Australian Government

Australian GEO Report

1. GEO Related Observing Systems

2. Innovative Use of Earth Observations

Michael Coughlan
Chief Climatologist
Australian Bureau of Meteorology

Australian Government

GEO Related Australian Systems

- Observing Systems
- Basic Meteorological Networks
  - Surface
  - Upper Air
  - Radar
  - Chemistry
  - Radiation
- Oceanographic Observing Systems
  - Volunteer Observing Ships
  - Ships of Opportunity (XBT/CTD)
  - Moored Arrays
  - Sea Level & Tidal
    - Coastal
    - South Pacific Sea Level Array
  - Floats & Buoy

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Innovative use of Earth Observations

- Disaster Mitigation
- Global Carbon Monitoring System
- Tsumami Warning System
- Seasonal Forecasting
- Data Management
- Water Resource Accounting

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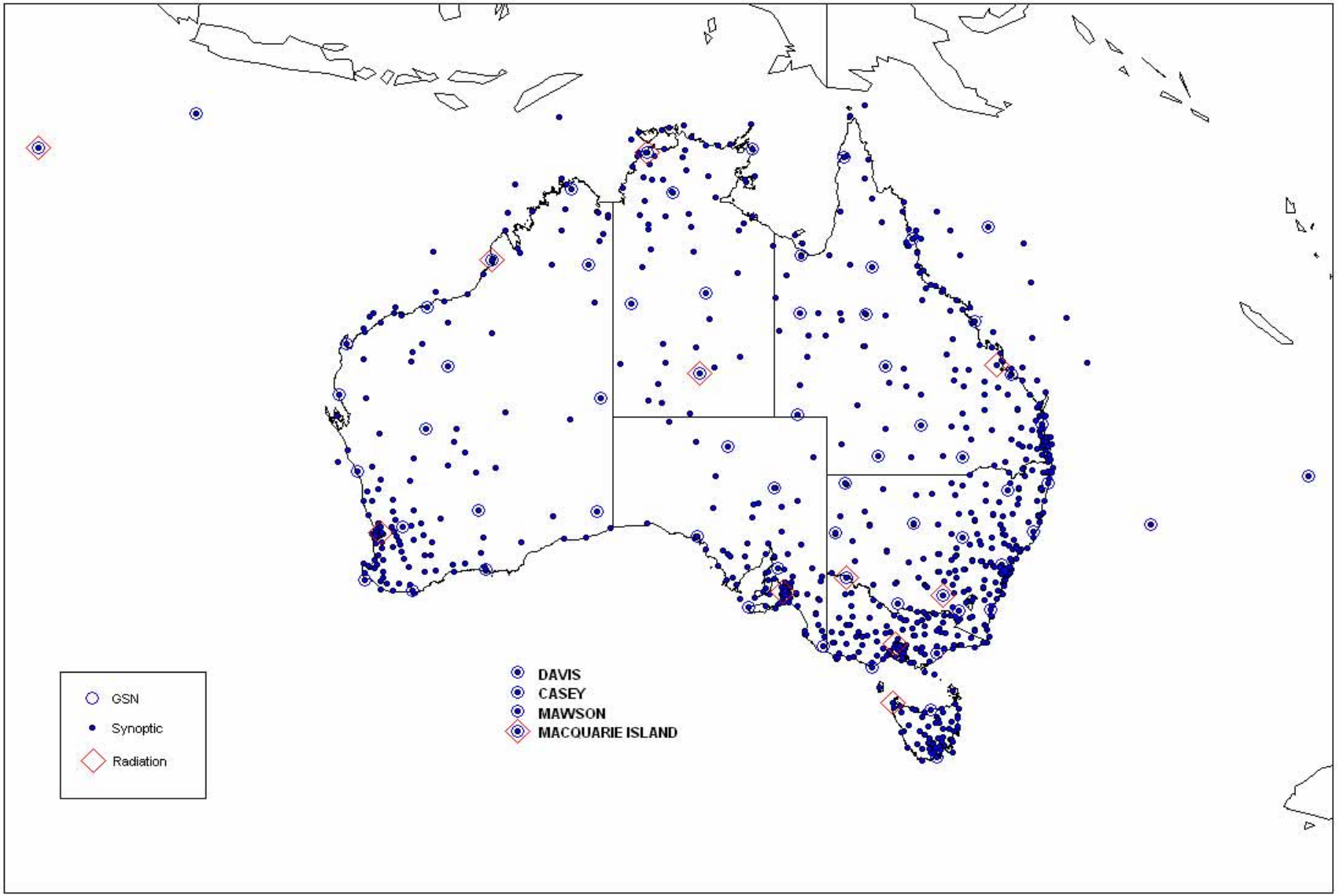
Australia's Surface Climate Network



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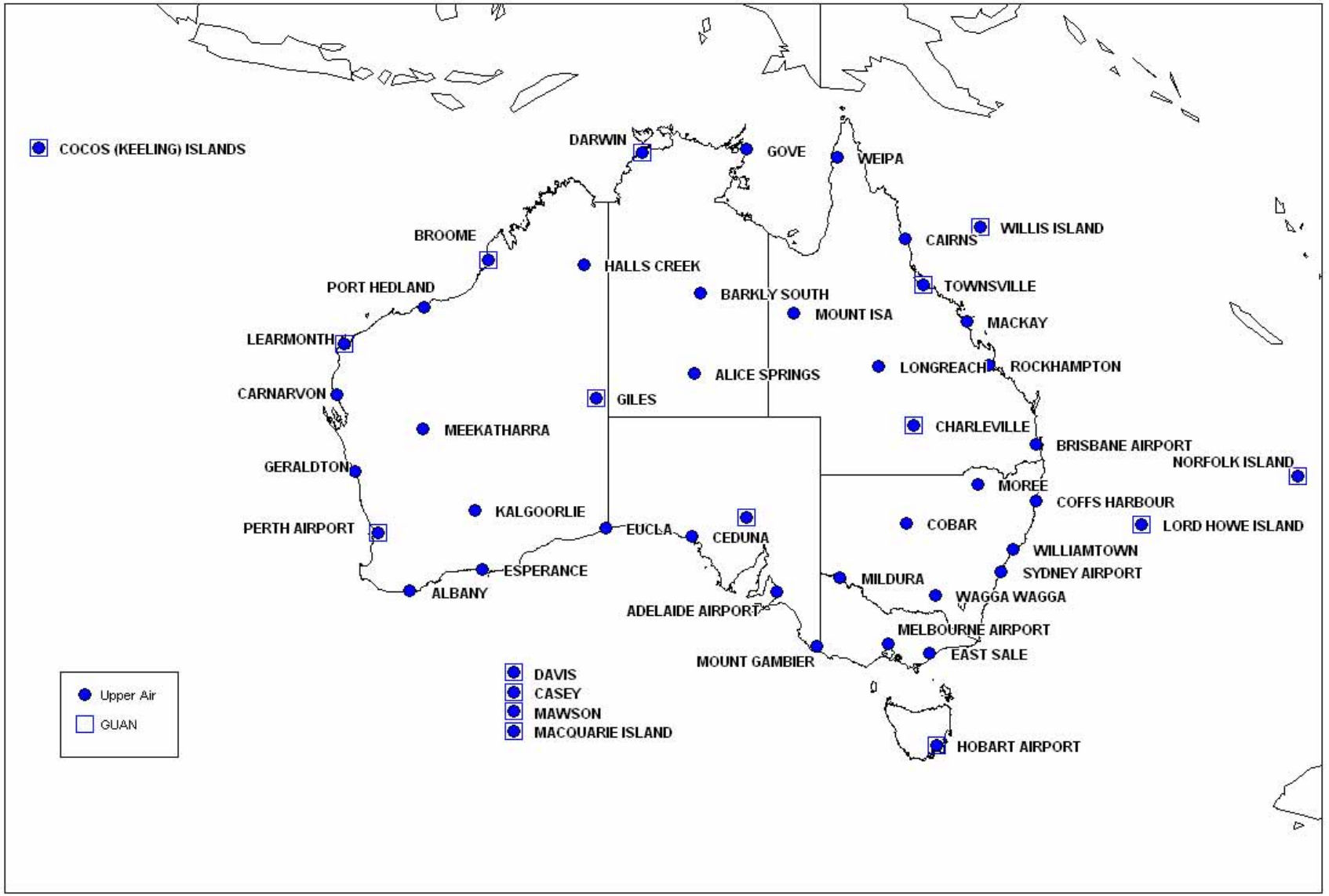
Australia's Upper Air Climate Network



