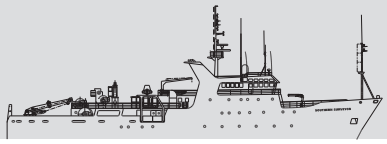

MARINE
NATIONAL FACILITY

2011 program

RV *Southern Surveyor*

voyageplan
SS2011_c01

Tsunami Detection Buoy Maintenance for Australian Tsunami Warning System (ATWS)

Itinerary

Mobilise 0700 Sydney, Tuesday 5 April 2011
Depart Sydney 1600, Tuesday 5 April 2011
Arrive Hobart 1400, Thursday 14 April and demobilise

Principal Investigator

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CSIRO

Scientific Objectives

The Australian Tsunami Warning System (ATWS) is a national effort involving the Australian Bureau of Meteorology (Bureau), Geoscience Australia (GA) and Emergency Management Australia (EMA) to provide a comprehensive tsunami warning system capable of delivering timely and effective tsunami warnings to the Australian population by 2009. The project also supports international efforts to establish an Indian Ocean tsunami warning system, and contributes to the facilitation of tsunami warnings for the South West Pacific.

Due to the complexity and uncertainty as to whether an undersea earthquake has the potential to generate a tsunami, the observation of sea levels is a critical factor in verifying whether a tsunami has actually been generated. The use of actual sea level observations, as compared with reliance on seismic observations alone, therefore helps to significantly reduce the risk of false tsunami warnings being issued. All Australian-owned buoys, as well as deep-ocean buoys operated by other countries in the Australian region, provide critical data to Australia's tsunami warning system.

Voyage Objectives

The maintenance process will consist of the following work:

1. Deploy new ETD tsunameter

At site TE2 deploy new ETD (Easy to Deploy) tsunameter at location 46° 52.2' S 161° 43.80' E. Deployment of the ETD requires tilting of the system cradle at the vessel's edge and allowing the buoy and anchor components to slide into the water. See figure 3.The anchor automatically separates and sinks to the sea floor as mooring line within it unspools.

2. Deploy new DART II tsunameter

At site TD1, deploy DART II system comprising separate bottom pressure recorder (BPR) and moored surface buoy. A sounding to determine water depth at the site is desirable to allow the buoy mooring length to be correctly adjusted. The surface buoy is first lowered into the water via the A-frame (see figure 5), and its mooring line payed out while the vessel travels slowly toward the anchor drop point. When this point is reached, the buoy anchor is lowered into the water via the A-frame and released. The vessel continues on the same course. The BPR floats and line are payed out into the water, and when the vessel reaches a point approximately 300 m beyond the previous anchor drop point, the BPR (with integral anchor) is lowered into the water via the A-frame and released.

3. Recover STB tsunameter

At the site of TS2, recover the existing STB tsunamater which comprises a separate BPR and moored buoy. The existing buoy will be located, raised onto the deck and the mooring line made good. See figure 7.The line is then detached from the recovered buoy, and the buoy lowered onto deck and secured. If time and weather permit, the mooring line will be recovered using one of the vessel's winches, otherwise it will be detached from the vessel with a top section of chain attached and lowered over the side.

The BPR will also be located and released from the ocean floor. It may take up to 1 hour for the BPR floats to bring it to the surface. The buoy will then be recovered onto the vessel.

4. Changeover ETD buoy

At site 108, the existing buoy will be replaced with an identical buoy loaded with fresh batteries. The BPR at this site is not recoverable – the purpose of the changeover is to allow continued operation of the station until the BPR batteries are depleted. A tender is required to be lowered over the side so that a line can be attached to the existing buoy. Once the line is attached, the buoy it can be raised onto the deck then the mooring line made good to the vessel. The mooring line is then removed from the buoy and attached to a blob. A new thimble will be installed on the mooring line end. The line is then attached to a replacement buoy. The mooring line is released from the vessel, and the replacement buoy lifted in to the water and released.

If time and weather make deployment of tender impossible, this activity can be aborted.

