

IMOS Data Product Landscape AODN Portfolio Highlights

Mark Rehbein Director, Australian Ocean Data Network Integrated Marine Observing System



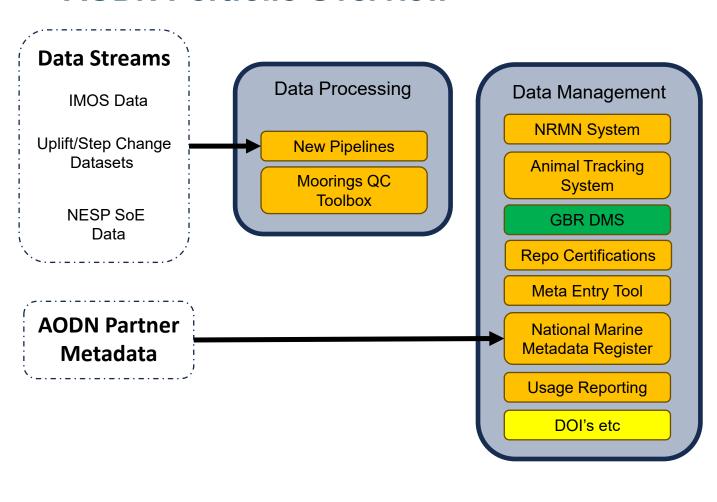








AODN Portfolio Overview



Data Delivery Portal **IMOS Website*** OceanCurrent-UI **IMOS Live**

Interoperability

Cloud Optimised

WIS2.0 GTS

Metadata Service

THREDDS

Python Notebooks

Non-technical user scenarios Data discovery Interactive experience Visualisations Subset download (CSV) Data products Data to information **Data Services &**

Data experts

- Programmatic access
- Data analysis
- Data science use-cases
- (Parquet & Zarr)
- Weather forecasting
- Climate modelling
- National Metadata Aggregators

Cyber Security & Infrastructure

Data Replication

Build Automation

Security Posture

Monitoring & Alerts

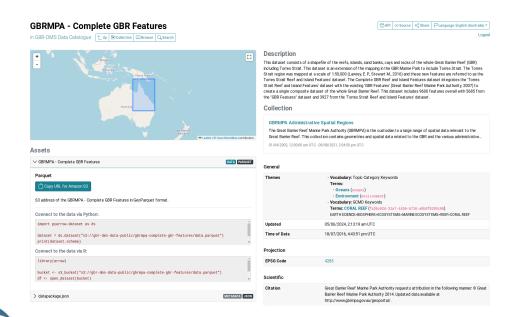
Major Achievements – Data Management

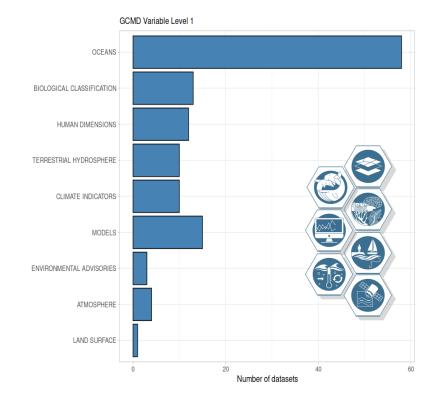
1. GBR Data Management System delivered!

OS Integrated Marine Observing System

For Reef 2050 Integrated Monitoring and Reporting Program (RIMReP)

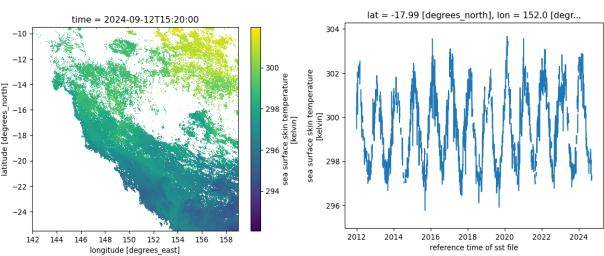
- ~180 diverse datasets available (updates from many sources)
- Cloud optimised format for fast data extraction using R and Python
- Used by GBRMPA and others for reporting, decision making, analysis
- Transferred system to AIMS for ongoing operations





