

## **Concept Note for an Australian Ocean Observing Partnership**

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### **Rationale**

To ensure that Australia fully realises the value and benefits of the marine environment to the nation, sustained and nationally coordinated observations of Australia's coastal and ocean environment are essential. In particular, it is essential to secure and share the real-time and long-term data streams that:

- a. inform and address national ocean information, service and research needs;
- b. provide an ongoing historical context for monitoring, assessing and addressing changes in that environment;
- c. provide reliable and immediate situational awareness of threats and hazards within and affecting that environment;
- d. underpin delivery of, and continuous improvement in, analysis, modelling and forecasting of short and longer term changes in that environment and timely warning of extreme events and their impacts; and
- e. underpin delivery of, and continuous improvement in analysis, modelling and forecasting of ocean structure.

There is no single agency with national responsibility for sustained ocean observations in the Australian region. The extent (spatially and historically) of existing ocean observing systems derives largely from commitments by a number of agencies, at local, state and national levels, that are linked to their specific service or domain mandates. These observing systems rely heavily on research-based investments, most especially for the last decade through the Integrated Marine Observing System (IMOS). The longest standing national agency operating and supporting ocean observations on a sustained, long-term basis is the Bureau of Meteorology, which also has strong links into the international community via WMO and UNESCO/IOC including through the Joint Commission for Oceanography and Marine Meteorology (JCOMM). The Bureau of Meteorology has some independent ocean observing capability to support its marine and climate services. However it relies heavily on access to third party ocean data, including from State Governments, industry providers, the research sector and international collaborators (including satellite agencies). Amongst the Australian user communities, the Department of Defence, as well as observing the ocean environment, stands out as the highest intensity user of ocean observations and services, and is a key shaper of both.

Collaboration is the hallmark of existing ocean observing systems that support operational and research purposes, involving a wide range of communities, across all levels of government, research agencies, universities, and both the private sector and international groups. This broad marine community spans the entire value chain from suppliers to users, and this close engagement between the supplier and user perspectives is critical to the level of sustainability that we have been able to achieve so far.

However, it is a fragile type of sustainability, heavily dependent on renewal of time-bounded research budgets and application of research effort towards continuation of monitoring programs. Australia does not currently have a national operational ocean agency with a mandate for ongoing investment in core, underpinning ocean observing capability.

### **Characteristics of Ocean Observing Systems**

Broadly speaking, ocean observing systems, including satellite-based observing systems, fall into one of two categories:

- **Sustained:** those that exist with continuing commitment and funding as well as sustained operational support and maintenance.
- **Experimental:** those that exist - possibly for an extended period but on finite funding - as experimental, project-based or R&D activities.

A major challenge faced by both suppliers and users of ocean observations is the difficulty of determining what really needs to be sustained and establishing a continuing commitment to funding and operational support. Experimental systems are justifiably for a finite period, to address a research challenge or to meet a specific need. However there has been a tendency to build dependency on experimental systems that fill a particular gap in measurement or coverage, and to treat them as de facto sustained systems.

Some ocean observing systems are developed to meet specific needs, such as safety for off-shore industries, efficient port operations and recreational boating, while others support broader scale applications, such as marine weather, ocean navigation and productive fisheries. The number of players in the ocean observing space drives this diversity of applications and (growing) demand, and vice versa, and contributes to the richness of observations that, if shared, add value to many others. However, this diversity can also lead to a lack of coordinated focus on national ocean observing priorities.

Contemporary drivers within Australia and globally indicate that it is timely for the key players in ocean observing to come together. We need a national partnership that can guide decisions about investment in sustained and experimental systems, to meet operational and research requirements, across government portfolios and jurisdictions, and across marine industries and service providers.

There are major drivers from an end user perspective. The Defence White Paper sets Australia on a course of unprecedented investment in future submarine and vessel building, with a strong requirement for best environmental ocean information. The combination of Australia's response to climate change, the demand for improved seasonal climate prediction, and the ever-present need for better weather/extreme-event prediction, means that the Bureau of Meteorology needs sustained ocean observations to deliver essential services to industry, government and society. The Forum for Operational Oceanography provides a mechanism for identifying ocean observing and modelling priorities across marine industries through direct engagement with service providers, government services, and the R&D sector.

