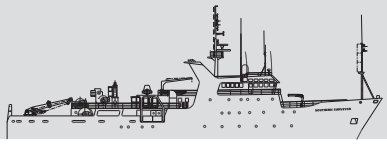


MARINE
NATIONAL FACILITY

2012 program

RV *Southern Surveyor*

voyageplan
ss2012_t01

XBT fall-rate experiments using XBT/CTD intercomparisons.

Itinerary

Depart Hobart 0800hrs, Wednesday 12 April 2012
(or 1600 11 April if ss2012_v01 Ridgway mobilisaton complete)

Arrive Brisbane 1600hrs, Wednesday 18 April, 2012 and demobilise

Principal Investigators

Ms Rebecca Cowley
CSIRO Marine and Atmospheric Research
Email: rebecca.cowley@csiro.au
Phone: 0362325446

CSIRO

Scientific Objectives

XBT/CTD intercomparison (Rebecca Cowley):

We propose a simple and reliable experiment to assess the fall-rate and temperature biases of modern XBTs manufactured by Lockheed Martin Sippican (the major global supplier). We aim to collect concurrent temperature profiles form both XBT systems and high accuracy CTD systems. We have some old XBT probes which we would like to deploy to compare with modern probes.

We plan to address the questions:

1. Do modern XBTs have temperature and depth biases?

2. Do older XBTs (circa 2001-2003) show similar temperature and depth biases to those found in previous work?

3. Can we use depth soundings to check depth accuracy, and how do these results compare with the CTD/XBT intercomparison method?

Voyage Objectives

The Southern Surveyor will leave Hobart and begin swath mapping as soon as possible. If departure is 1600 on the 11th April, the first deck operation will not commence until after 0800 on the 12th April, and this will be a net tow.

The XBT/CTD intercomparisons will be conducted at two sites which will be occupied for 10 to 12 hours, and these activities take priority. We would like to aim to be in water that is 750 to 800m deep for these experiments. At the XBT/CTD stations, the CTD will be deployed to the bottom. It will be cycled multiple times. During the first part of each downcast, multiple XBTs will be deployed on up to four acquisition systems. We will need a minimum of four people to launch the XBT probes and two to operate the computers if all four XBT systems are used.

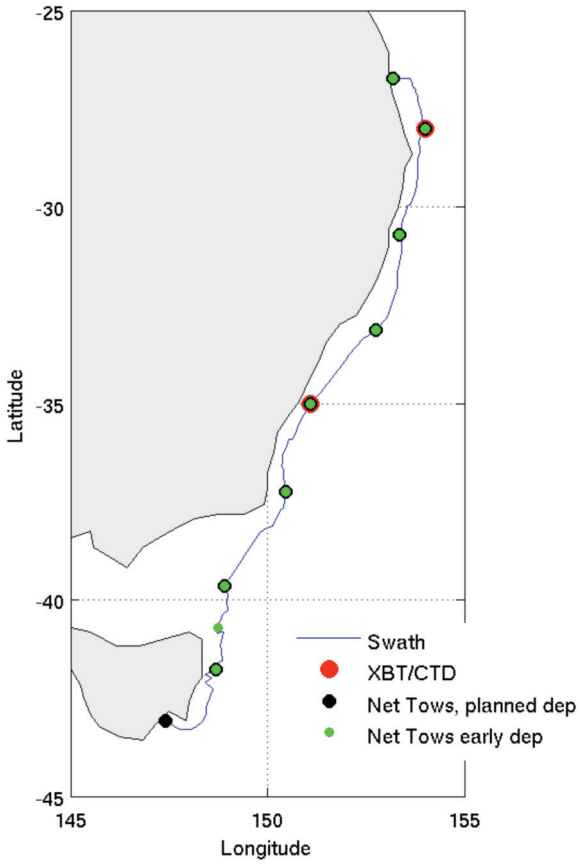
In total, we would like to complete around 10 CTD down/up cycles at each site. This will allow us to deploy ~240 probes at each site.

Swath mapping will be conducted during the entire transit and the voyage track is located along the preferred swath route. Net tows will occur at approximately every 150Nm and at these times, the ship will need to be slowed to ~3knots for approximately 1 hour.

Table 1 Summary of the planned activities.