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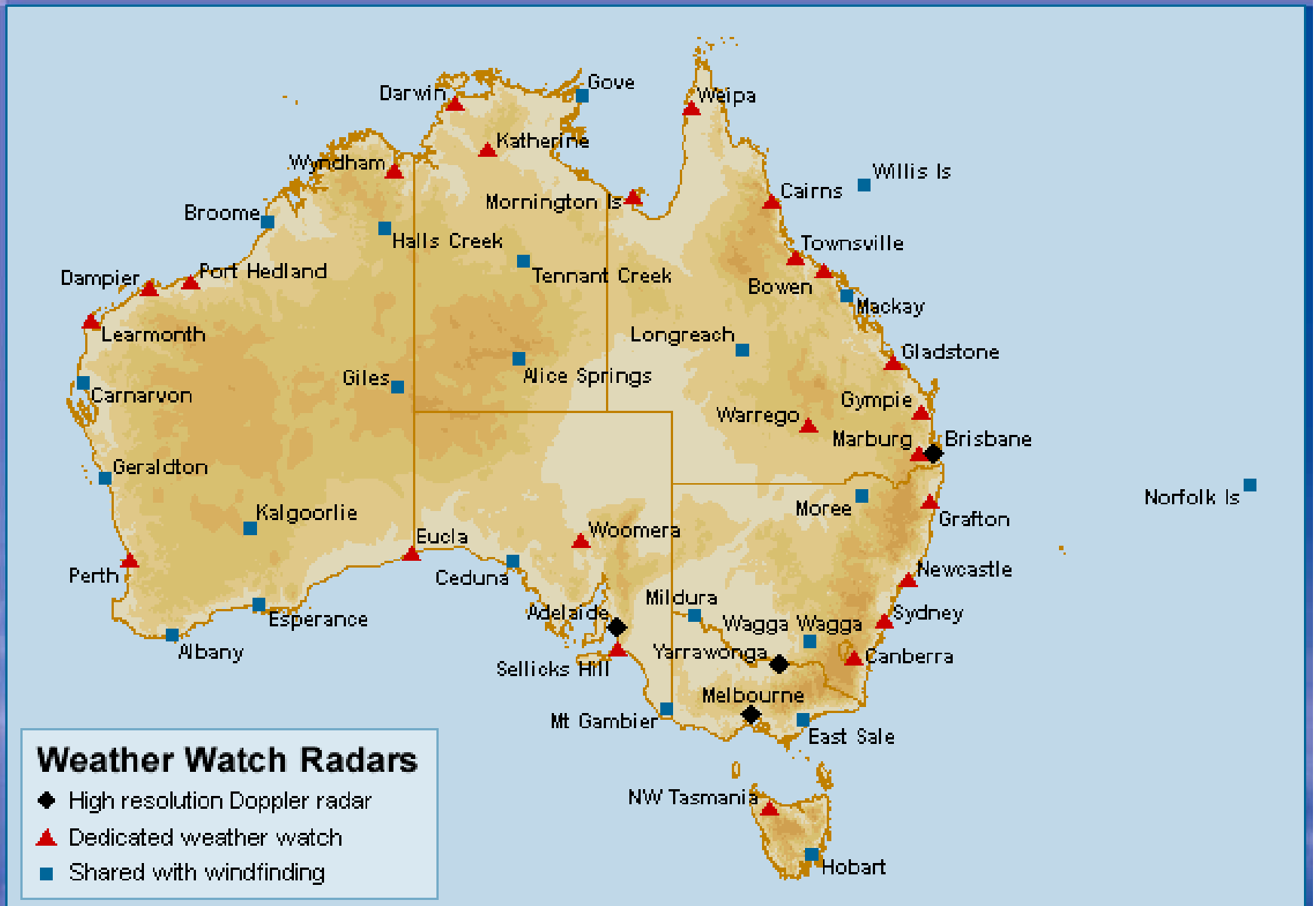
Australian Weather Watch Radar Sites



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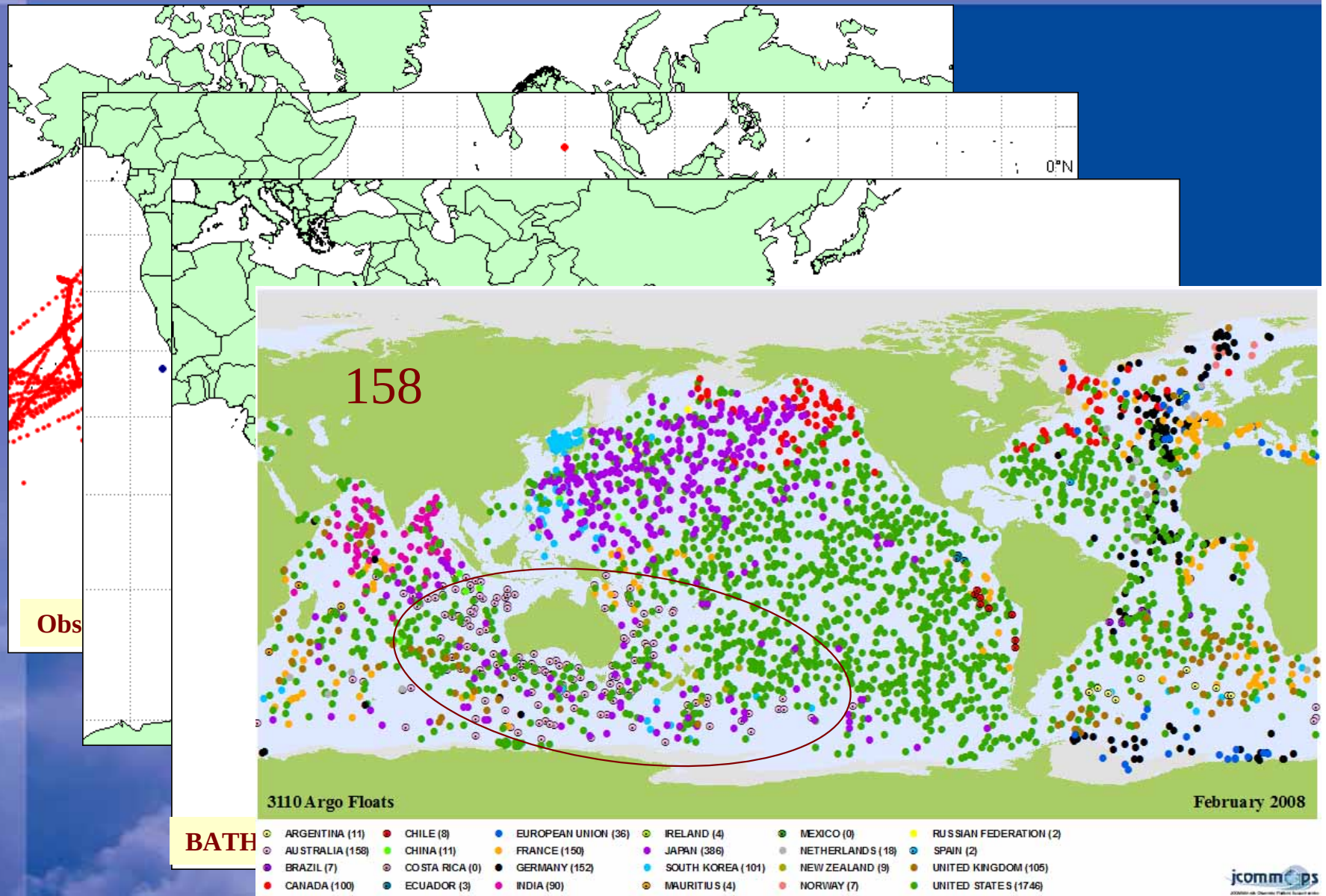
Oceanographic Observations



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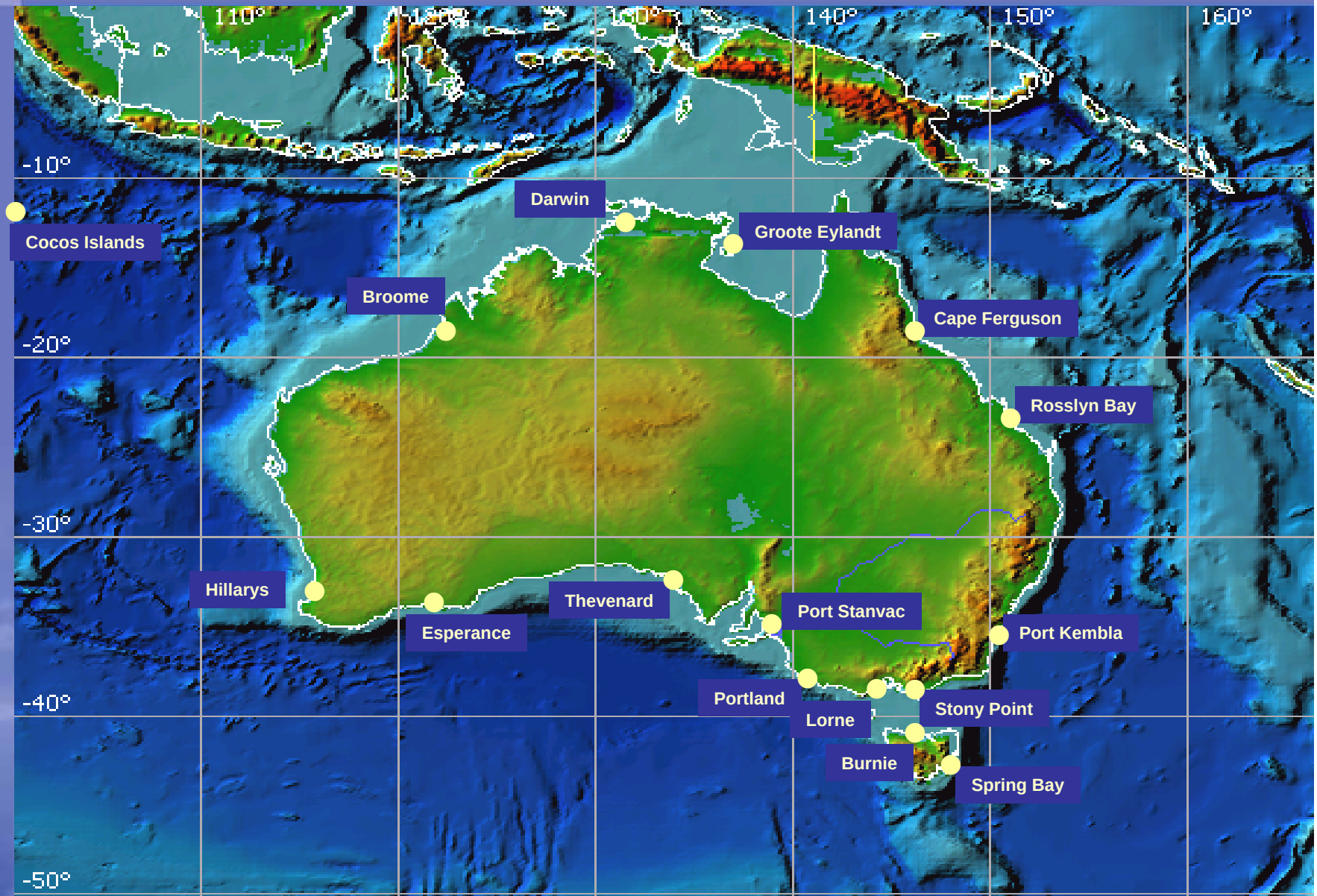
Australian Baseline Sea Level Monitoring Project