Get 26y daily time series at

one location: <3.0s



Get 1-day snapshot: <1.5s

Major Achievements – Data Management

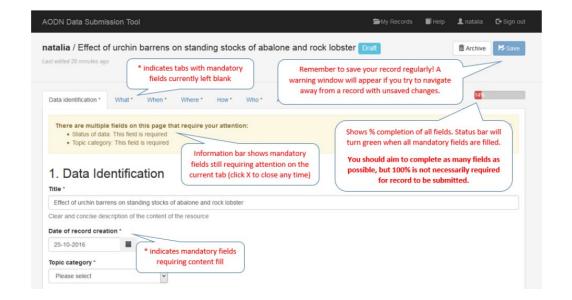
2. Upgrade and re-launch of the Metadata Entry Tool

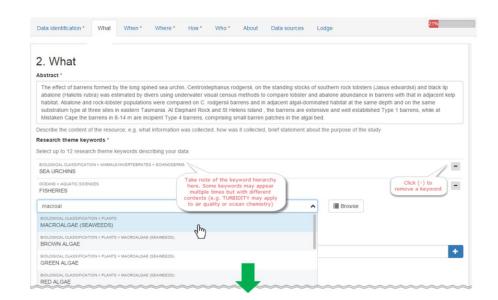
Simplifies the process of creating metadata

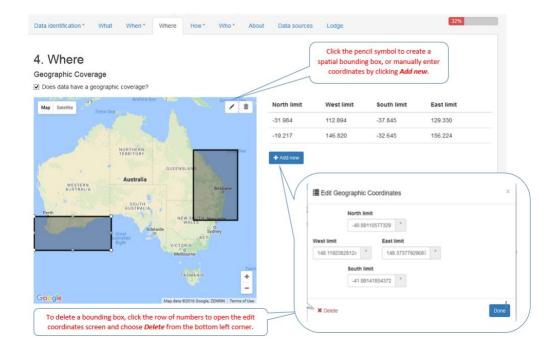
Important security upgrades

IMOS Integrated **Marine Observing** System

Feature improvements







Major Activities – Data Management

Animal Tracking and NRMN data management applications

Animal Tracking - Australian Animal Acoustic Telemetry Database online centralised management of Australia's passive acoustic animal telemetry data

- Improve speed and robustness of data ingestion
- Data consistency and reliability improvements
- Cyber security improvements

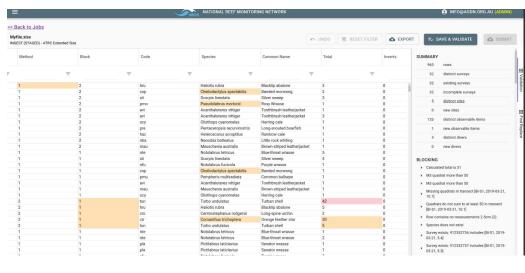
NRMN – National Reef Monitoring Network – Unified data management solution for data ingestion, QC and data correction across multiple programs and state departments

- Correction tool improvement for robustness
- Integration with FishBase for consistency with global standards



Australian Animal Acoustic Telemetry Database 14,163 171.5 1,345

Animal Tracking dashboard



NRMN data correction tool

Major Achievements – Data Management

4. Gained IODE NODC Accreditation

National Oceanographic Data Centre (NODC) under the International Oceanographic Data and Information Exchange (IODE) program

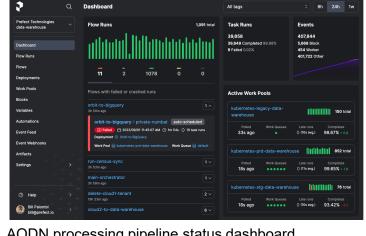
- One of 12 accredited NODC globally
- Builds on previous activities
 - World Data System member (WDS) 2023
 - Core Trust Seal (CTS) certification 2022
 - Nature endorsed repository 2015

Recognises high standard in ensuring long-term preservation and accessibility of oceanographic data, standards for data exchange and management of marine data at national scales

