



# 2013

**RV Southern Surveyor**

## program

### **voyageplan**

**ss2013\_v06**

**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 Mobilisation Hobart 0800hrs 04th October 2013

Depart Hobart 0800hrs 07th October 2013

Arrive Hobart 1500hrs 16th October 2013 or as late as 0800hrs 17th October

Demobilise Hobart 17th October 2013

#### **Principal Investigator**

Dr Eric Schulz (**Chief Scientist**)

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## 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 inter-annual timescales. Obtaining observations with the necessary frequency is not possible from ships. For this reason the IMOS Southern Ocean Time Series Facility seeks to obtain this information using automated sensor measurements and sample collections.

This voyage will carry out early recovery of the SOTS moorings as a result of unavoidable voyage schedule changes. The moorings to be recovered are:

- **SOFS-4 mooring**  
makes meteorological and upper ocean measurements of physical and chemical properties important to air-sea exchange of heat, water, momentum, and dissolved gases (oxygen and CO<sub>2</sub>).
- **Pulse-10 mooring**  
makes upper ocean measurements of properties that control carbon uptake and export to the ocean interior, including temperature, salinity, mixed layer depth, light, oxygen, total dissolved gases, phytoplankton fluorescence, particle backscatter, and dissolved nitrate, and collect 24 paired water samples later study of nutrients and phytoplankton identification.
- **SAZ-15 mooring**  
collects sediment trap samples in the deep sea (below 1000m) to quantify the transfer of particulate carbon and other materials to the ocean interior.

No moorings will be deployed and the SAZ-16 mooring will not be recovered. It will remain in the ocean until its collections are complete on 10 May 2014, and then be recovered later in 2014 or 2015.

Ancillary work includes underway and CTD sensor measurements and sample collections, and potentially zooplankton net sampling and towing of a continuous plankton recorder (CPR).

No Argo floats or gliders will be deployed.

## Voyage Objectives

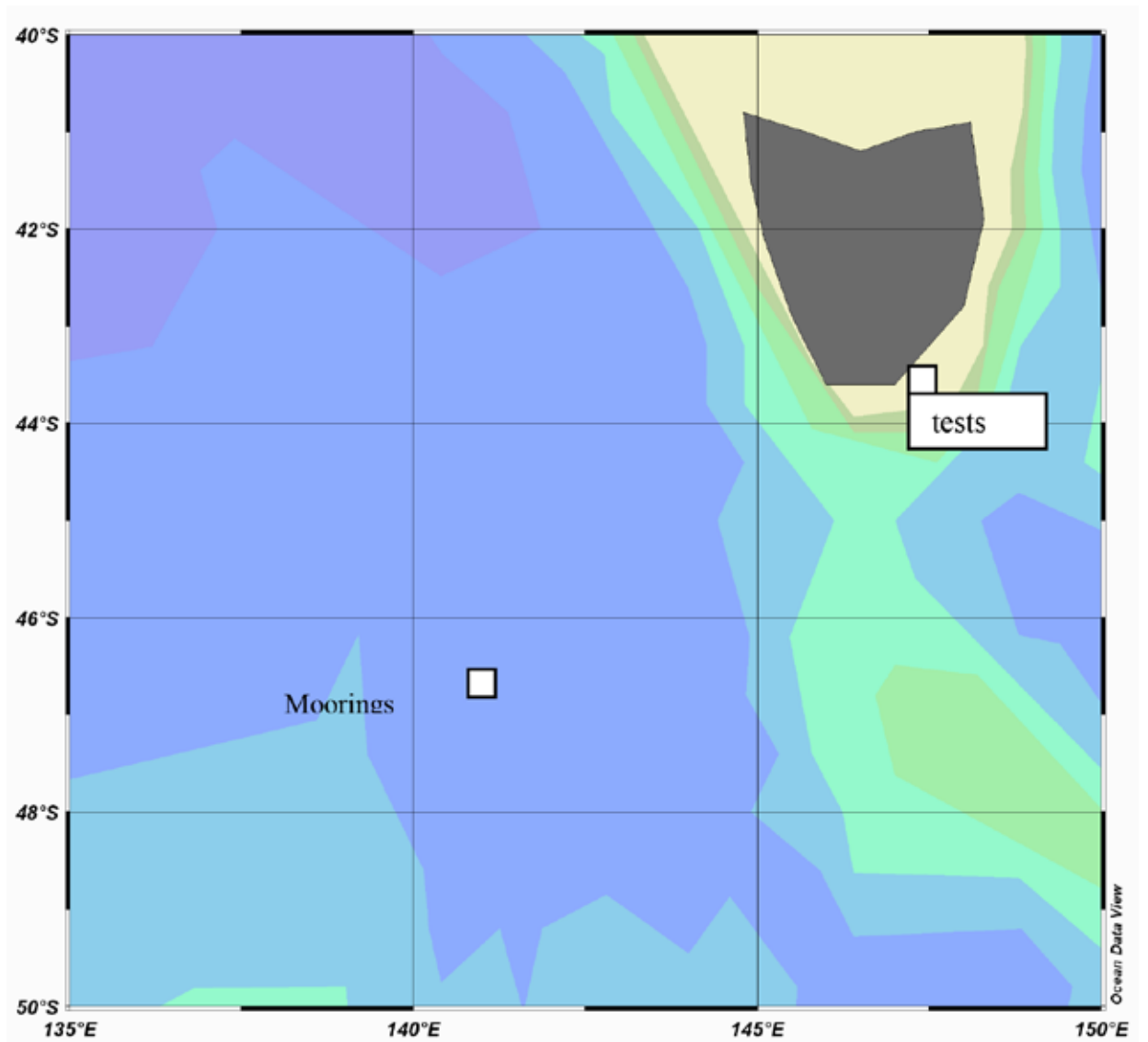
### Priority-ranked list of tasks to achieve the overall objectives:

1. Recover existing moorings (SAZ-15, Pulse-10, SOFS-4  
*(but not SAZ-16 which remains until 2014 or 2015)*)
2. Do ancillary CTD measurements (2 casts to 1000m) near the Pulse1- and SOFS-4 moorings (near 141°E, 46.8°S)
3. Do ancillary underway measurements, and potentially tow CPR
4. Deploy zooplankton drop-net (up to 6 times to 100m) near the Pulse1- and SOFS-4 moorings (near 141°E, 46.8°S)

### Priority-ranked list of tasks to achieve the overall objectives:

1. mount stern ramp cover, with welded-on gap protectors
2. test A-frames and winch hydraulics
3. Test A frame remote control
4. mount half-height open container on mezzanine deck, for equipment storage
5. load cage pallets on deck, and mooring recovery equipment in Fish Lab and Fish Sorting room
6. mount the Radio-Direction Finder and Argos antennae on the monkey island, and the associated receiving units on the ship's bridge.
7. ensure CTD has following sensors mounted: PAR, fluorescence, transmission, oxygen
8. have MNF, P&O, and Science team review and practice mooring recovery procedures
9. Install mounts for Go-Pro video camera recording of trawl deck work.

## Voyage track



## Mooring recovery locations

Mooring recovery locations			
<b>SAZ-15 Deployed 18 July 2012</b>			
Anchor Target Site	46° 50.000'S	141° 39.000'E	4600 m
Anchor Drop Site:	46° 50.036'S	141° 40.300'E	4602 m
Anchor Triangulated Site:	46° 50.229'S	141° 40.710'E	4591 m
Distance from Drop to Triangulated site: 0.63 nmiles			
Distance from Drop to Target site: 1.65 nmiles			
Subsurface mooring – no surface expression			
<b>Pulse-10 Deployed 7 May 2013</b>			
Anchor Target Site	46° 55.800'S	142° 15.00'E	4300 m
Anchor Drop Site:	46°56.3495'S	142°16.0126'E	4236 m (4326 Swath)
Anchor Triangulated Site:	46° 56.268'S	142° 17.079'E	4332 m
Distance from Drop to Triangulated site: 0.73 nmiles			
Distance from Drop to Target site: 0.88 nmiles			
Watch Circle Radius: 1.1 nm			
Surface Light: White flash, 3s frequency			
<b>SOFS-4 Deployed 1 May 2013</b>			
Anchor Target Site	46° 45.880'S	141° 58.023'E	4550 m
Anchor Drop Site:	46° 46.795'S	141° 59.024'E	4610 m
Anchor Triangulated Site:	46° 46.628'S	141° 59.586'E	4654 m
Distance from Drop to Triangulated site: 0.37 nmiles			
Distance from Drop to Target site: 1.12 nmiles			
Watch Circle Radius: 2.1 nm			
Surface Light: Amber flash, 6s frequency, 0.5s duration (two redundant light systems)			