		Planned departure		Early departure	
Latitude	**Longitude**	**Date/Time**	**Activity**	**Date/Time**	**Activity**
Hobart wharf		12/04/2012 0800	Pilot	11/04/2012 1600	Pilot
		12/04/2012 0840	Net Tow	12/04/2012 0900	Net Tow
		13/04/2012 0200	Net Tow	12/04/2012 1700	Net Tow
		13/04/2012 1700	Net Tow	13/04/2012 0000	Net Tow
		14/04/2012 0800	Net Tow	13/04/2012 1500	Net Tow
35S	150E	15/04/2012 1000	XBT/CTD deployments	14/04/2012 1700	XBT/CTD deployments
		15/04/2012 1100	Net Tow	14/04/2012 1800	Net Tow
		16/04/2012 0400	Net Tow	15/04/2012 1200	Net Tow
		16/04/2012 2100	Net Tow	16/04/2012 0400	Net Tow
28S	154E	18/04/2012 0130	XBT/CTD deployments	17/04/2012 0900	XBT/CTD deployments
		18/04/2012 0200	Net Tow	17/04/2012 0900	Net Tow
		18/04/2012 1300	Net Tow	17/04/2012 2000	Net Tow
Brisbane Wharf		18/04/2012 1600	Pilot	18/04/2012 1600	Pilot

Voyage track



Time Estimates

See table 1 for an outline of approximate times for each activity. 10 to 12 hours will be spent on station at the two XBT/CTD intercomparison stations. For the rest of the time, the ship will proceed at ~10 knots for swath mapping, and slow to ~3 knots for net tows.

In the case of an early departure, ~18 hours is available for extra work. In this case, the extra time will be used for XBT/CTD comparisons if needed. Any remaining time available at the end of the voyage will be used for swath mapping or extra net tows if required.

Piggy-back Projects

Rudy Kloser (CMAR)

Rudy's project is SWATH mapping of the 200m to 1000m depth range, particularly along the northern edge of Bass Canyon. MNF swath support staff will undertake the mapping project.

Julia Reisser (PhD student, CMAR)

Julia's project is looking at the sources, distribution and fate of marine debris. There are two components to her program, one is visual and the other is sampling several times per day using a neuston net. Julia has one berth and tows on the shift opposite to hers will be carried out by someone from our team. As many tows as possible in the time frame will be carried out.

Clare Murphy (UoW)

Clare's project is looking at transect measurements of greenhouse gases in the marine atmosphere. Her project requires no ship time, but she has two berths.

Southern Surveyor Equipment

XBT/CTD intercomparison (Rebecca Cowley):
- CTD rosette, with no bottles attached.
- Depth sounder (or any equipment that can give us bottom depth readings).
- We may also require use of the Southern Surveyor XBT system.

- **Marine Debris study (Julia Reisser):**
- Winches for deployment of neuston net

- **Swath mapping (Rudy Kloser):**
- Swath mapping system.

User Equipment

XBT/CTD intercomparison (Rebecca Cowley):
- 4 Devil XBT systems and associated cables, computers, launchers
- Approximately 40 boxes of XBT probes (480 probes, ~3 pallets)

Marine Debris study (Julia Reisser):
- 2 nylon neuston nets, 0.333mm mesh size

Greenhouse Gases (Clare Murphy):
- See attached equipment list

Special Requests

XBT/CTD intercomparison (Rebecca Cowley):

- At least two (possibly all four) of the XBT systems will require cables to be connected from the computers to the launchers on deck. These cables can be rolled up out of the way between stations. We may set the systems up prior to departure.
- We will also require a person from our team to watch the CTD winch cable during the up cycle of the CTD to ensure that there is no copper wire from the XBTs tangled around it. We may need a broom or similar tool to remove any that does get tangled to avoid damage to the winch block. This procedure will also require some form of communication between the winch operator and the person watching for wire.

Marine Debris study (Julia Reisser):

- Processing of materials will require access to a wet laboratory, a dissecting scope, and facilities for handling small amounts of liquids necessary for cleaning nets and preserving samples. This project also require access to vantage points for starboard and port observations, with one person at each observation station.

Greenhouse Gases (Clare Murphy):

- gas measurements of the atmosphere: two inlet sample lines (1/4" or 3/8") well above the ocean
- a space of 110 cm (height) x 100 cm x 50 cm
- a bench of about 150 cm x 80 cm for monitor, computers and for working space. an opening to get sampling inlet lines out.
- 'clean' usv power for instruments.
- sea-ocean flux measurements: bench to allow for instrument of dimensions of 200 cm (height) x 50 cm x 50 cm
- ability to pump ocean water in without contact with ambient air.