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South Pacific Sea Level and Climate Monitoring System

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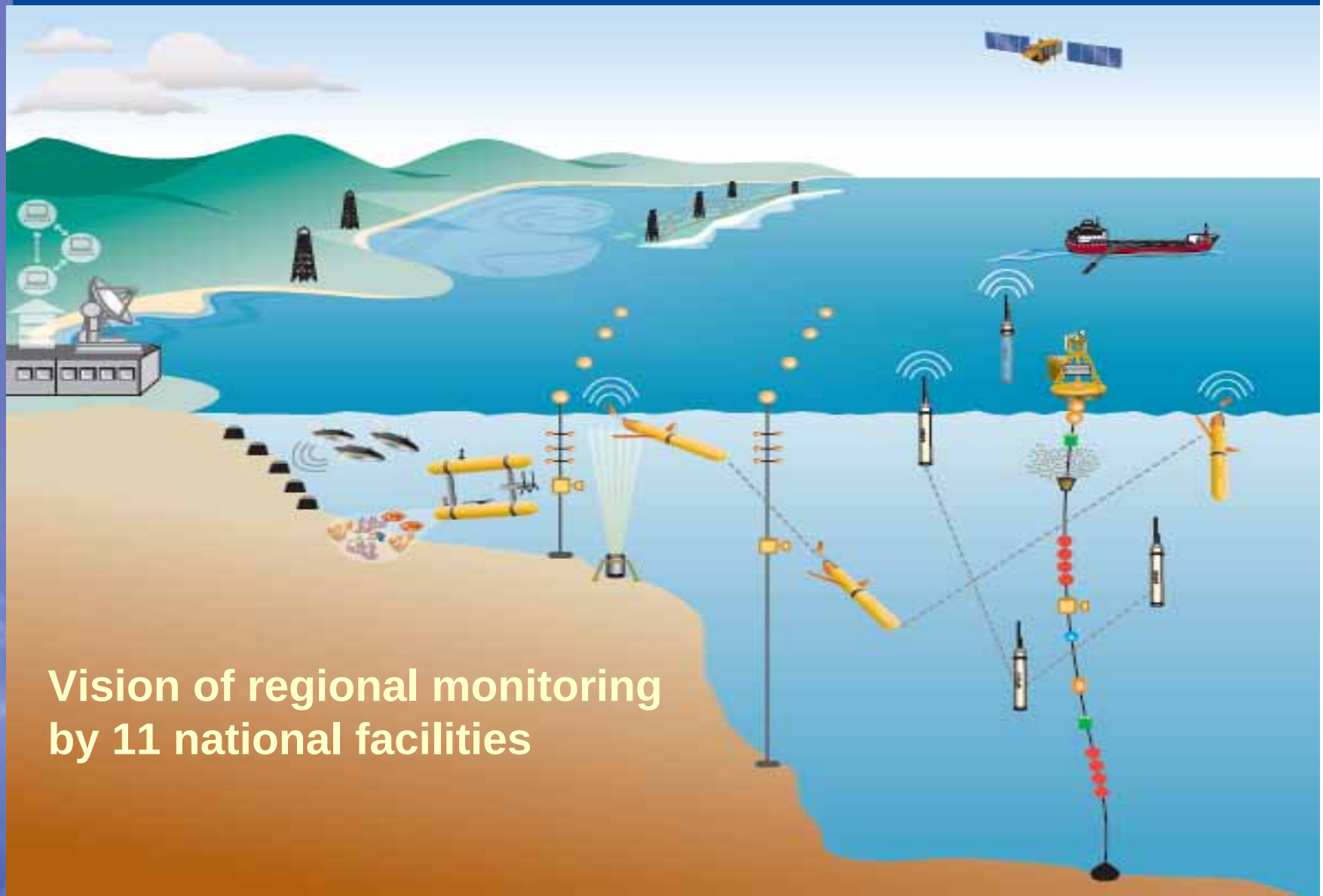
IMOS Integrated Marine Observing System

http://www.imos.org.au/



Vision of regional monitoring by 11 national facilities

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IMOS Integrated **Marine Observing** System

Strategic Goals:

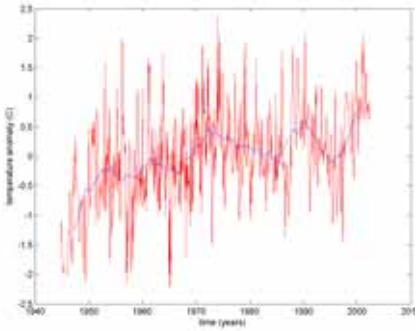
A continent dominated by boundary currents…

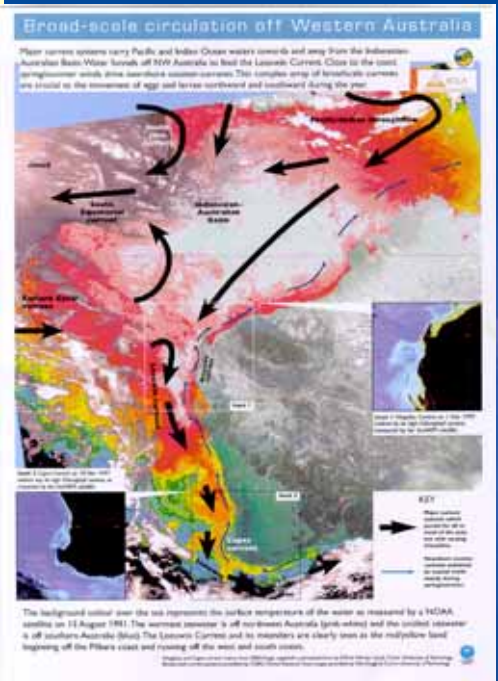
Assemble and provide free, open and timely access to streams of data that support research on

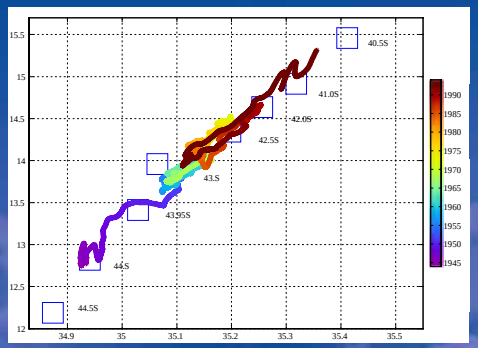
- **The role of the oceans in the climate system**
- **The interaction between major boundary currents and shelf environments and ecosystems**

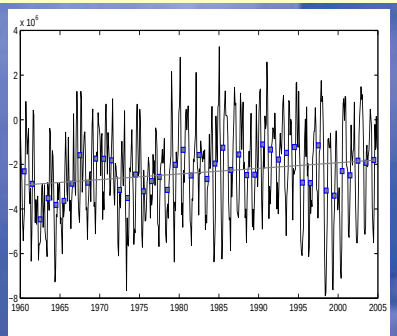
And in the longer term

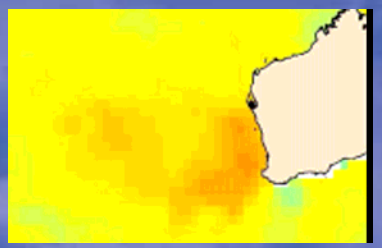
- **Supports policy development, management of marine and terrestrial climate impacts and adaptation by industries**