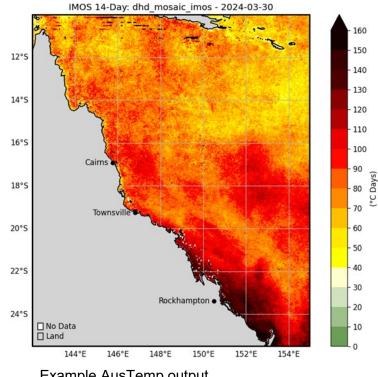
Major Activities – Data Processing

New AODN Data Processing Pipeline System

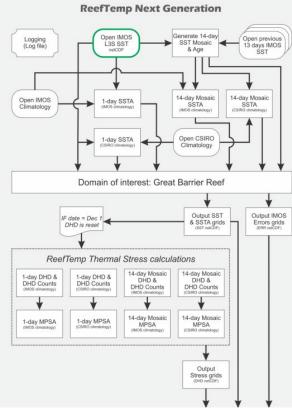
- IMOS pipeline implementation & migration
 - Robust, scalable, flexible
 - Monitor data processing status
 - Scheduled and event driven (NRT) processing
 - Reduced development and maintenance effort
 - Make new datasets available sooner
- 1st Uplift/Step Change dataset
 - Degree heating days/anomaly SST (nc & zarr)
 - Method by BoM/CSIRO (ReefTemp/AusTemp)
 - Example of integrated dataset
 - Translate data into information for non-experts
 - More datasets to come



AODN processing pipeline status dashboard



Example AusTemp output



AusTemp processing flow



Major Activities – Cyber Security & Infrastructure

1. Data Replication

Sydney to Melbourne with WORM

2. Build Automations for New Portal

- Best practice software engineering processes
- QA -> Stage > Production
- Disaster recovery (Infrastructure as Code)

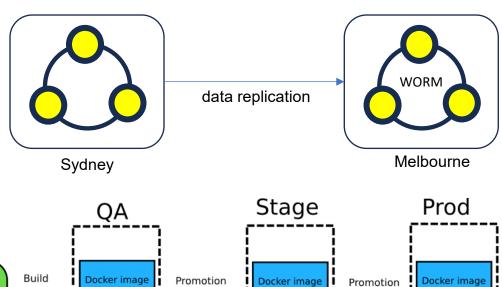
3. Cyber Security Posture

- SSO & Multi-factor authentication on cloud systems
- Australian Signals Directorate monitor for critical vulnerabilities
- Automated Code Vulnerability Checks on AODN code repositories
- Expanded Security vulnerability alerts
- Automated cloud cost anomaly monitoring
- Cyber Incident Response Protocol established high severity escalation to UTAS CIO and Australian Cyber Security Centre (ACSC)

Source

Code

Id = 5d23f



Id = 5d23f

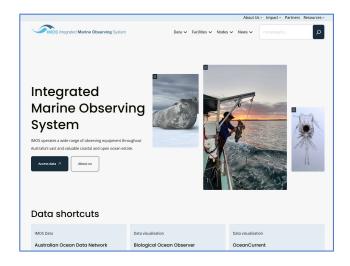
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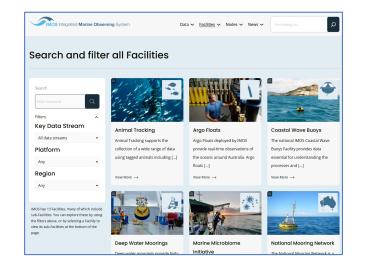
Major Achievement – Data Delivery

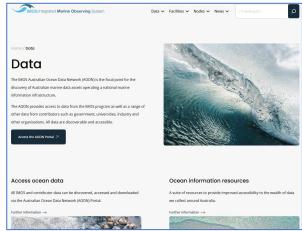
1. IMOS Website

- IMOS Office lead
- Re-branding, content simplification
- Navigation improvements
- Migration to new platform
 - Easier to use and maintain
 - Improved outsourcing and skills options
- Consolidating AODN & IMOS websites
 - Cost savings
 - Brand consistency







