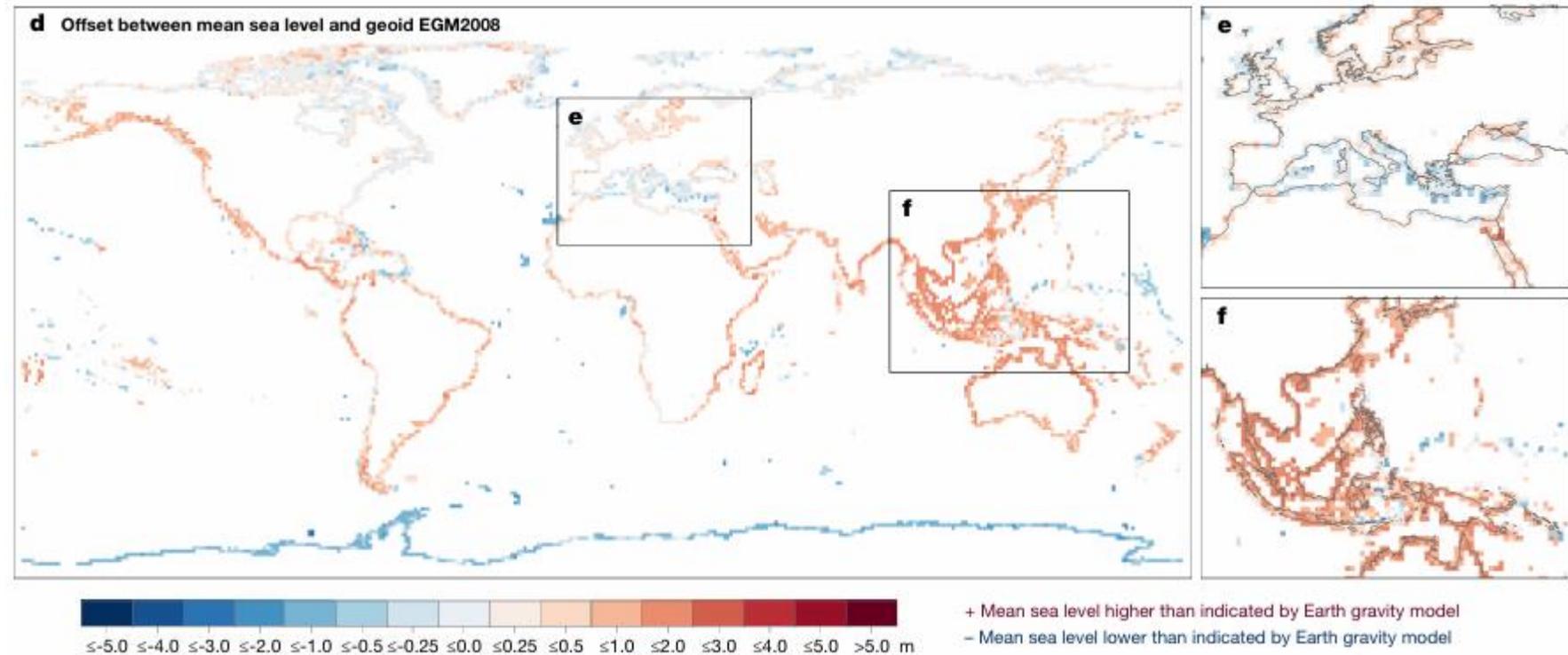
Published online: 04 March 2026

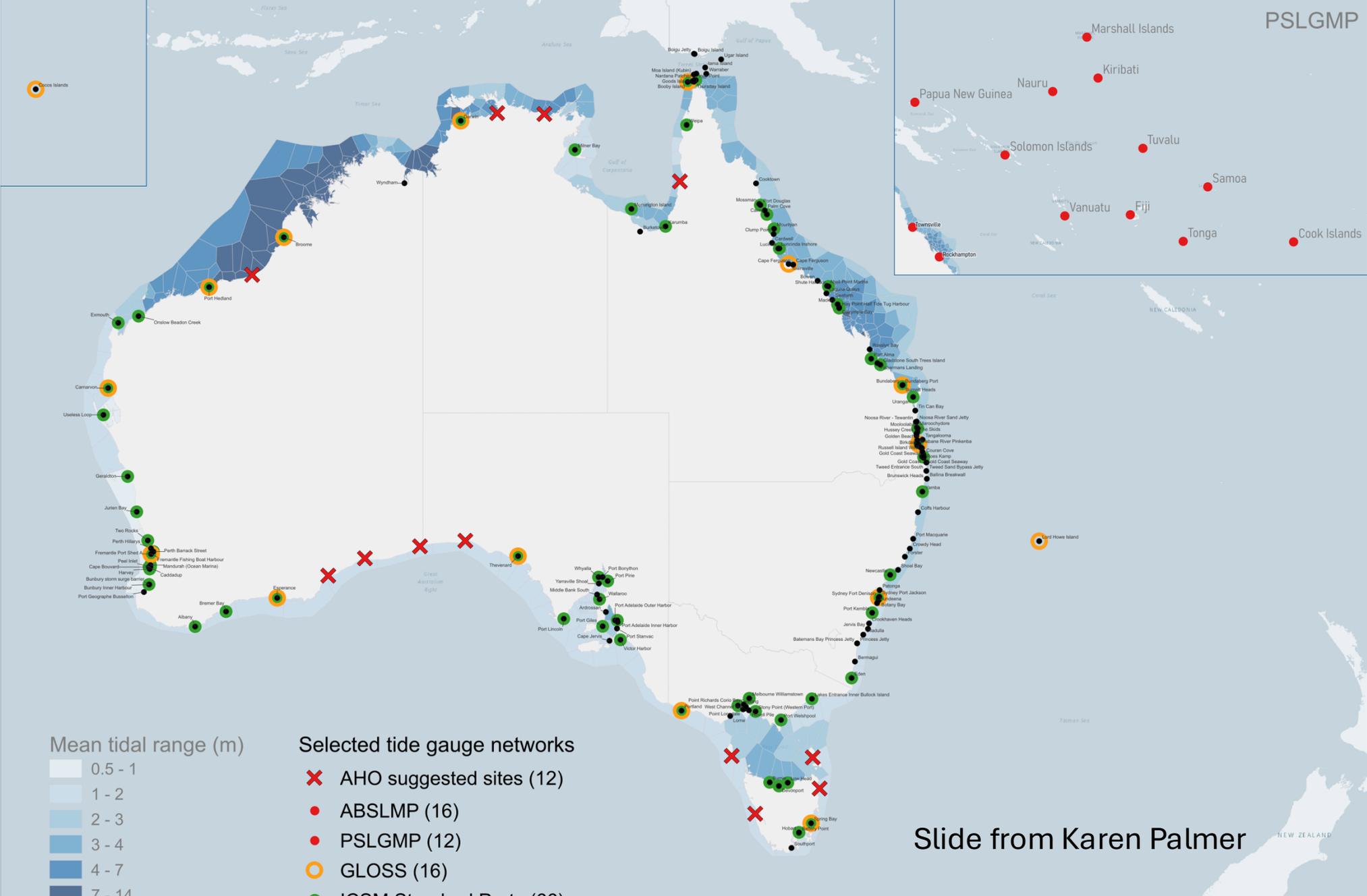
<https://doi.org/10.1038/s41586-026-10196-1>

Katharina Seeger^{1,2,3} & Philip S. J. Minderhoud^{1,3,4}

nature

- Datum-aligned land–sea observations enable accurate coastal hazard forecasting
- Most coastal risk studies misalign sea level and land elevation datums.
- 1 m of relative sea-level rise, 31–37% more land and
- 48–68% more people would fall below sea level.





Slide from Karen Palmer

Next Steps

➤ Pre-Full Program Funding:

- CoastRI website
- Implementing initial funding investments
- Workshop planning across themes
- Continue cross NCRIS, stakeholder and First Nations engagement

➤ Post-Full Program Funding:

- Adjust activities depending on funding outcome
- Workshops and annual CoastRI conferences to strengthen coordination, alignment and connection
- Establishment of cross NCRIS CoastRI super sites)





Australia's Integrated Marine Observing System is enabled by the National Collaborative Research Infrastructure Strategy (NCRIS). It is operated by a consortium of institutions as an unincorporated joint venture, with the University of Tasmania as Lead Agent.

PRINCIPAL PARTICIPANTS



SIMS is a partnership involving four universities

ASSOCIATE PARTICIPANTS



IMOS thanks the many other organisations who partner with IMOS, providing co-investment, funding and operational support, including investment from the Tasmanian and Western Australian Governments.