…that are changing

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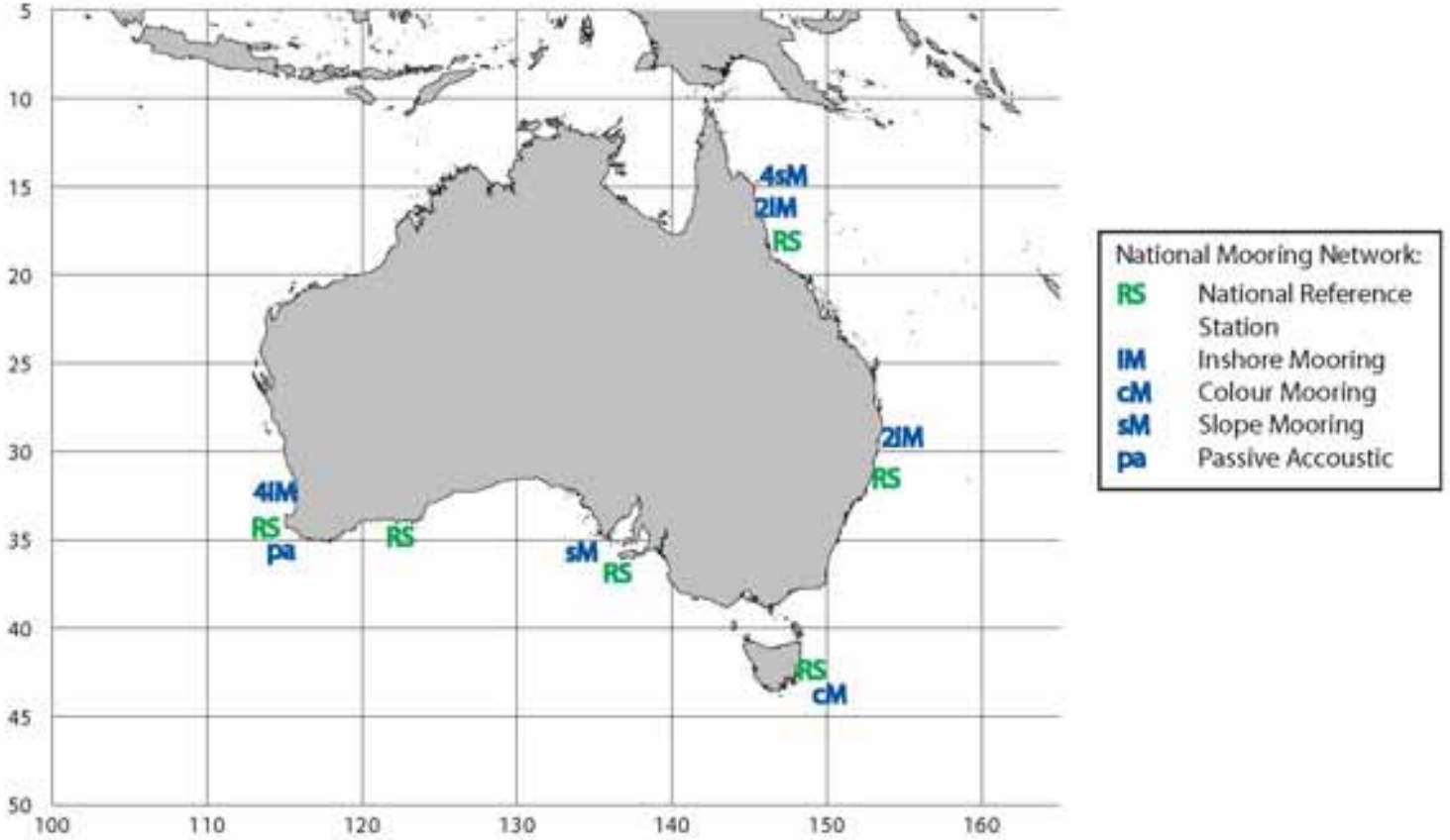
IMOS Implementation 2007/08 (1)

Tentative IMOS Moorings Deployment Plan - out to June 2008



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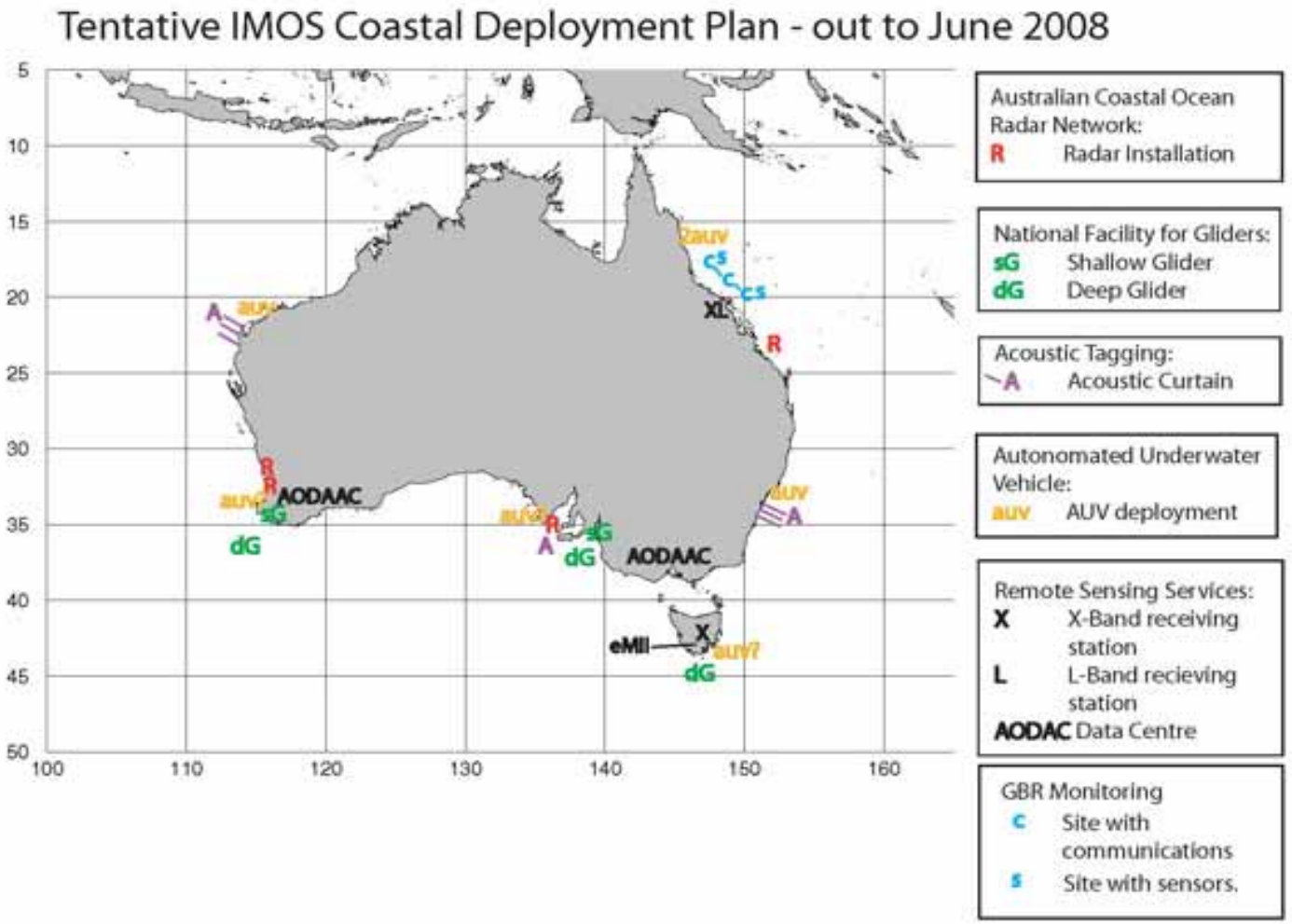
IMOS Implementation 2007/08 (2)



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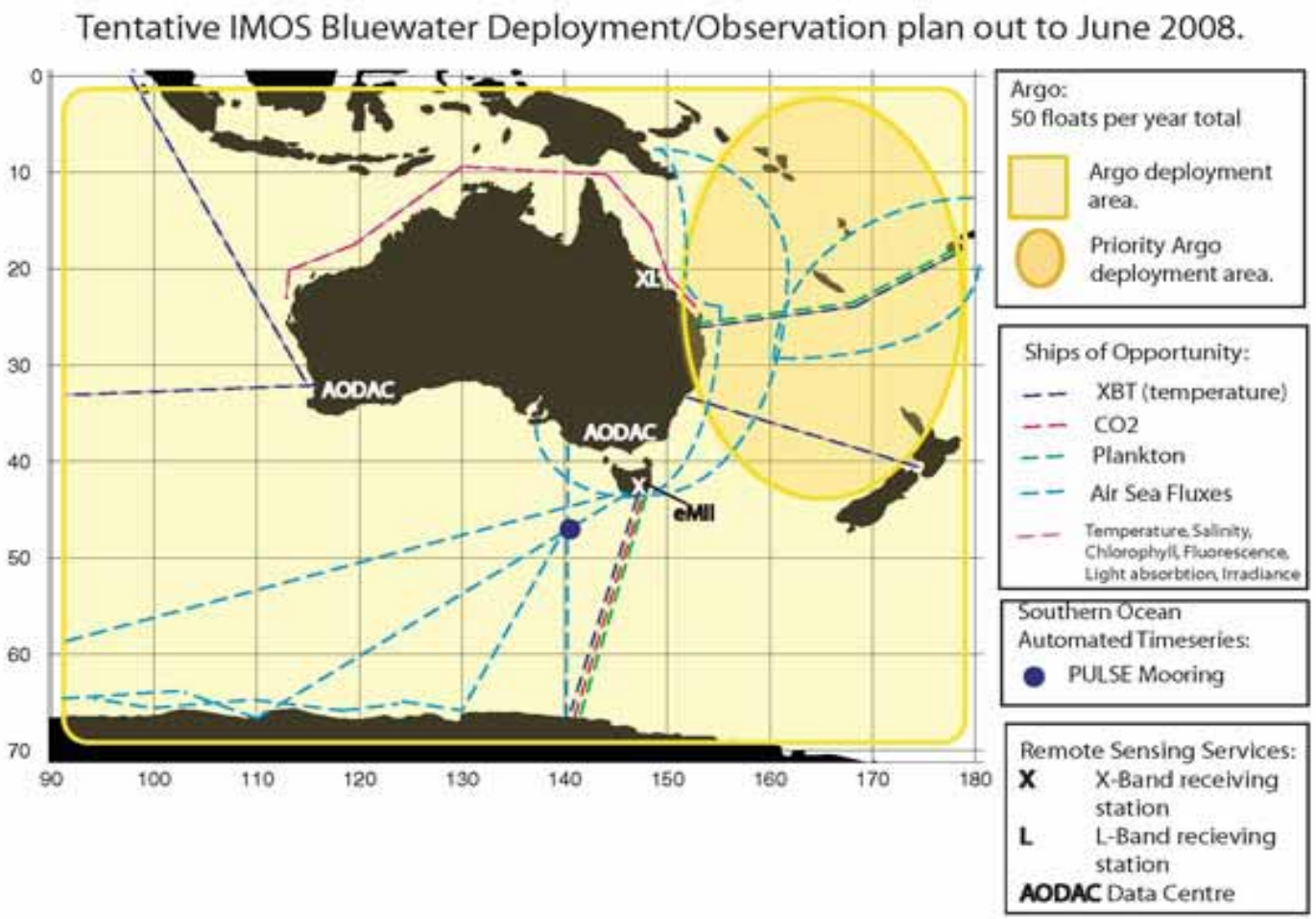
IMOS Implementation 2007/08 (3)



