

Australian Coastal Ocean Radar Network 2011-13 IMOS EIF Facility Project Plan

Overview:

Infrastructure Investment:	HF Ocean Surface Radars
IMOS Facility:	Australian Coastal Ocean Radar Network (ACORN)
Operating Institution:	James Cook University
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Other(s) key people involved:	John Middleton, SARDI, Director of Sub-Facility
Collaborating Institutions:	SARDI; Flinders University; SIMS/UNSW

Background:

The Australian Coastal Ocean Radar Network Facility (ACORN) was established under the original IMOS program to acquire, install and operate a network of HF ocean radar stations within Australia. Under that program, 12 stations were approved to be operating as 6 pairs of stations at the following sites:

- a. QLD Great Barrier Reef – around Heron Island;
- b. SA Gulfs – around the entrance to the Gulfs;
- c. WA Turquoise Coast between Seabird and Cervantes;
- d. WA Rottneest Shelf
- e. SA Bonney Coast off Mt Gambier;
- f. NSW Coffs Harbour.

Of these, (a) was operating in 2008; (b), (c) and (d) were installed in 2009; and (e) and (f) are scheduled for installation in early 2010. By the end of the first IMOS period (30 June 2011) these radars will each have returned more than one year's data to the archive. The primary data are maps of surface currents, with wave directional spectra, significant wave heights and wind directions observations also being available. The Extension part of this proposal is to continue operating these sites at the 30 June 2011 level for a further two years. The Enhancement part of this proposal is in response to plans from IMOS Nodes to increase the number of HF radar sites in the ACORN network. At this stage, there may be one additional site (pair) in SEQ, subject to a decision by the Queensland State Government about further co-investment.

Nature of Investment:

Objectives

HF ocean radar makes a significant contribution to providing a national backbone for observing boundary currents (Strategic Priority 3) by providing surface current maps of the shelf, the shelf edge and into the deep water beyond. The data are highly resolved in time and space and make good validation for operational models (Strategic Priority 3). The deployments are being made in direct response to requests from Regional Nodes and provide an integrating effect in the design of transects etc (Strategic Priority 4). ACORN has been in a growth phase during the first years of the program and we are just now beginning to see the cost per observation approach a steady state under a maintained operation to create the data archive. For the proposed Extension Strategy, the budget has been constructed on the basis of incremental cost per radar station. Once that is done it becomes easy to evaluate efficiencies and control the cost per observation

(Strategic Priority 7). We are now reaping the benefits of work done in ACORN to develop Quality Control processes for the WERA archived data. These processes can easily be applied to new radar stations as they come on line. QC processing of SeaSonde data is due to be completed by 31 Dec 2009.

Implementation Strategy:

(a) Extension of initial ACORN/IMOS operations

Proposals from nodes in QLD, NSW, SA and WA request the continuation of the operation of HF radars established during the initial IMOS contract period.

Node	Site	Stations	QC Data commenced
GBROOS	GBR	Tannum Sands	Nov 2007
		Lady Elliot Island	Nov 2007
SAIMOS	SA Gulfs	Cape Wiles	Dec 2009
		Cape Spencer	Dec 2009
WAIMOS	Turquoise Coast	Cervantes	Dec 2009
		Seabird	Dec 2009
SAIMOS	Bonney Coast	Nora Creina	Jun 2010
		Cape Douglas	Jun 2010
NSWIMOS	Coffs Harbour	Red Rock	Jun 2010
		North Nambucca	Jun 2010

(b) Enhancement to a New Level of ACORN/IMOS Operations

Proposals from regional Nodes to expand the ACORN Facility are coming to IMOS in submissions from the Nodes. Each site being proposed for an HF radar station is entered into the summary table below and is described in an appendix.