Voyage Track

- On departure from Sydney, head toward location TE2 approximately 820 n miles. Refer figure 1.
- After TE2, head toward TD1, approx. 134 n miles. Refer figure 2.
- After TD1, head toward TS2, approx. 7 n miles. Refer figure 2.
- After TS2, head toward 108, approx. 29 n miles. Refer figure 2.
- After 108, head to Hobart, approx. 625 n. miles. Refer figure 1.

Time Estimates

- Mobilisation at Sydney . . . . . 8 hrs
- Deployment of ETD at TE2 . . . . . 3 hrs
- Deployment of DART II at TD1 . . . . 8 hrs
- Recovery of STB at TS2. . . . . 4 hrs
- Changeover of ETD buoy at 108 . . . 3 hrs
- Demobilisation at Hobart. . . . . 4 hrs

Voyage day	Date	Time		Event
		AEST	GMT + 11	
1	5/4/2011	0700		Begin mobilisation
		1500		Mobilisation complete
				Depart Sydney for TE2 (820 nmi, 92 hours)
2	6/4/2011			In transit
3	7/4/2011			
4	8/4/2011			
5	9/4/2011		1200	Arrive TE2 Begin ETD deployment & verification
			1500	Deployment complete Depart for TD1 (134 nmi, 15 hours)
6	10/4/2011		0600	Arrive TD1 Begin DART II deployment
			1400	Deployment complete Depart for TS2 (7 nmi, 1 hour)
			1500	Arrive TS2
7	11/4/2011		0600	Begin STB/BPR recovery
			1000	Recovery complete Depart for 108 (29 nmi, 4 hours)
			1400	Arrive 108 Begin ETD buoy changeover
			1700	Changeover complete Depart for Hobart (625 nmi, 70 hours)
8	12/4/2011			In transit
9	13/4/2011			
10	14/4/2011	1400		Arrive Hobart Begin demobilisation
		1800		Demobilisation complete

Southern Surveyor Equipment

- Frame
- A-Frame Snatch block
- Knuckleboom crane
- Capstan
- Some type fair lead from Capstan A-Frame
- Tugger winch
- Echo Sounder for bottom features and water depth determination-ring?
- Placed on Aft deck 10,000 lbs rating for stopper chain and towing.
- Good cleats and tie offs for Tag lines.
- Chain and Binders to secure equipment on deck.
- Tender used to attach mooring line to ETD.
- High Pressure cleaner to clean growth of recovered buoy.

User Equipment

- 6 × Wire cages containing specialized tools/equipment. Size 1400 × 1400 × 1200 mm each. Mass approx. 400 kg each. These can be stored on deck but require lashing down.
- DART II buoy. Conical, 2600 mm diameter × 3500 mm. Mass approx. 2000 kg.
- Mooring kit for DART II buoy comprising nylon rope, steel cable and chain elements. Size 2000 × 1800 × 1200 mm. Mass approx. 1500 kg.
- Anchor for DART II buoy. Mass approx. 3200 kg.
- BPR for DART II system. Size 1200 × 600 × 800 mm. Mass approx. 600 kg.
- ETD system. Size 2200 × 1800 × 2000 mm. Mass approx. 2200 kg.
- ETD buoy. Conical, 1800 mm diameter × 2200 mm. Mass approx. 600 kg.

Personnel List

Name	Affiliation	Position
Thomas Alan	BOM	Chief Scientist
Bill Gauci	BOM	Deployment Mooring Engineer
Pamela Brodie	CMAR	MNF Voyage Manager
Pete Dunn	CMAR	MNF Electronics Support
Hugh Barker	CMAR	MNF computing Support
Tara Martin	CMAR	MNF Swath Mapping support
Rod Palmer	CMAR	MNF Electronics Support