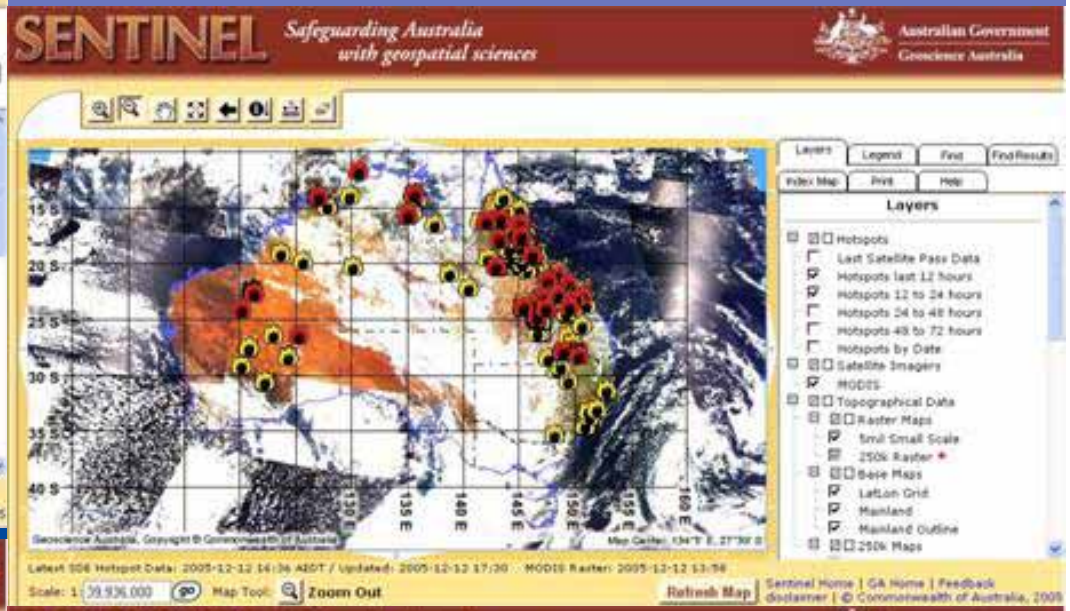
Australian Government

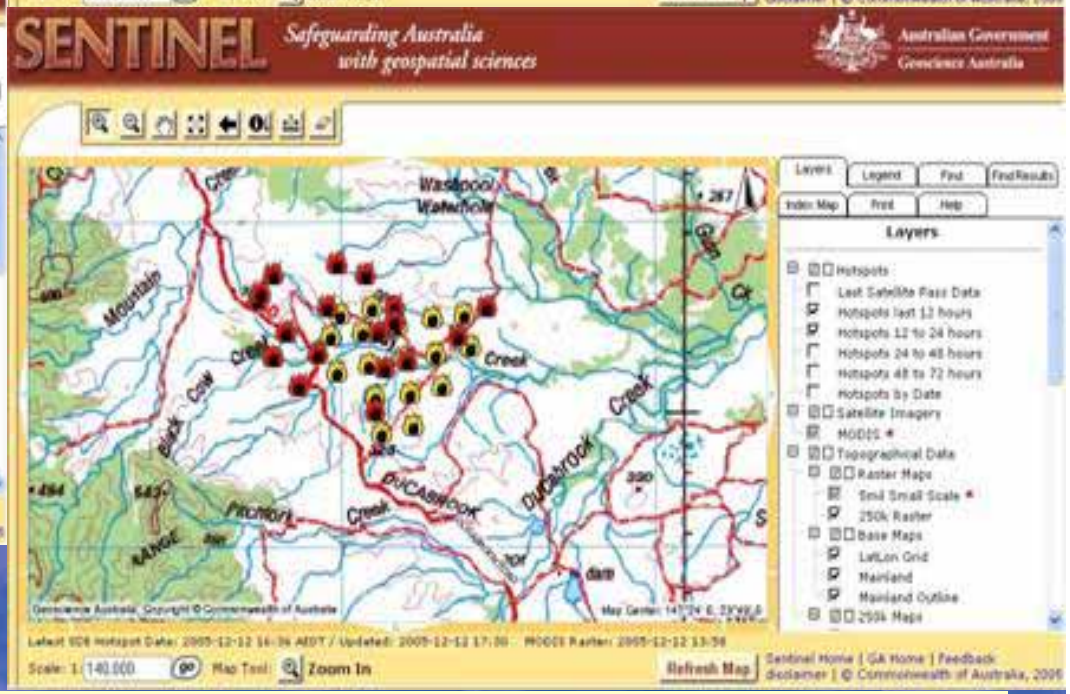
Innovative Uses of Earth Observations

1. Disaster Mitigation (Sentinel)
2. Carbon Monitoring & Accounting
3. Tsunami Warning
4. Seasonal Forecasting
5. Data Management
6. Water Resource Accounting

1. Sentinel

Australian Node of Sentinel Asia



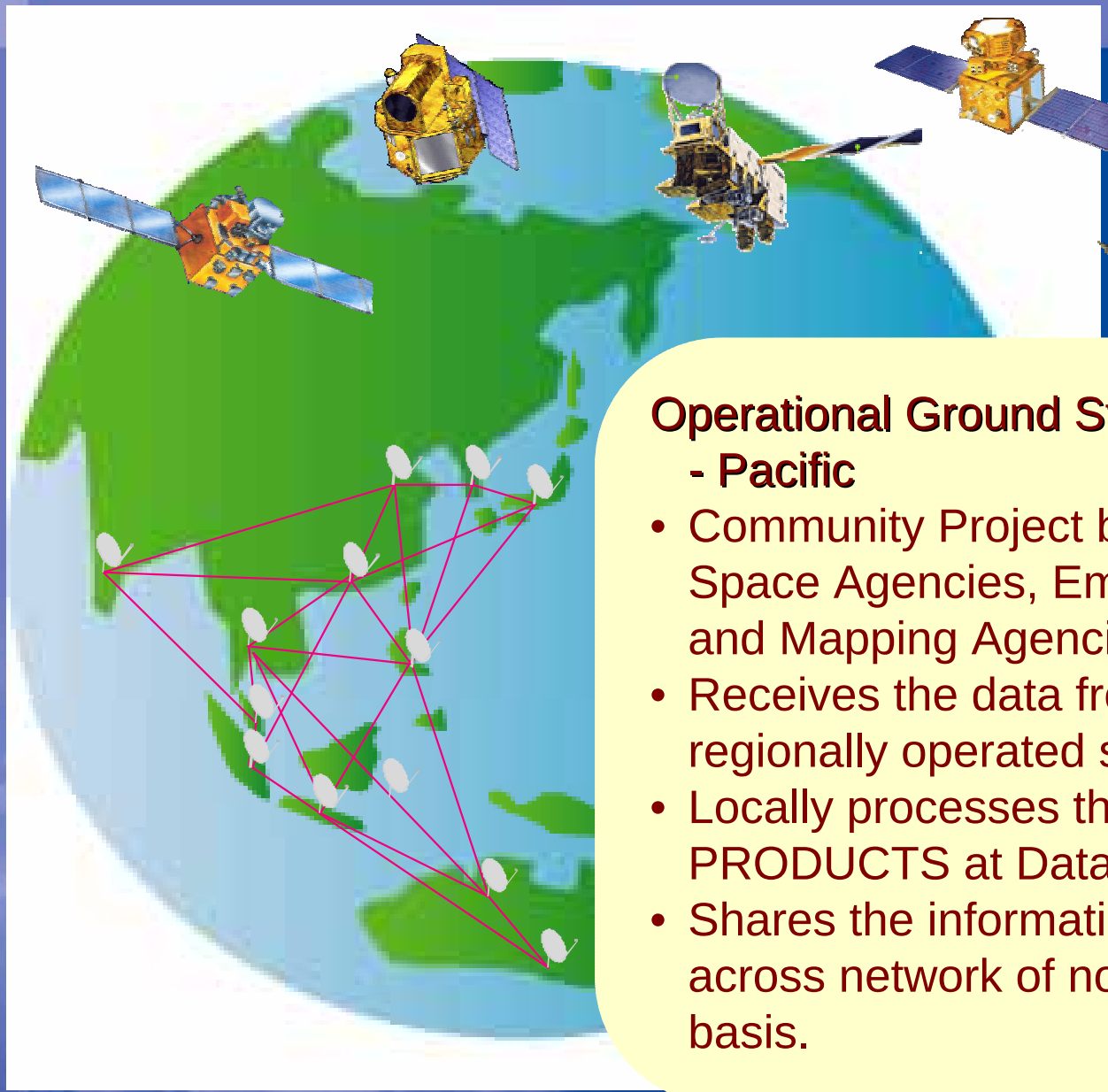


http://sentinel1.ga.gov.au/acres/sentinel/index.shtml

Operational at CSIRO since January 2003; transferred to Geoscience Australia from January 2006

Australian Government

Basic Philosophy of Sentinel Asia



Operational Ground Stations across Asia - Pacific

- Community Project by Asia – Pacific Space Agencies, Emergency Agencies and Mapping Agencies
- Receives the data from various regionally operated satellites
- Locally processes the data to derived PRODUCTS at Data Provider nodes
- Shares the information PRODUCTS across network of nodes by voluntary basis.

Australian Government

2. Australian Department of Climate Change
Global Carbon Measurement System - GCMS

Goal: Development of a consistent and robust global land cover change monitoring and carbon accounting system, to address international programs to also estimate emissions from deforestation and forest degradation (REDD), as well as emerging carbon trading markets

Closely aligned with the international "Carbon Measurement Collective - CMC" (Clinton Climate Initiative, Rockefeller Foundation, NGO's, WB, etc.)