Node and Site	Station Place & Type	Cost to Acquire, install & Operate 2011-2013	Notes
QMOS-Moreton_EAC	Cape Moreton WERA		Off-grid Power; Remote
	Flinders Beach WERA		
Moreton_EAC		\$1,344,648	

Access, pricing regimes:

- *[How will data access be provided?]*
First-Look data are returned to the ACORN lab in real time for conversion to netCDF formats, and are streamed with metadata onto a Staging Area at QCIF. They are then taken by eMII to the Ocean Portal. When the raw data are collected from the radar stations (approx 3-monthly) they are re-processed with Quality Control Indices and delivered to the staging Area in QCIF, whence eMII take them to the ocean Portal.
- *[How will data and products be managed?]*
Via eMII.
- *[What are the dependencies on external / other facilities (national and international)?]*
Foreign exchange is a significant external variable. Delays in implementing acquisition and installation are now focussed on site approvals and power connection. A strategy has been devised to commence site approval work early in the schedule and push those processes ahead as quickly as possible for all sites. Then it is within our control to schedule the installation work according to which approvals have moved more quickly. Delay in factories

is not likely to be a problem because we have established good working relationships with suppliers.

- [Collaborative structures for allocation of priorities]
ACORN works in collaboration with Nodes to establish acquisition and installation schedules.

Governance

A review of the management structure of ACORN within JCU (December 2009) identified issues in financial management, and work loads. Outcomes are that financial management will become the responsibility of Financial and Business Services (within JCU) and the delivery of reports to ACORN and IMOS will be revised; and the scope of work for ACORN will be modulated to match the level of staffing and the institutional overheads. It was agreed that maintenance on the radar network would not be 'on call', but on scheduled 3-monthly maintenance and data download tasks. More emphasis will be placed on the network of Caretakers at the radar stations.

- Performance indicators
The quantitative performance indicator that ACORN has adopted is the station "on-time" for each radar station. This is not a measure of quality, but a measure of the % of time (24/7) that a station has power and is functional. This is likely to be affected by the change in maintenance procedures.

The main Quality Performance Indicator is the number of people who access the data; and the number of publications which refer to ACORN data.

- Describe key risks and risk management strategies
A tabulation of risk, risk assessment and proposed treatment is given for the Extension and Enhancement proposals.

	Description of Risk	Rating of Likelihood	Rating of Consequence	Assessment of Net Risk	Proposed Treatment of Risk
1.	Vandalism at Radar Sites	Likely (Different at different sites)	Significant	Significant	1.1 Daily monitoring to detect problems early, 1.2 Maintain technical support network; 1.3 Place electronics in secure housing; 1.4 Keep a comprehensive set of spares.
2.	Environmental Damage at Radar Sites	Likely	Minor	Moderate	2.1 Daily monitoring to detect problems early; 2.2 Maintain technical support network;
3.	Delays in site approvals	Likely	Significant	Moderate	3.1 Start site searches early in program; 3.2 Schedule installation work according to progress in approvals.
4.	Power and telephone outages at radar sites	Likely	Significant	Moderate	4.1 Install backup power (UPS); 4.2 Include on-site data storage facility.
5.	Inflation and Foreign Exchange Rates	Likely	Significant	Moderate	5.1 Avoid payments when rates are below the Planning level.

- For existing Facilities, respond to any issues raised in the 2008 IMOS Review

A tabulation refers to **Discussion Points** of the Board and **Recommendations** at the mid-term review.

Most of the concerns relate to delays in approvals for installations, and in data flow. The concerns about installation have been largely addressed by the installation of four WERA stations in September 2009. We set up a system of First-Look data for near real time flow of data to the Staging Area at QCIF. This was operational for Tannum Sands (GBR) in July 2009, and for Lady Elliot Island (GBR) when the broadband phone connection was made in August 2009. We are adopting this procedure for all other stations as they become operational.

Research quality data are being produced by re-processing WERA data to include QC indexing. These data are being uploaded to the Staging Area at QCIF. This procedure is set up for each new WERA station as it comes on line. Work on QC for the SeaSonde data is due for completion by 31 Dec 2009.