Alan Thomas
Chief Scientist

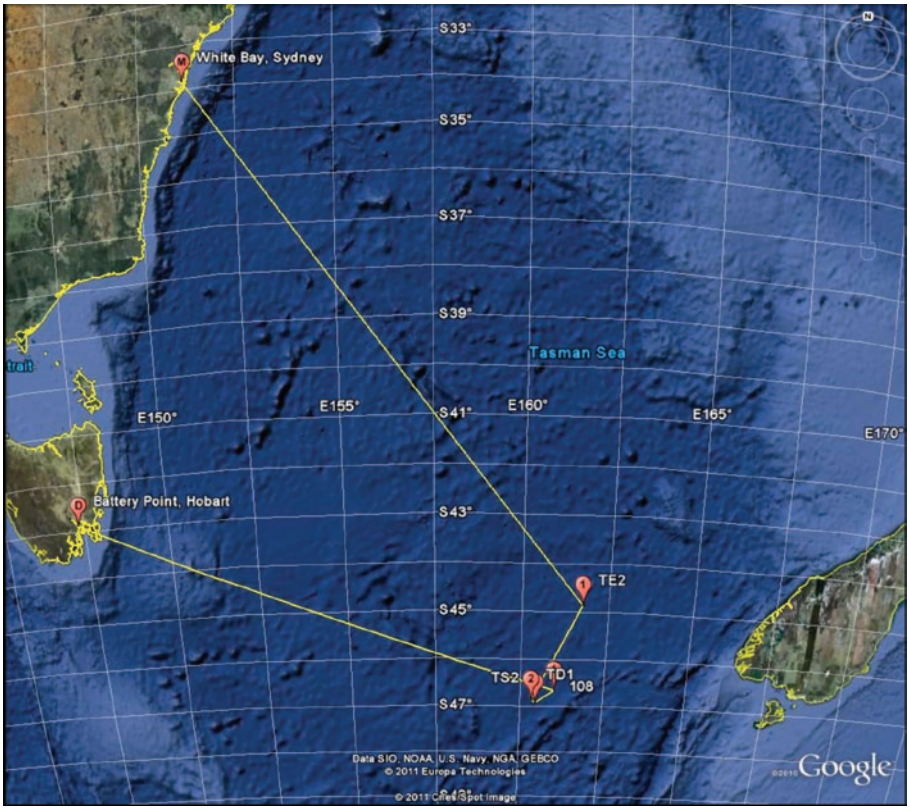

Figure 1: Overall Voyage Track

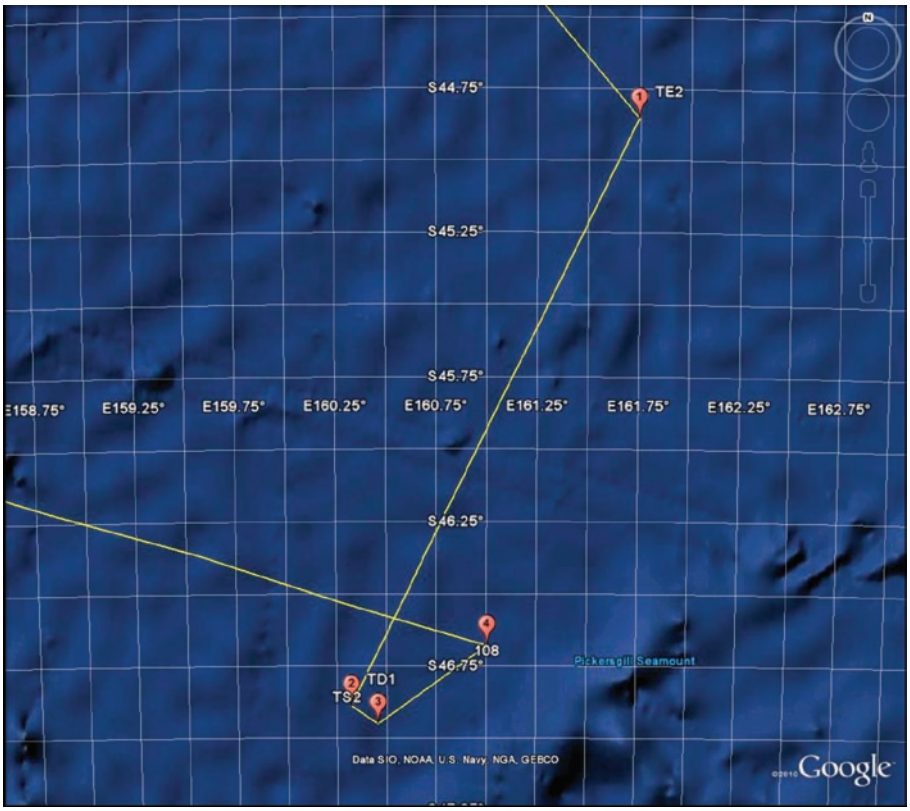