Australian Government

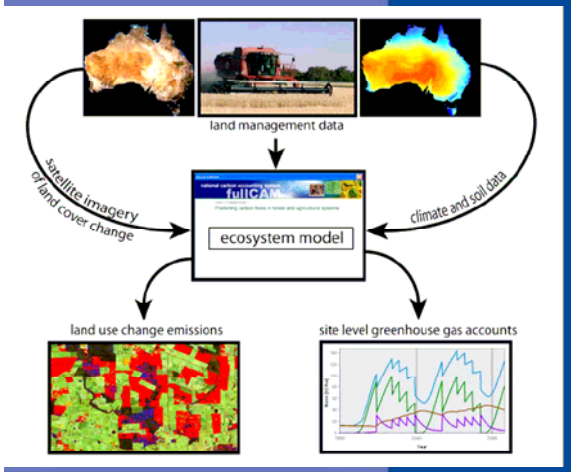
Australian Department of Climate Change
Global Carbon Measurement System - GCMS

Anticipated System Elements:

1. **WebGIS delivery tool for free, open access to forest cover change monitoring data**
2. **Application of Australia's world-class Land-use Change Mapping Methods and Forest Productivity Models**
3. **Establishment of a global satellite database, 10-15 year layers: optical & SAR**
4. **Wall-to-wall mapping of all land-use changes at ~ 25-30 m resolution world-wide over last ~10 years.**
5. **Develop pilot sites and demonstration projects (incl. Indonesia, PNG, China, Africa)**
6. **Promotes development of next-generation satellite mapping methodologies (ie. multi-sensor fusion - hyperspectral + Lidar+ radar)**
7. **Establish precision forest measurement & verification sites (Australia, Asia, USA, Africa, etc.)**

Australian Government

National Carbon Accounting System (NCAS Australia)



The NCAS accounts for activities such as: livestock and crop production, land clearing and forestry, through a highly integrated system that combines:

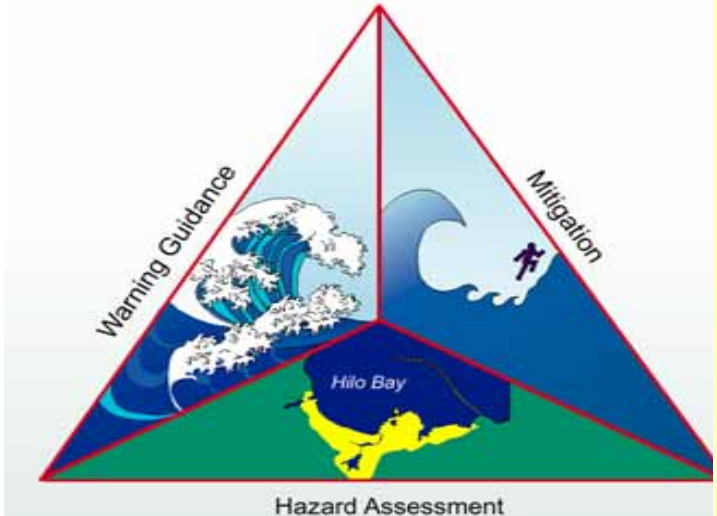
1. **Remotely sensed land cover change (including mapped information from thousands of satellite images)**
2. **Land use and management data**
3. **Climate and soil data**
4. **Greenhouse gas accounting tools, and**
5. **Spatial and temporal ecosystem modelling**

Australian Government

3. Tsunami Warning System

Develop national and regional capacity to:

- Assess national tsunami risk (Hazard assessment)
- Promote preparedness and risk reduction against tsunami hazard (Mitigation and Public Awareness)
- Establish a national and regional warning system against local and regional tsunamis (Warning guidance)



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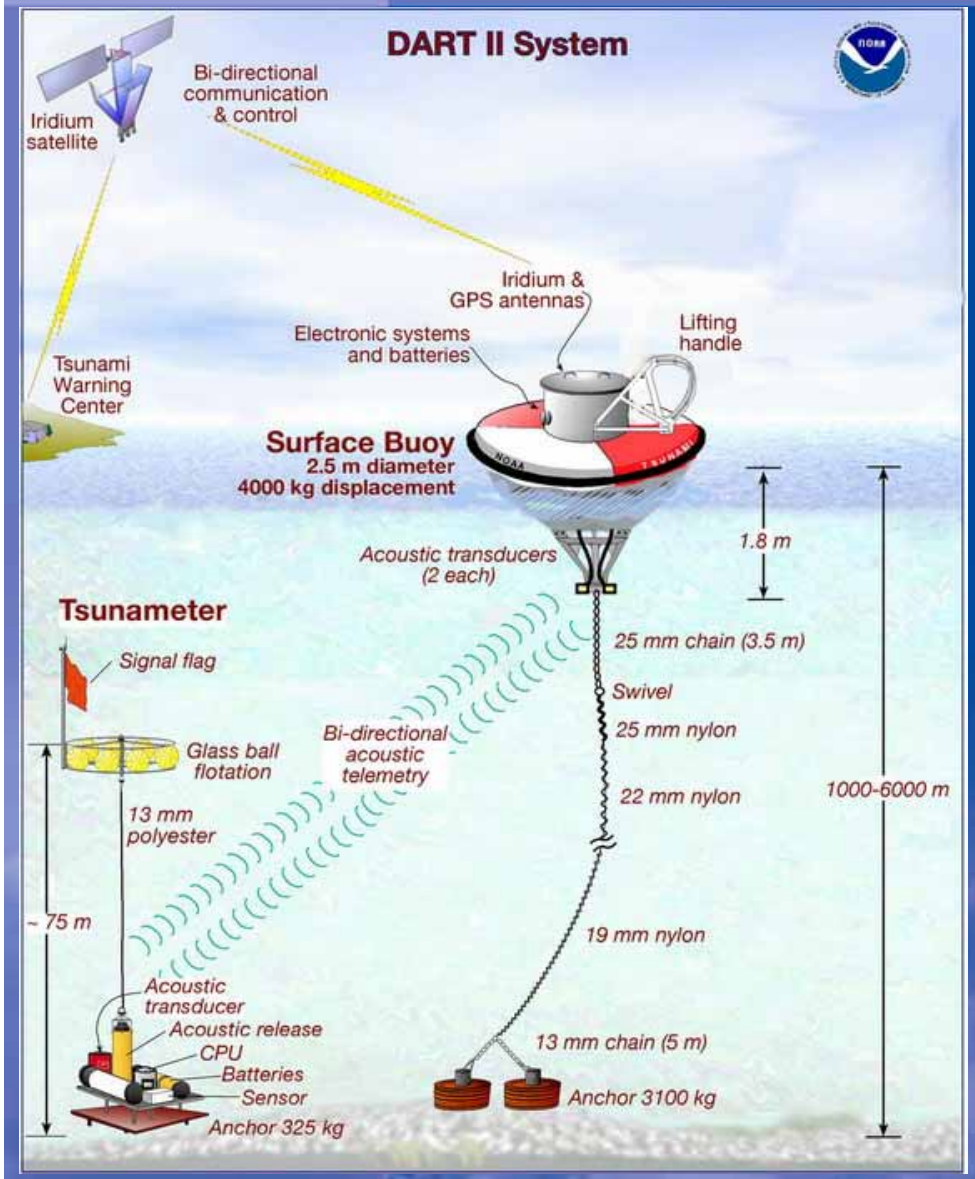
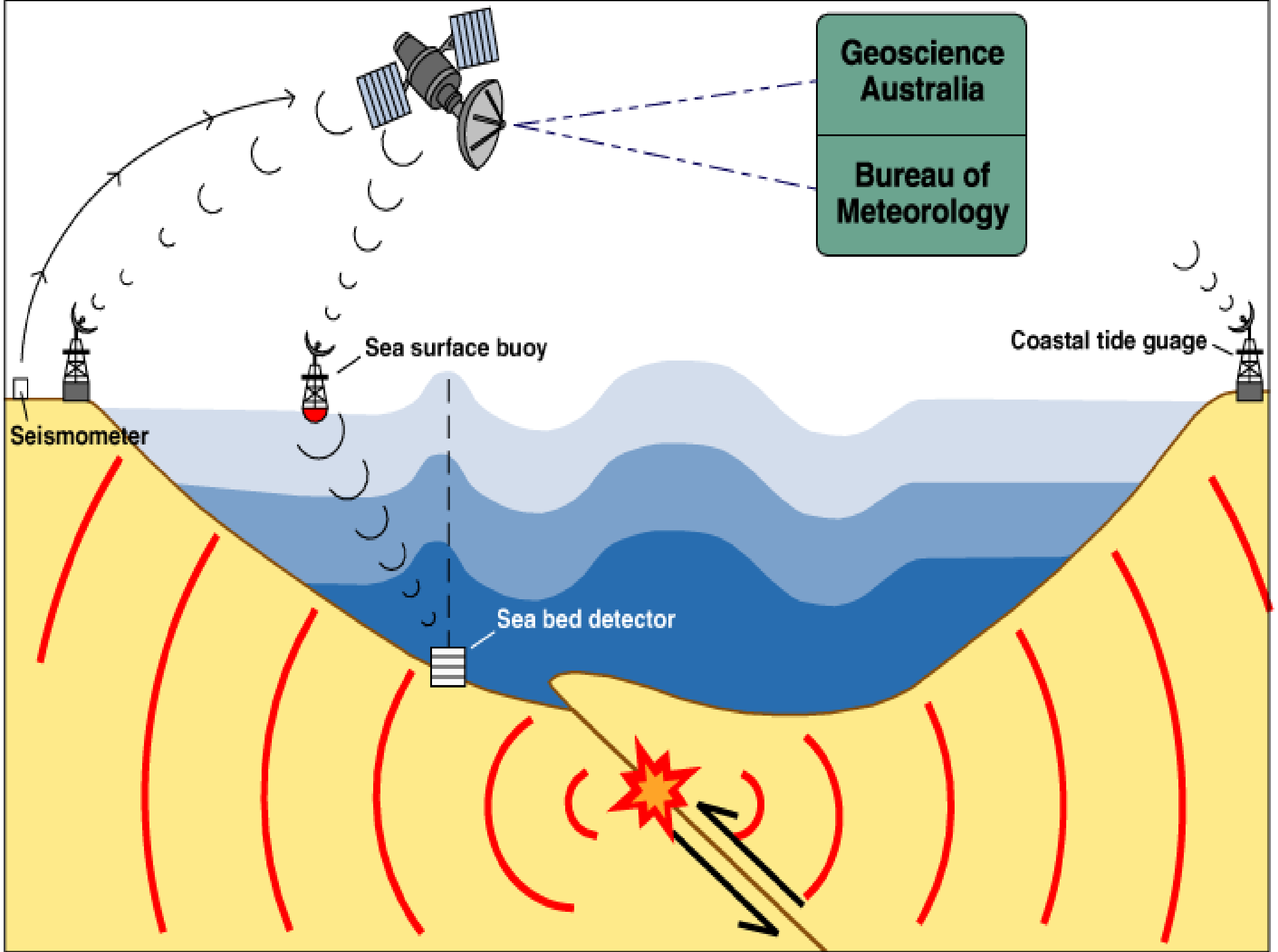
Deep Ocean Tsunami Buoy



