The Australian Integrated Marine Observing System

Patrick Gorringe
Deputy Director
IMOS eMarine Information Infrastructure
The circulation in the oceans around Australia is changing …

A country dominated by boundary currents

Signs of climate change – Maria Island
Trend 2.28°C and 0.34psu per century, 2-3x global average

IMOS is an initiative of the Australian Government (funded to 2013)

Principles:
1) a national system providing a service; 2) data is free, open to all, and timely; 3) it is a multi-platform, multi-disciplinary integrated system; 4) It is delivering repeated observations in an enduring way

IMOS is establishing Australia’s Sustainable Marine Observing System
What is it?

- The Integrated Marine Observing System (IMOS) is a National Collaborative Research Infrastructure program.
- It brings together the Australian Universities and Publicly-Funded Research Agencies working in marine and climate science.
- It funds them to deploy ocean observing equipment.
- And (most importantly) it makes all of the data freely available to the whole community.
How does it work?

- IMOS receives its core funding from the Australian Government
- The program is led by the University of Tasmania, on behalf of the marine and climate science community
  - Aided by an Advisory Board, with an independent chair
- UTAS carries out this role under a contract with the Australian Government
- UTAS sub-contracts various institutions to operate elements of the system based on their expertise
How does it really work?

• IMOS operates a ‘matrix’ of **Nodes** and **Facilities**

• **Nodes** represent the scientific opinion of the research community, provide the scientific rationale, develop research goals, and identify the need to obtain specific data streams
  - Nodes undertake multi-institutional science planning at national/regional scale

• **Facilities** own and operate the designated equipment and make the data streams available to the whole community
  - Some Facilities are operated by single institutions, some are multi-institutional, but all are ‘national’ facilities
Structured around 5 regional Nodes

Western Australia, Queensland, New South Wales, Southern Australia
Delivered by 11 National Facilities

Facilities provide the information for regional Node science
IMOS Facilities (there are 11)

1. Argo Australia
   - autonomous profiling floats

2. Ships of Opportunity
   - repeat underway observing on volunteer ships
   - physical, chemical and biological observations

3. Deepwater Moorings
   - existing: Southern Ocean Time Series (47°S)
   - planned: Antarctic Coast (Adelie Land), Indonesian Through Flow, East Australian Current (26°S)

4. Ocean Gliders
   - coastal and open ocean

5. Autonomous Underwater Vehicle
   - benthic surveys
IMOS Facilities

6. National Mooring Network
   – National Reference Stations (nine)
   – shelf moorings and arrays

7. Coastal Radar Network
   – phased array and direction finding

8. Acoustic Tagging and Monitoring
   – Acoustic curtains and satellite tags

   – southern Great Barrier Reef

10. Satellite Remote Sensing
    – SST, altimetry (planned), and ocean colour
IMOS Facilities

11. electronic Marine Information Infrastructure (eMII)
   - Facility responsible for creating and developing the information infrastructure
     - to make all data discoverable and accessible
     - via the IMOS Ocean Portal
     - ~10% of core funding invested in this activity
   - Opportunity to use this infrastructure to create a larger Australian Ocean Data Network (AODN)
     - providing access to IMOS and non-IMOS data
     - ‘publicly-funded data, publicly available’
The Future

Australian Ocean Data Network

Primary users
Australia’s one-stop-shop for marine science data

Open Ocean / Climate
- Ocean Circulation
- Ocean Chemistry
- Ocean state
- Surface temperature
- Sea level
- Ocean colour

International Contribution
- Satellites
- Moorings, buoy networks
- Floats, autonomous
- Ships of Opportunity
- Sections

Australian Contribution

Coastal

Regional Node
- Remote sensing
- Reference sites
- Common networks
- Coastal monitors

National Backbone
- Data standards
- Interoperability
- Exchange protocols

Secondary Users
PRODUCTS
NEEDS
Current Coastal obs
Current coastal + Funded*

*Seal CTD tags
*Bio-acoustics
*Bio (non repeat)
*CPR
*PIES

4. Gliders
   SeaGlider
   Slocum
5. AUV
   AUV
6. Moorings
   Colour Reference Station
   Jason II Cal
   National Reference Station
   Passive Acoustics
   Shelf Mooring
   Slope Mooring
   Waverider
7. HF Radar
   CODAR
8. AA/AMS
   AATAMS
9. FAIMMS
   FAIMMS
Existing Bluewater observations
Existing + New Funded* Observations

- Shelf/Deep Moorings to monitor the Indonesian Throughflow (with international partners monitoring other choke points) / Holloway Current
- Seagliders to monitor the Hiri Current
- Shelf / Deep Current meter / End Point mooring Array to monitor EAC
- CTD’s on Seals and Ice Capable Argo floats to monitor waters under the Antarctic sea ice.
- Seagliders to SOTS to monitor Tasman Outflow
- SOFS-2 for continuous flux data-stream at SOTS
- Polynya array to monitor AABW Formation
- Monitoring Apex Predators in the Southern Ocean
Seal CTD profiling off SA, courtesy Simon Goldsworthy
Key Features of IMOS

- All data discoverable and accessible, for free
- Integrated from the open ocean, onto the continental shelf and into the coast
- Integrated across physics, chemistry and biology
- Linked to the Global Ocean Observing System – key role for Australia in the southern hemisphere
- Node science plan-driven
- Funded from equipment purchase to data delivery
Where next for IMOS?

- Additional AUD$52M in 2009 from the “Super Science Initiative” to enhance and extend IMOS to June 2013

Potential new Facilities:
Drifting Buoys, Sediment deposition, Microbial Observatory, Bio-acoustics, Fast Ice

Potential new data types:
Floc imagery, gene sequences, sound spectra, ice properties
Thank you

Integrated Marine Observing System
University of Tasmania
Private Bag 110
Hobart Tasmania 7001
http://www.imos.org.au
How does it work?

• Core funding from the Australian Government
  • $102M over ~six years ($50M ‘NCRIS’ and $52M ‘EIF’)
• Co-investment by Partners
  • Operators, other Australian Govt. Programs, State Govt’s
    • ~$78M cash and in-kind (40+%)
• Ramp up to 2009-10, then levelling out at ~$35M pa