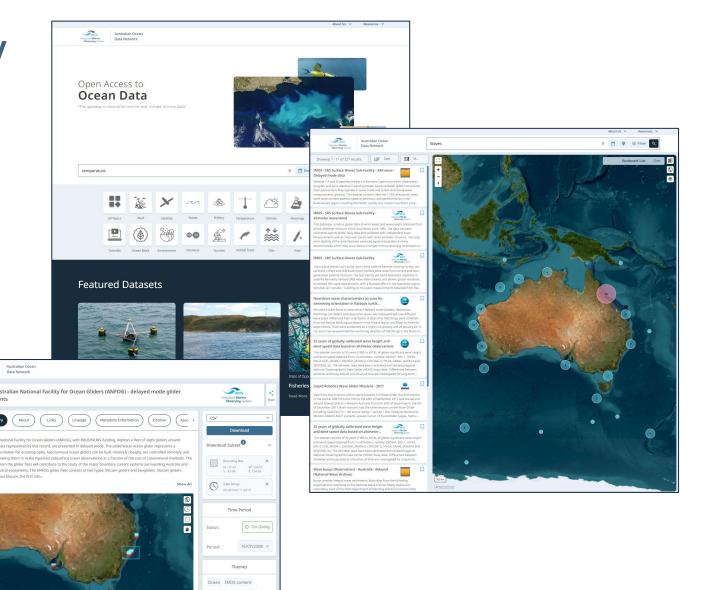


Major Activity – Data Delivery

2. Progress on new AODN Portal

Good progress has been made:

- 3 stage build environment
- Search functions
- Explore on interactive map
- Dataset details
- Mobile friendly
- Some sub-setting
- Cloud optimised formats (30%)
- Data processing pipelines

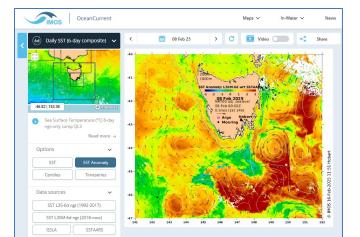


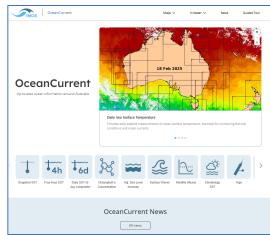


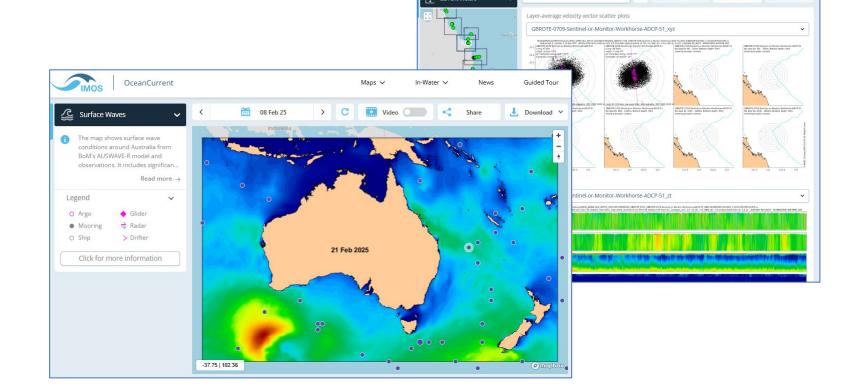
Major Activities – Data Delivery

3. OceanCurrent UI/UX improvements

- With CSIRO team
- Improve navigation, theme and usability
- UI only, generation of images unchanged
- UI technology is consistent with AODN









Major Activities – Data Services & Interoperability

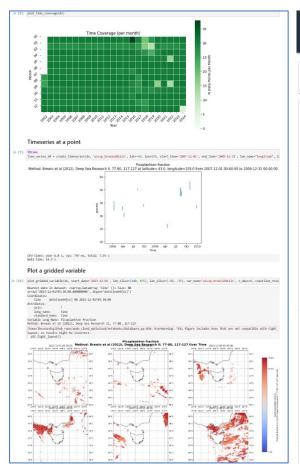
1. Data available in Cloud Optimised formats

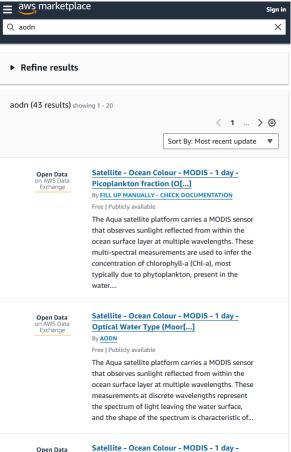
- Cloud optimised 40 IMOS datasets converted (30%)
- Available via AWS Open Data Platform free storage & egress
- AODN maintains data sovereignty
- The cloud-optimised formats provide dual-purpose functionality:
 - Enhanced data sub-setting capabilities within the new portal
 - Robust, scalable access for data science use cases
 - Python & R examples