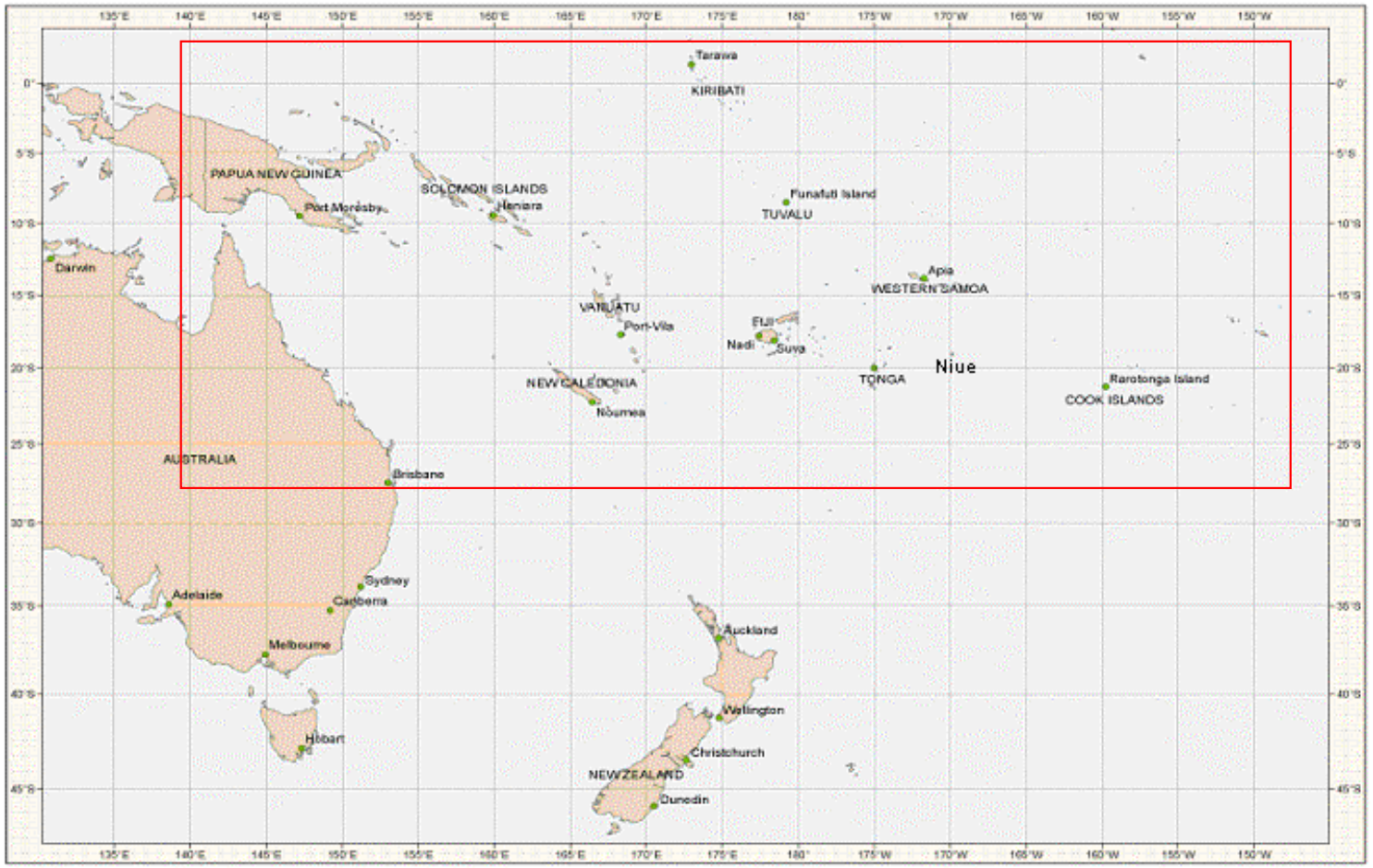

Geoscience Australia
Bureau of Meteorology
Sea surface buoy
Coastal tide guage
Seismometer
Sea bed detector

Australian Government

4. Pacific Islands Climate Prediction Project PI-CPP

Ten participating PICs:

- **Fiji,**
- **Cook Islands**
- **Vanuatu**
- **Samoa,**
- **Tonga,**
- **Niue,**
- **Solomon Islands**
- **Kiribati,**
- **Tuvalu**
- **Papua New Guinea.**



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Aims of PI-CPP

- **Strengthen PIC NMS capacity in climate prediction**, through providing proven seasonal prediction system (based on Australian Bureau of Meteorology's operational system), and training in its prudent use
- **Enhance ability of PICs to provide a sustainable climate prediction service** to meet needs of users in climate-sensitive industries, through in-country workshops involving NMSs and potential user representatives (e.g. agriculture, health etc.)

Australian Government

5. Data Rescue in the Pacific Islands

Stage 1: Preserving Paper records

Station_ID	Station_Name	Element_Code	Element_Name	yy	mm	dd	obs_val
30002	Lae Weather Office	2	TMPMAX	1974	1	1	31.2
30002	Lae Weather Office	3	TMPMIN	1974	1	1	23.7
30002	Lae Weather Office	5	PRECIP	1974	1	1	0
30002	Lae Weather Office	2	TMPMAX	1974	1	2	31.2
30002	Lae Weather Office	3	TMPMIN	1974	1	2	24.6
30002	Lae Weather Office	5	PRECIP	1974	1	2	0
30002	Lae Weather Office	2	TMPMAX	1974	1	3	31
30002	Lae Weather Office	3	TMPMIN	1974	1	3	24.5
30002	Lae Weather Office	5	PRECIP	1974	1	3	0
30002	Lae Weather Office	2	TMPMAX	1974	1	4	31.5
30002	Lae Weather Office	3	TMPMIN	1974	1	4	23.7
30002	Lae Weather Office	5	PRECIP	1974	1	4	2.6
30002	Lae Weather Office	2	TMPMAX	1974	1	5	31.2
30002	Lae Weather Office	3	TMPMIN	1974	1	5	24
30002	Lae Weather Office	5	PRECIP	1974	1	5	14.8
30002	Lae Weather Office	2	TMPMAX	1974	1	6	31.3
30002	Lae Weather Office	3	TMPMIN	1974	1	6	23.7
30002	Lae Weather Office	5	PRECIP	1974	1	6	39.2
55006	PT Moresby W/Office	2	TMPMAX	1974	1	1	31.2
55006	PT Moresby W/Office	3	TMPMIN	1974	1	1	22.8
55006	PT Moresby W/Office	5	PRECIP	1974	1	1	1
55006	PT Moresby W/Office	2	TMPMAX	1974	1	2	32.4
55006	PT Moresby W/Office	3	TMPMIN	1974	1	2	23.9
55006	PT Moresby W/Office	5	PRECIP	1974	1	2	0
55006	PT Moresby W/Office	2	TMPMAX	1974	1	3	29.8
55006	PT Moresby W/Office	3	TMPMIN	1974	1	3	23
55006	PT Moresby W/Office	5	PRECIP	1974	1	3	35
55006	PT Moresby W/Office	2	TMPMAX	1974	1	4	32.5
55006	PT Moresby W/Office	3	TMPMIN	1974	1	4	21.9
55006	PT Moresby W/Office	5	PRECIP	1974	1	4	9
55006	PT Moresby W/Office	2	TMPMAX	1974	1	5	31
55006	PT Moresby W/Office	3	TMPMIN	1974	1	5	24.3
55006	PT Moresby W/Office	5	PRECIP	1974	1	5	0
55006	PT Moresby W/Office	2	TMPMAX	1974	1	6	31.2
55006	PT Moresby W/Office	3	TMPMIN	1974	1	6	22.7
55006	PT Moresby W/Office	5	PRECIP	1974	1	6	3.8

Stage 2: Managing Data

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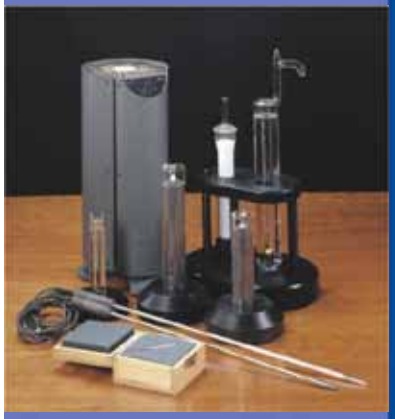
6. Collecting Information under national water plan (Australian Water Act 2007)