### Nearby mooring that will not be recovered until 2014 or 2015

<b>SAZ-16 Deployed 4 May 2013</b>			
Anchor Target Site	46° 47.400'S	141° 49.500'E	4530 m
Anchor Drop Site:	46° 47.7516' S	141° 48.8316'E	4496 m
Anchor Triangulated Site:	46° 47.603'S	141° 49.392'E	4531 m
Distance from Drop to Triangulated site: 0.41 nmiles			
Distance from Drop to Target site: 0.58 nmiles			
Subsurface mooring – no surface expression			

### Time Estimates

Transit times at 11 knots (total 3 days)

	Decimal Latitude	Decimal Longitude	Distance (nm)	Total Distance (nm)	Steaming time (hrs)	Total Steam (hrs)
<b>Hobart</b>	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
<b>Hobart</b>	42.87	147.35	352.44	748.98	32.04	68.09

### Tentative Calendar (highly weather dependent)

2013-10-04: mobilise  
 2013-10-07: test CTD and practice mooring recovery procedures in Storm Bay  
 2013-10-08: transit to SOTS mooring site  
 2013-10-09: recover SAZ-15 mooring, collect ship data near SOFS-4 mooring overnight  
 2013-10-10: recover Pulse-10 mooring, collect ship data near SOFS-4 mooring overnight  
 2013-10-11: spool off SAZ-15 and Pulse-10 moorings do 2 CTDS, 4 net drops, and collect ship data near SOFS-4 mooring  
 2013-10-12: recover SOFS-4 mooring  
 2013-10-13: weather day  
 2013-10-14: weather day  
 2013-10-15: return to Hobart  
 2013-10-16: 15:00 arrive Hobart, or as late as 2013-10-17 at 08:00  
 2013-10-17: 08:00 begin demobilisation

### ***Southern Surveyor* Equipment**

1. stern-ramp cover fitted, with welded-on gap protectors
2. CTD-rosette with 10L Niskin bottles and O<sub>2</sub>, PAR, fluorometer, and transmissometer.
3. connections for hull-mounted hydrophone to acoustic release deck unit
4. deployments and recoveries will require operating with the stern-ramp cover in place, without pound boards, and with the ramp gates open.

### **User Equipment**

1. ½ -height open-top container to hold mooring equipment – to be installed on upper deck with doors inboard, for stowage of recovered mooring components
2. ~06 cage pallets to be installed on trawl deck
3. 2x acoustic release deck units and 2x hand-held hydrophones
4. Grappling canon and other mooring recovery equipment
5. mount the Radio-Direction Finder and Argos antennae on the monkey island, and the associated receiving units on the ship's bridge.

### **Special Requests**

1. Ensure non-elastic working line on net drum. Install wide cheek block on stern A-frame. Test all hydraulics.
2. At sea, closely coordinate the CTD casts with ship operations – specifically to avoid releasing grey water or other wastes at this time.

## Personnel List

Participant	Affiliation	Position
Eric Schulz	CAWCR-BOM	Chief Scientist, Met obs, CTDs, zoonets, CPR, mooring work
Stephen Bray	ACE CRC	Moorings, sedtraps, CTDs, zoonets, CPR
Peter Jansen	IMOS-UTAS	Moorings, Toolbox briefings
Mark Lewis	CMAR	Moorings, Technical Supervisor
James LaDuke	CMAR	Moorings
Don McKenzie	CMAR	MNF Voyage Manager
Pamela Brodie	CMAR	MNF Computing support/ Deputy Voyage Manager
Peter Dunn	CMAR	MNF Electronics support
Tegan Sime	CMAR	Voyage Manager Understudy
Max McGuire	CMAR	Voyage Manager Understudy
Nicole Morgan	CMAR	MNF Electronics support

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

**Eric Schultz**  
*Chief Scientist*