2. Python notebooks, one for each dataset

- Data science 'kick starters'
- Guide users in accessing and utilising the cloud-optimised formats







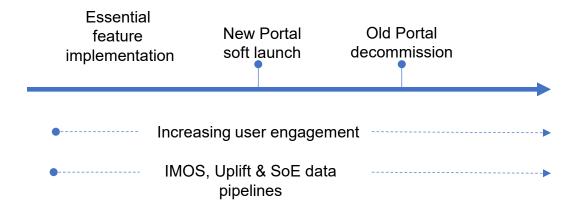


Upcoming Priorities

1. New Portal Rollout

Prepare for soft launch and then later decommission of the existing Portal

- Sub-setting of IMOS datasets
- Some data preview capabilities
- IMOS Data pipeline migrations, NRT pipeline for moorings
- Pipelines for SoE (NESP) and Uplift/Step Change datasets for inclusion into Portal



Upcoming Priorities

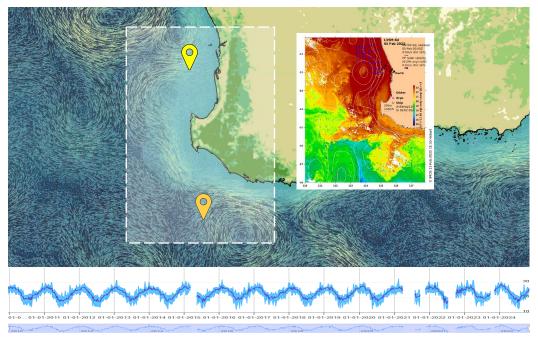
2. IMOS Live – Visualising IMOS NRT data streams

As part of the 'Data Uplift' brings together NRT data streams, various existing IMOS visualisations.

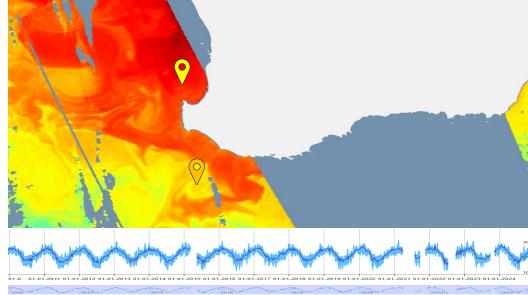
- Leverages work done with AAL/ADACS* on gridded vector animations
- Consolidates the coastal waves data delivery with other NRT data such as moorings
- Link in with existing OceanCurrent product visualisations
- Include existing gridded satellite map visualisation
- Include the new 'AusTemp' heat stress products
- Not started yet concepts only

^{*}Astronomy Data & Computing Services (ADACS) from Astronomy Australia Limited (AAL) - NCRIS





Overlay animated vector with insitu timeseries (eg wave buoy, moorings)



Retain existing satellite data visualisations

Upcoming Priorities

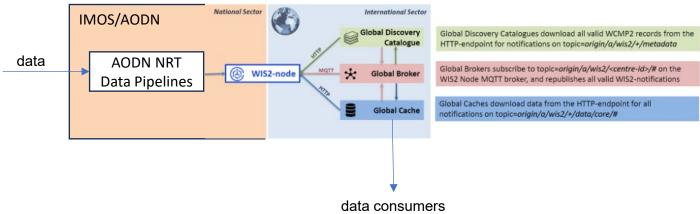
3. IMOS NRT Data to WMO via WIS 2.0

WIS 2.0 (WMO Information System 2.0) is the next-generation global data-sharing framework developed by the **World Meteorological Organisation (WMO)**. It is designed to modernise and replace the traditional **Global Telecommunication System (GTS)**

WIS 2.0 – Australian node registration underway

- Will gain WMO DCPC (Data Collection and Production Centre) certification
- Discussing priority datasets with BoM
- Part of 'Data Uplift' activities
- IMOS data more easily included in global climate models and weather forecasting in near real time

- MQTT broker: to publish WIS2 notifications for metadata and data
- HTTP server: to enable the download of data and metadata



4. Matlab toolbox: where to next?

Upcoming discussions with facility



Thank you

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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 invoving 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.