1. **Set standards for water data measurement and transmission.**
2. **Gather water information and make it freely available via the web, with value-added analyses.**
3. **Conduct annual national water resource assessments.**
4. **Produce an annual national water account.**
5. **Provide continuously updated water availability forecasts.**

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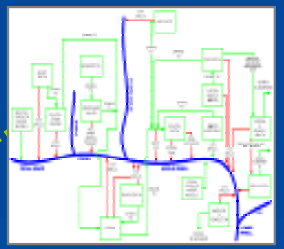
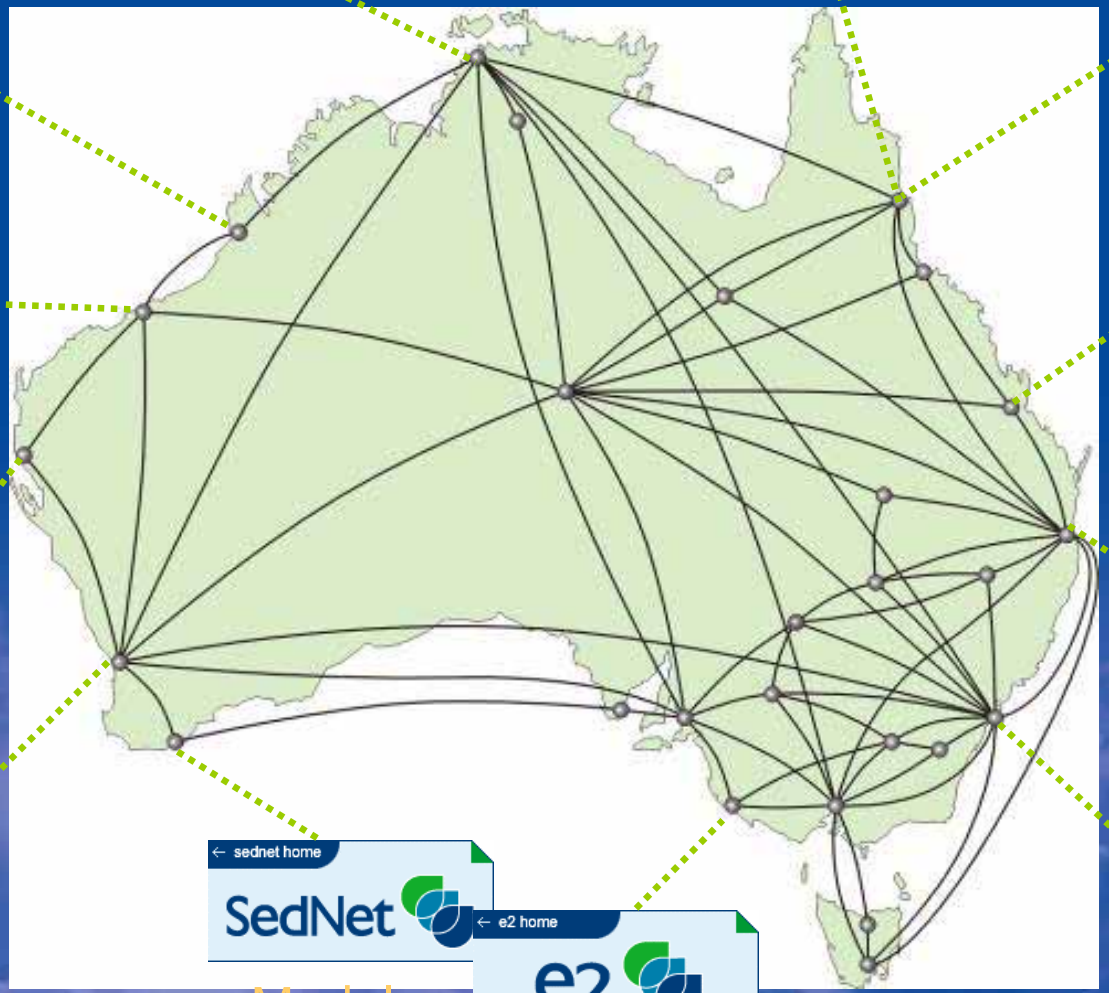
Link all water-related information via web services.

Hydrometric data

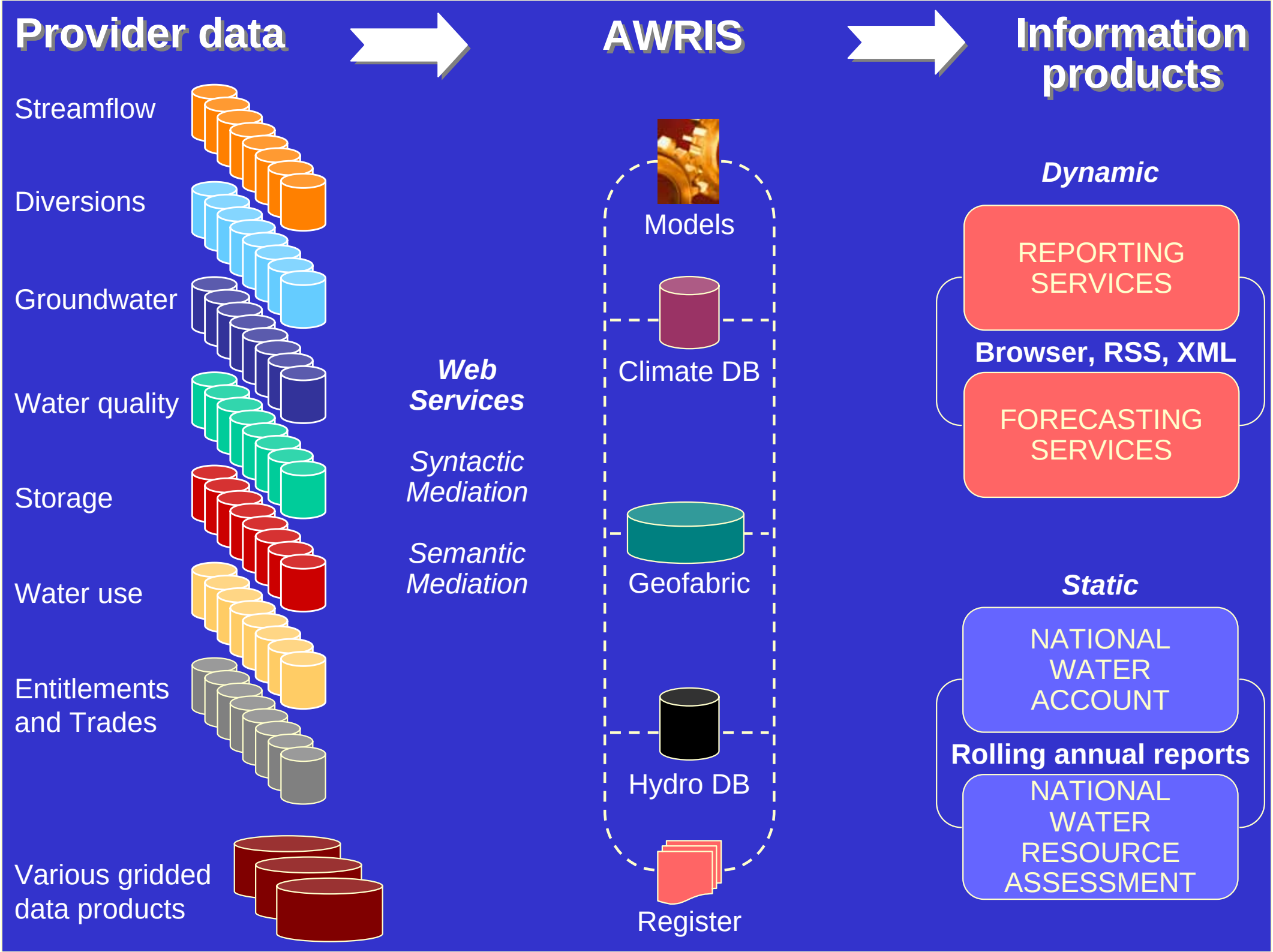
Usage and entitlement data

Geospatial data



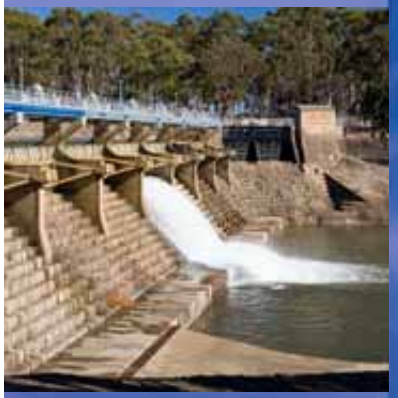


Models


Provider data
AWRIS
Information products
Streamflow
Diversions
Groundwater
Water quality
Storage
Water use
Entitlements and Trades
Various gridded data products
Web Services
Syntactic Mediation
Semantic Mediation
Models
Climate DB
Geofabric
Hydro DB
Register
Dynamic
REPORTING SERVICES
Browser, RSS, XML
FORECASTING SERVICES
Static
NATIONAL WATER ACCOUNT
Rolling annual reports
NATIONAL WATER RESOURCE ASSESSMENT

Australian Government

The questions to answer



- How much water is available in different parts of the country today and how does it compare with history?
- How much water is likely to be available in the coming days, weeks, months and years?
- Who is entitled to use water and how much are they using?
- How much water is being allocated and how is the security of particular water entitlements changing?
- How much water is being traded and to where?
- How much water is the environment getting?
- How is water quality changing?
- How much water is being intercepted by farm dams and various land management changes?