Personnel List

Participant	Affiliation	Position
Rebecca Cowley	CMAR	Chief Scientist
Alan Poole	CMAR	XBT equipment expert
Felicity Graham	CMAR	XBT team member
Veronique Lago	CMAR	XBT team member
Trevor Goodwin	CMAR	XBT team member
Student (TBC)	US Navy	XBT team member
Tara Martin	CMAR	MNF Swath Mapping support
Sascha Frydman	CMAR	MNF Swath Mapping support
Julia Reisser	CMAR	Marine debris
Dagmar Kubistin	UoW	Greenhouse gases
Chris Kaldow	UoW	Greenhouse gases
Stephen McCullum	CMAR	Voyage Manager
Pamela Brodie	CMAR	MNF Computing support
Rod Palmer	CMAR	MNF Electronics support
John East	P& O	Observer

As per AMSA requirements for additional berths on Southern Surveyor, the following personnel are designated as System Support Technicians and are required to carry their original AMSA medical and AMSA Certificate of Safety Training on the voyage:

Name	AMSA Certificate of Safety Training No.
Stephen McCullum	BB03845
Pamela Brodie	AS02447
Rod Palmer	BB05328
Tara Martin	BB05761

This voyage plan is in accordance with the directions of the Marine National Facility Steering Committee for the Research Vessel Southern Surveyor.

Rebecca Cowley
Chief Scientist

University of Wollongong Equipment

Space Requirements (approximate)

- 4 m^3 in berth for air sampling equipment including FTIR Trace Gas Analyser, Calibration Tanks, Pumps, Ozone monitor etc.
- Additional 2 m^3 in berth for equilibrator sampling if applicable.
- Very small amount of space on bow, stern, port and starboard for air inlets and throughout ship for 1/4" air sampling lines.

Power Requirements (approximate)

1. Air Sampling

- Total for FTIR Trace Gas Analyser – running on Peltier Cooler (e.g. Thomas) = 815 W
- Total for FTIR Trace Gas Analyser – running on resistive heater (Eddy) = 1065 W.
- Total for Ozone Monitor = 150 W

Breakdown of individual components that sum to above figure:

- Peltier temp control – 140 W
- Resistive heating – 240 W
- Vacuumpump – 340W
- Air pump – 65 W
- 8 x Solenoid Valves ON – 65 W
- IR Cube, I/O Box& Laptop – 115 W

2.Equilibrator Sampling (if applicable)

- Total power consumption (additional to that outlined for air sampling) = 945 W

Breakdown of individual components that sum to above figure:

- 1 x water pump – 750 W
- 3 x Air pumps – 65 W each = 195 W total

List of Equipment

1. Air Sampling

- FTIR Trace Gas Analyser
- Vacuum pump
- UPS
- Air pump drawing air in from sampling points
- Dekabon hose running from sampling points to FTIR analyser – length dependant on size of ship. Probably ~100 m.
- Teflon hose running from sampling points to Ozone analyser – length dependant on size of ship. Probably ~100 m.
- Connections for air sampling line e.g. 1/4" push-fits, 1/4" quick connects , Teflon etc.
- 4 x air filters with rain/sea spray protection
- Magnesium perchlorate (note: in tropics with high air water vapour content, magnesium perchlorate may be depleted relatively quickly).
- Calibration tank and/or target tank including regulators
- Nitrogen tank including regulators
- Synthetic air tank including regulators
- GPS attachment for OOOFTI – unless location co-ordinates already supplied by other researchers
- Fastenings for holding FTIR TGA / Ozone monitor in place in high seas
- Power strips

1.1 Replacement Parts for Air Sampling

- ICP Modules: 1 x 7050 and 1 x 7017
- Replacement solenoid valves for FTIR TGA: 1 x 2-way, 1 x 3-way
- Replacement connections
- Replacement vacuum and/or air pumps
- Replacement parts for IR Cube e.g. source, laser... (may not be necessary)

2. Equilibrator Sampling (if applicable)

- Equilibrator
- 2 x immersible thermometers and loggers for equilibrator and seawater, traceable to NIST reference scale and with desired accuracy ± 0.02 ºC.
- 2 x pressure sensors and loggers with desired accuracy ± 0.5 mbar. One to be mounted inside equilibrator and the other to measure ambient pressure.
- Auxiliary measurements of water characteristics e.g. DO, pH and Salinity
- Air bags x 4 plus rubber stopper connections
- Lung system
- Water pump to provide water to equilibrator
- Protective cage and mount for water pump if ship doesn't have an onboard seawater reservoir
- Water filter
- approx. 1" or 1/2" water hose running from pump to equilibrator
- Insulation for water line (not necessary)
- approx. 2" pipe running from drain of equilibrator to overboard
- 1 x pipe connection to regulate flow to equilibrator
- Additional chemical dryer
- Additional magnesium perchlorate (note: in tropics with high air water vapour content, magnesium perchlorate may be depleted relatively quickly)
- Additional nafion dryer (if available)

2.1 Replacement Parts for Equilibrator Sampling (if applicable)

- ICP Modules: 1 x each if used in lung system
- Replacement air bags
- Replacement connections for equilibrator, hose, pipe etc.
- Replacement water pump (if available)

3. Miscellaneous

- Tool kit
- Sea sickness tablets!