From a science perspective, the National Marine Science Plan lays out a framework for driving development of Australia's blue economy in response to the above (and other) grand challenges. The requirement for ocean observations is fundamental to recommendations on baselines and

monitoring, processes and resilience, and ocean modelling. It is inherent in recommendations to sustain and enhance IMOS, enable full utilisation of research vessels, and train the next generation of marine-STEM professionals. Over the last decade, Australian Government has funded the implementation on a national scale, of a systematic, sustained marine observing system through IMOS. Its core mission has been to provide research infrastructure, though by enabling open data access and broadly-based science planning, IMOS observations and data have had very broad uptake and use.

Australia's ocean observing effort needs to be seen in a global context. Bodies such as WMO, IOC, GOOS and GEO provide the mechanisms for international coordination required to understand the global ocean and how it impacts regionally and locally. The Framework for Ocean Observing sets out a structured process for considering readiness levels of global ocean observing activities (from proof-of-concept, to pilot, to mature), providing very useful international context for discussion about an Australian Ocean Observing Partnership.

### **Nationally Coordinated Network of Ocean Observations**

Given the nature and history of ocean observations in Australia and the many different partners, collaborators and players, there is merit in stepping back from the complexity of institutions and disparate needs, and considering a tiered ocean observing paradigm along the lines of the categorisation above, vis:

- Sustained, Core Australian Ocean Observing System
  - Basic ongoing ocean observations that meet national (public good) needs
  - Maintain, operate, support, deliver observations from core observing systems
  - Develop and implement standards, operational practices, data exchange, lifecycle management
  - Provide a hub for access to and integration of satellite-based ocean observations
  - Access to sustained funding and renewal of capability
  - Provide a foundation for common support of mission-based/experimental observing systems
- Experimental, Mission-based ocean observing systems
  - Development/improvement/innovation pilots (technical or scientific) funded from core or business development
  - Major research initiatives with a finite life (typically < 7 years)
  - Project-funded research and development investigations, with defined-life, start and end – e.g. assessing new systems or measurements, data impact studies, investigating phenomena, design studies, evaluating new service commitments
  - Special purpose missions (ongoing or short term) e.g. special applications, cost recovery, business development

Not all experimental or mission-based ocean observing systems necessarily could or should transition from non-ongoing to sustained ongoing operation. And the sustained/core observing systems will not remain static in perpetuity as it responds to technological innovation, greater scientific understanding, and new requirements.

There is a clear need for an agreed framework to:

- determine the requirements of the sustained, core observing systems and the roles and responsibilities of Australian Ocean Observing System partners in its delivery
- evaluate experimental systems as potential candidates for transitioning to sustained systems giving due consideration to requirements, technical suitability and funding implications
- manage the transition from experimental to sustained operation by drawing on the strengths of all Australian Ocean Observing System partners
- manage and/or coordinate the sustained ocean observing systems on a whole-of-lifecycle basis including decommissioning of systems which have been superseded or are no longer required.

Such a framework would link well to an innovation strategy, which stimulates, supports and captures innovation opportunities, and ensures the pathway from idea to implementation is well-considered and planned from the earliest stages.

Many diverse organisations invest in and rely heavily on ocean observations in Australian and international waters. To maximise the value of this information and to secure its ongoing availability, collaboration and coordination is essential, to optimise our respective investments and to deliver a sustained and nationally coordinated network of ocean observing networks.

Key to implementing such a sustained, nationally-coordinated network of ocean observations is a set of defined institutional responsibilities and appropriate resourcing to ensure effective coordination of the many contributors and users. The institutional responsibilities may well be distributed but they will be more manageable if coordination, at least, is concentrated into a small number of overarching lead agencies or bodies, with authority to liaise, negotiate and act on behalf of the broader ocean observing and user community.