Discussion Points Jan 2009	Response at October 2009
Only one of six systems operational; data not yet available	4 (of 6) are now installed, with the last 2 scheduled for installation in Feb/March 2010. We are waiting for power reticulation at Guilderton (WA), Fremantle (WA), and Cape Spencer (SA); SeaSondes at Seabird (WA) and Cervantes (WA) are in shake-down period with CODAR helping resolve issues; First-Look data are flowing in real time from Tannum Sands (GBR) and Lady Elliot Island (GBR) to the Staging Area in QCIF for eMII to pick up and take to the Archive; and QC data are being posted.
Budget Overruns	Errors in JCU accounts have led to confusion about planning decisions and operational decisions in ACORN and IMOS. This will be addressed by improving the management of ACORN within JCU.
Concern for Bonney Coast site approvals	Approvals for Bonney and Coffs are on track for installations in Feb/March. Approval times can be shortened by increased effort from ACORN staff allocations
WA sites appear to be close to approval	All four WA sites have been installed and tested; we are waiting for power reticulation at Fremantle and Guilderton; Seabird and Cervantes are operating but being optimised.
Concerns about effort to produce research quality data	ACORN has spent significant effort on QC for WERA data; this is now complete and is easily installed on future WERA systems. The same effort is not appropriate for SeaSonde data but QC processing has to be developed.
Recommendations Jan 2009	Response at October 2009
15. Protocol for creating research-quality data	This task is complete for WERA data. Protocols are being established for SeaSonde data and are due for completion by 31 Dec 2009
16. Create plan for site approvals	Site approvals for Coffs and Bonney are on track for installations in Feb/Mar 2010. For Enhancement sites beyond June 2011 we will commence all site work at the beginning of the period. Progress on site approvals will determine the sequence of installations (unlike the past where we made a sequential time line).
17. Extend ACORN capability outside GBROOS	Maintenance capability is shifting to nodes; Lincoln Marine Centre in Port Lincoln are involved in maintenance; personnel from UWA and SARDI participated in installations in WA and SA.

18. Update risk profile in light of concerns	Refer to risk assessment above.
19. Undertake consultation with USA/European users to understand how they overcame obstacles in implementation and data provision	This is included in the benchmarking plan and will be pursued through that process. Comparisons to date indicate that ACORN staffing levels are lower than those in benchmarking institutions. Staffing levels were underestimated for ACORN at the beginning, and loss of trained technical staff has exacerbated this. This is addressed in the Extension Plan in this proposal where Radar Technician support is based on 1 Tech for 4 stations (This is still on the low side of the benchmarks). QC for WERA radars in ACORN is superior to that used by others. QC for SeaSondes in ACORN will be best practice. Delays in approvals are hard to compare because they vary widely between countries and within countries. Our plan to re-organise the way we approach site approvals has potential to improve the timeliness. Assigning more staff effort would potentially shorten the process.

Budget:

Detailed budget in 'Final IMOS EIF Project Plan' submitted to DIISR 26 February 2010

TABLE: Observations required by the Nodes in relation to this Facility

Facility	Observations required by the Node			
	NCRIS Funded (already allocated to Jun11) (see Appendix 1 of the Guidelines)	EIF first \$8M funded (already allocated to Jun10) (see Appendix 1 of the Guidelines)	Extension of existing facility infrastructure out to 2013.	Enhancements of existing Facilities / new infrastructure required 2010-2013
Bluewater & Climate				
WAIMOS	SeaSonde, Cervantes SeaSonde, Seabird WERA, Guilderton WERA, Fremantle		SeaSonde, Cervantes SeaSonde, Seabird WERA, Guilderton WERA, Fremantle	
GBROOS/QMOS	WERA, Tannum Sands* WERA, Lady Elliot Island*		WERA, Tannum Sands* WERA, Lady Elliot Island*	WERA, Cape Moreton WERA, Flinders Beach
NSW-IMOS	WERA, Red Rock WERA, N. Nambucca		WERA, Red Rock WERA, N. Nambucca	SeaSonde, Laurieon SeaSonde, Seal Rocks SeaSonde, Redhead** WERA, Long Reef
SAIMOS	WERA Cape Wiles* WERA, Cape Spencer* SeaSonde, Cape Douglas SeaSonde, Nora Creina		WERA Cape Wiles* WERA, Cape Spencer* SeaSonde, Cape Douglas SeaSonde, Nora Creina	
Other <enter name>				

*These Radar Stations were funded outside of the NCRIS budget

**This Radar Station is proposed to be funded outside of the EIF budget.