

**MARINE**  
**NATIONAL FACILITY**

**voyageplan**  
**ss2010\_v07**

# 2010 *RV Southern Surveyor* program

**Integrated Marine Observing System (IMOS)  
Facility 3. Southern Ocean Time Series (SOTS)  
moorings for climate and carbon cycle studies  
southwest of Tasmania (47°S, 140°E).**

## **Itinerary**

Begin loading equipment Hobart 0800hrs, Monday 6 September, 2010, or earlier during port period if possible.

Depart Hobart 0800 Tuesday 7 September 2010

Arrive Hobart no later than 1000hrs Wednesday 15 September, 2010 and demobilise

## **Principal Investigators**

Professor Tom Trull (Chief Scientist) – CMAR, UTAS, ACE CRC, PB 80, Hobart, 7001

**Phone:** (03) 6226 2988 – (03) 6232 5069 – 0447 795 735

**Emails:** Tom.Trull@csiro.au – tom.trull@csiro.au – Tom.Trull@acecrc.org.au



## Scientific Objectives

The overall scientific objective is to obtain frequent measurements of surface and deep ocean properties that control the transfer of CO<sub>2</sub> from the atmosphere to the upper ocean, and then onwards to the ocean interior in the form of sinking particles. This “biological pump” drives carbon sequestration from the atmosphere, and writes the sedimentary record. The controls on its intensity are complex and involve processes that vary on daily, weekly, seasonal, and interannual timescales. Obtaining observations with the necessary frequency is not possible from ships. For this reason the NCRIS IMOS Southern Ocean Time Series Facility seeks to obtain this information using automated sensor measurements and sample collections.

### This voyage will:

- i) deploy the Pulse-7 mooring to make measurements of temperature, salinity, mixed layer depth, photosynthetically available radiation, oxygen, total dissolved gases, phytoplankton fluorescence and backscatter, and dissolved nitrate. The Pulse-7 mooring will also collect 24 paired water samples, approximately weekly, for later measurement of dissolved nitrate, silicate, inorganic carbon, and total alkalinity.
- ii) recover the SAZ-12 (and redeploy as SAZ-13) deep ocean sediment trap mooring that collects samples to quantify the transfer of particulate carbon and other materials to the ocean interior
- iii) service the Southern Ocean Flux Station (SOFS-1) mooring deployed on SS1002 in April 2010 that measures properties that control the exchange of heat, moisture, and gases between the ocean and atmosphere
- iv) carry out underway and CTD based measurements of water column stratification for comparison to the moored instruments.
- v) deploy autonomous profiling floats and an ocean glider to obtain spatially distributed measurements of temperature, salinity, oxygen, phytoplankton fluorescence and particle backscatter in the vicinity of the moorings.

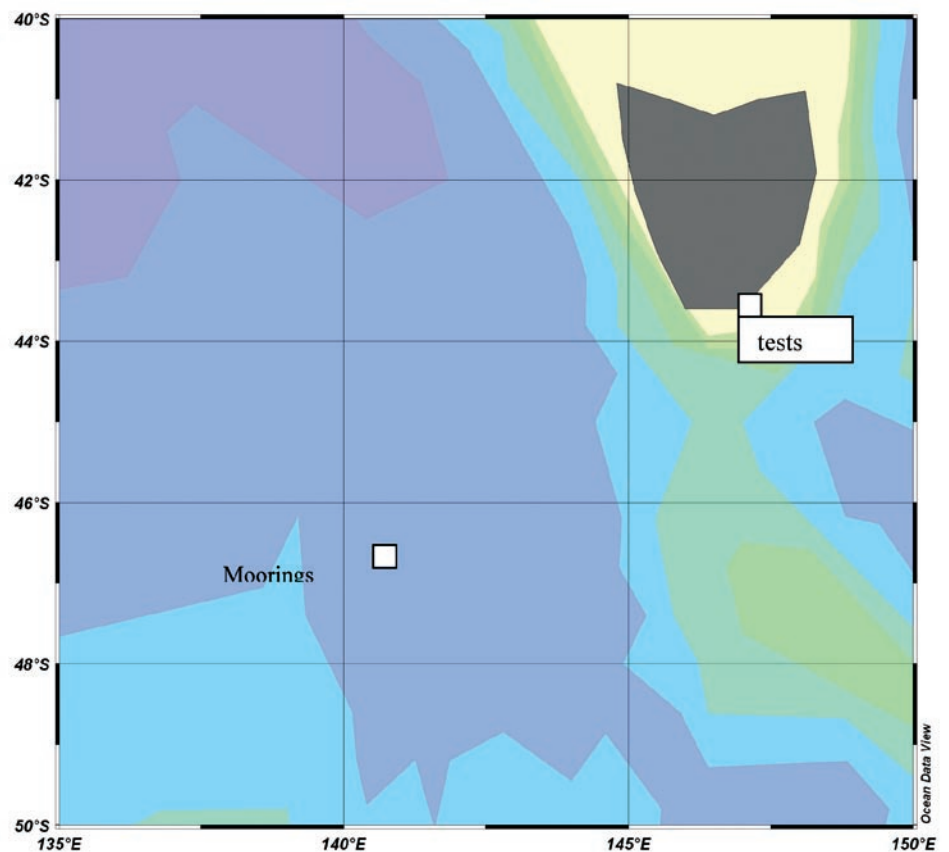
## Voyage Objectives

Sequential and priority-ranked list of tasks to achieve the overall objectives:

1. In Port:
  - test A-frames and winch hydraulics
  - spool on Pulse-7 mooring, and set up trawl deck for mooring work
  - launch workboat and evaluate procedure for man-overboard recovery
2. On first day in Storm Bay or off shelf at a convenient site and time:
  - do test CTD cast and lower SAZ-13 acoustic releases for in-water test,
3. Map bathymetry around new Pulse-7 mooring site, deploy Pulse-7 at this site or if new site not suitable then at old Pulse-6 mooring site, triangulate final position

4. recover SAZ-12 mooring, refurbish, redeploy at same site, triangulate final position
5. do two CTD casts to 1000m (with O<sub>2</sub>, PAR, transmissometer sensors) and sample for salinity, nutrients, alkalinity, DIC. (one near Pulse-7, one near SAZ-12).
6. service SOFS-1 mooring – this requires launching the work boat and placing 1 to 2 people on the mooring. Service tasks are i) replace pCO<sub>2</sub> equilibrator and hose, ii) replace humidity sensor
7. obtain ship-based meteorological measurements near SOFS-1 mooring, by holding ship head-to-weather near mooring for up to 24 hours (schedule permitting)
8. deploy one or two ARGO floats
9. deploy ANFOG ocean glider
10. sample underway clean seawater supply – using transmissometer set-up in Controlled Temperature Lab, and POC filtration rig set up in Fish Lab.

### Voyage Track



## Locations

*Target Deployment Location for Pulse-7*

*Attention: Pulse-7 surface buoy moves in a 'watch-circle' of ~1.1 mile radius*

46° 55.8'S

142° 15.0'E

4300 m bottom depth

*Recovery of SAZ-12 (bottom anchor triangulated location)*

46° 50.010'S

141° 39.417'E

4599 m bottom depth

*Deployment of SAZ-13 at same location*

*Service of SOFS-1 (bottom anchor triangulated location)*

*Attention: SOFS-1 surface buoy moves in a 'watch-circle' of ~2.1 mile radius*

46° 43.377' S

141° 57.211'E

4624 m bottom depth

## Time Estimates

Transit times at 11 knots (total 3 days)

	<b>Decimal Latitude</b>	<b>Decimal Longitude</b>	<b>Distance (nm)</b>	<b>Total Steaming Distance(nm)</b>	<b>Steaming time (hrs)</b>	<b>Total Steam (hrs)</b>
Hobart	42.87	147.35				
Storm Bay	43.33	147.350	27.62	27.62	2.51	2.51
Moorings	46.80	141.884	311.50	339.12	28.32	30.83
Hobart	42.87	147.35	352.44	748.98	32.04	68.09

Tentative Calendar (highly weather dependent)

Day 1: leave Hobart at 08:00, do CTD and acoustic release  
test casts south of Hobart when convenient

Day 2: transit to Pulse 7 site, map bathymetry for 4-6 hours to verify site is feasible (if  
not then will transit to previous Pulse 6 site which is ~5 hours to the northwest).

Day 3: deploy Pulse-7, triangulate, CTD to 1000m (or proceed directly  
to recover SAZ-12 depending on weather outlook)

Day 4: acoustic communication with SAZ-12 mooring at dawn, release, and recovery  
after breakfast and through day; CTD to 1000m late in day or early evening,

Day 5: attempt SOFS-1 service with work boat and do CTD if  
not yet completed, while SAZ-12 is refurbished

Day 6. deploy SAZ-13

Day 7. CTD to 1000m if not yet completed, shipboard meteorology  
measurements, deploy ARGO floats and glider

Day 8 transit

Day 9 arrive Hobart

## Southern Surveyor Equipment

1. stern-ramp cover fitted.
2. rosette with 12 Niskin bottles and CTD with working O2, PAR, and fitted with MNF or user-supplied transmissometer.
3. working echosounder and recorder
4. connections for hull-mounted hydrophone too acoustic release deck unit
5. work boat ready to go

## User Equipment

1. ~10 cage pallets on trawl deck (and O1 deck if required) for Pulse-6 mooring components
2. container laboratory for installation on O1 deck for SAZ sediment trap refurbishment
3. 2x acoustic release deck units and 2x hand-held hydrophones
4. grappling canon and other mooring recovery equipment

## Special Requests

1. In port, spool on as much of the Pulse-7 mooring as possible and install wide check block on stern A-frame. Test all hydraulics. Launch the workboat and evaluate procedures for eventual man-overboard recovery if this should occur while servicing the SOFS buoy.
2. In port, install mast with antennas on monkey island for RDF and ARGOS communication with SAZ-12/13 mooring
3. Closely coordinate the CTD casts with ship operations – specifically to avoid releasing grey water or other wastes at this time.

## Personnel List

Person	Employer	Role
1. Tom Trull	CMAR-UTAS-ACE	Chief Scientist
2. Stephen Bray	ACE CRC	Moorings, sediment traps
3. Mark Rosenberg	ACE CRC	Moorings, CTD, glider, floats
4. Peter Jansen	ACE CRC	Moorings, electronics
5. Eric Schulz	BOM	Moorings, meteorology
6. Pier van der Merwe	ACE CRC	Moorings
7. Adam Stephens	UTAS	Moorings
8. Pamela Brodie	MNF-CMAR	Computing support
9. Peter Dunn	MNF-CMAR	Electronics support
10. Stephen McCullum	MNF-CMAR	Observer

- all participants will be on watch on an as-needed basis

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

**Thomas W. Trull**

*Chief Scientist*

3 August 2010