As a major southern hemisphere island nation, whose economy and environment are heavily influenced by the world's oceans, a coordinated approach to international coordination and collaboration on ocean observing systems, including satellite-based systems, is also essential. Amongst the key international programs and intergovernmental stakeholders, Australia engages at both policy and scientific levels with UNESCO/IOC, WMO, GOOS, GEO and others, while coordinated liaison with space agencies allows Australia early access to important new data streams.

### **Partners in Australian Ocean Observing Systems**

Development of a tightly coordinated national approach to ocean observations is now essential, to harness the strategic advantage that our oceans provide for Australia and to ensure that we position ourselves as a nation to capitalise on this advantage for national prosperity.

To achieve this uplift in coordination, key operational, research and development, and user communities must work together in partnership and on behalf of the wider ocean observing community:

- to lead in efforts to optimise national ocean observing systems,
- to influence government investment in sustained ocean observing systems,
- to leverage international commitments,

- to drive open sharing of ocean observations, and
- to set strategic directions for the evolution and extraction of value from Australia's basic ocean observing systems, as a foundation for cutting edge ocean research, development and innovation.

To that end, it is proposed that an **Australian Ocean Observing Partnership (AOOP)** be established, under the joint leadership of the Bureau of Meteorology, Department of Defence, and Integrated Marine Observing System (IMOS). Each has a well-defined strategic framework for planning, funding and delivering against their ocean observing and applications obligations, and each brings their own resourcing and commitments to ocean observations, with the aspiration to leverage these and the contributions of other partners for increased effectiveness. Each also brings different perspectives as provider or user of ocean observations, often both, and together they are closely able to represent the range of interests and perspectives across the wider partnership.

A set of AOOP principles can be framed, building on the National Marine Science Plan and the Forum for Operational Oceanography as well as Australian Government open data principles, such as:

- optimised ocean observing system/network design for efficiency, effectiveness and adequate planned redundancy
- open, discoverable, accessible and retrievable data
- systematic evaluation of observing systems using an agreed framework that considers requirements, technical readiness, funding, and whole-of-lifecycle management
- international engagement that is coordinated and well-targeted at addressing priority gaps and needs, and
- plan for, monitor and assess benefits derived through use of ocean observations, building on strong provider /user linkages.

Early tasks of the AOOP, and in particular of the three lead partners, include:

- defining the scope, terms of reference, objectives and goals of the AOOP, and to lay these out for wider discussion amongst the ocean observing community;
- defining governance arrangements (such as the AOOP Board and operational support arrangements);
- establishing an inventory of partners across academia, governments and the private sector and associated ongoing and/or mission-based observing systems;
- developing a shared understanding of critical national and international relationships;
- developing a draft strategic vision for the AOOP, to realise the establishment of an Australian Ocean Observing System, building firstly on the contributions of all partners and with targeted improvements to enable it to perform as a foundation for a more sustained and effective nationally-coordinated ocean observing system; and
- position the AOOP to optimise existing investments in ocean observing systems and to influence future government investment in ocean observations.

**Next steps:**

1. Bureau of Meteorology, Department of Defence, and Integrated Marine Observing System (IMOS) approve the Concept Note by end of November 2016.
2. Consultation with the broader Australian ocean observing community using established mechanisms (NMSC, FOO etc.).
3. Subject to securing the required broad base of support, AOOP brought into existence from 1 July 2017.

## Partners

- Operational system and service (supplier) agencies
  - Bureau of Meteorology
  - GA
  - CSIRO
  - Ports
  - State agencies (to be specified)
  - AIMS
- User community
  - Defence
  - Customs
  - Fisheries
  - Sea transport
  - Tourism
  - AMSA
  - Oil & gas
  - insurance industry
- Research – via IMOS
  - CSIRO
  - AIMS
  - Bureau of Meteorology
  - SARDI
  - Universities (UTAS, UWA, SIMS=UNSW/Sydney/Macquarie/UTS, Curtin, other)
  - AAD