Figure 2: Voyage Track (detail at deployment/recovery locations)

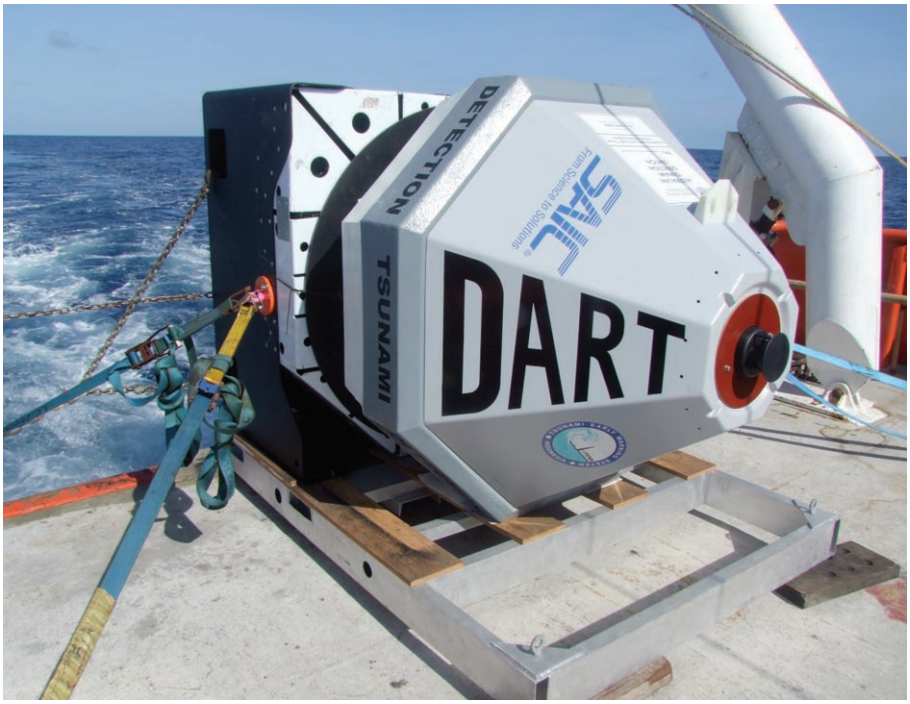

Figure 3: ETD Tsunameter System (under A- Frame ready for deployment)

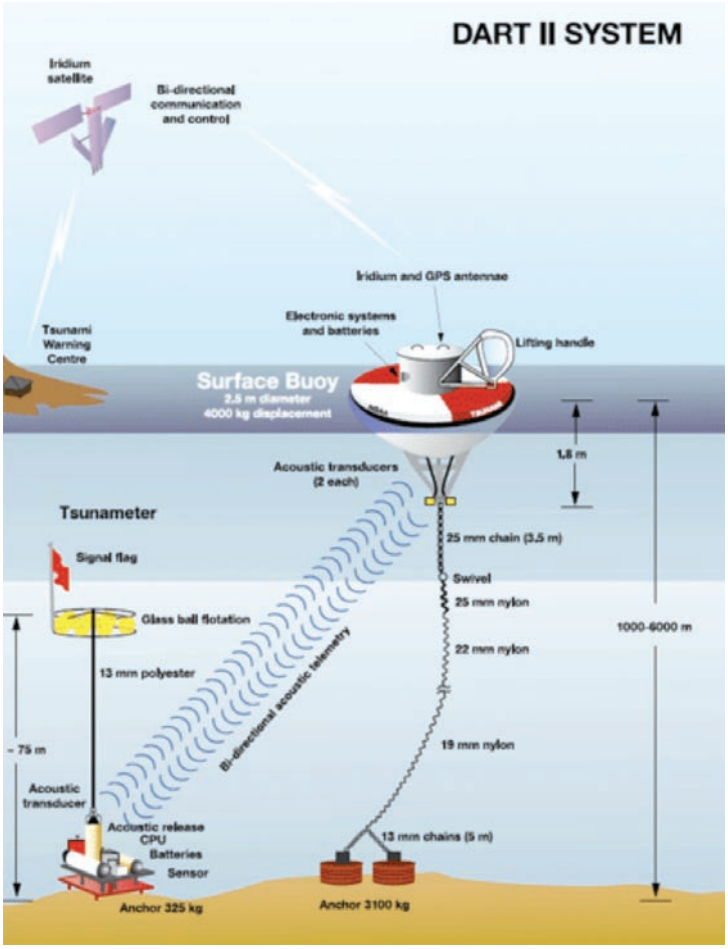

Figure 4: DART II Tsunameter System

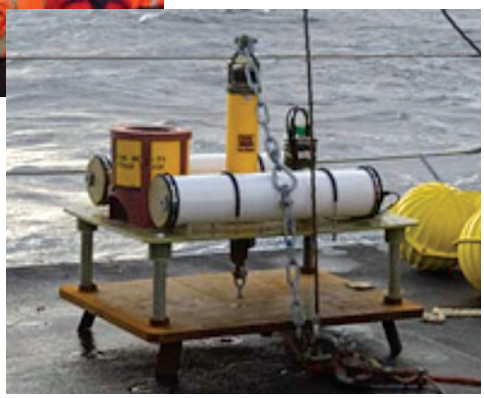

Figure 5: DART II Buoy (above) and BPR (right)

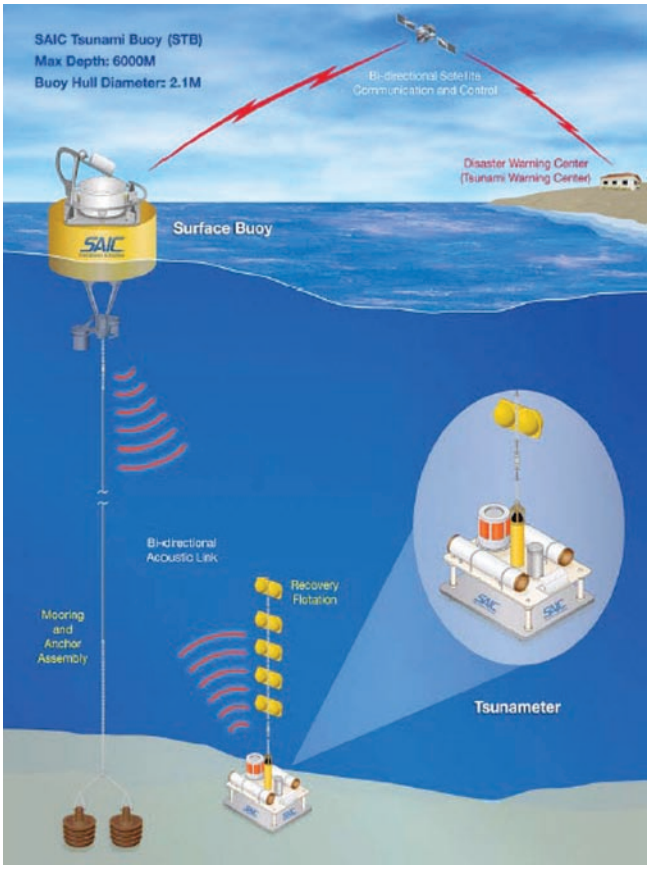

Figure 6: STB Tsunameter System

Figure 7: STB Buoy