

**MARINE
NATIONAL FACILITY**

voyageplan SS2011_v01

2011 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, Saturday 16 April 2011.

Depart Hobart as soon as possible following loading (expecting 1600hr on the 16th) and within constraints of crew and weather.

Arrive Hobart 1300hrs, Monday 25th April 2011 and demobilise.

Principal Investigators

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Associate Professor Tom Trull (not participating on voyage)

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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 CO₂ 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 recover the Southern Ocean Flux Station (SOFS-1) mooring to obtain in-air and in-sea measurements to better understand the exchange of heat, moisture, and gases between the ocean and atmosphere. It will also recover the Pulse-7 mooring that has been making measurements of temperature, salinity, mixed layer depth, photosynthetically available radiation, oxygen, total dissolved gases, and phytoplankton fluorescence and backscatter. The Pulse-7 mooring also collects 24 paired water samples, approximately weekly, for later measurement of dissolved nitrate, silicate, inorganic carbon, and total alkalinity.

Voyage Objectives

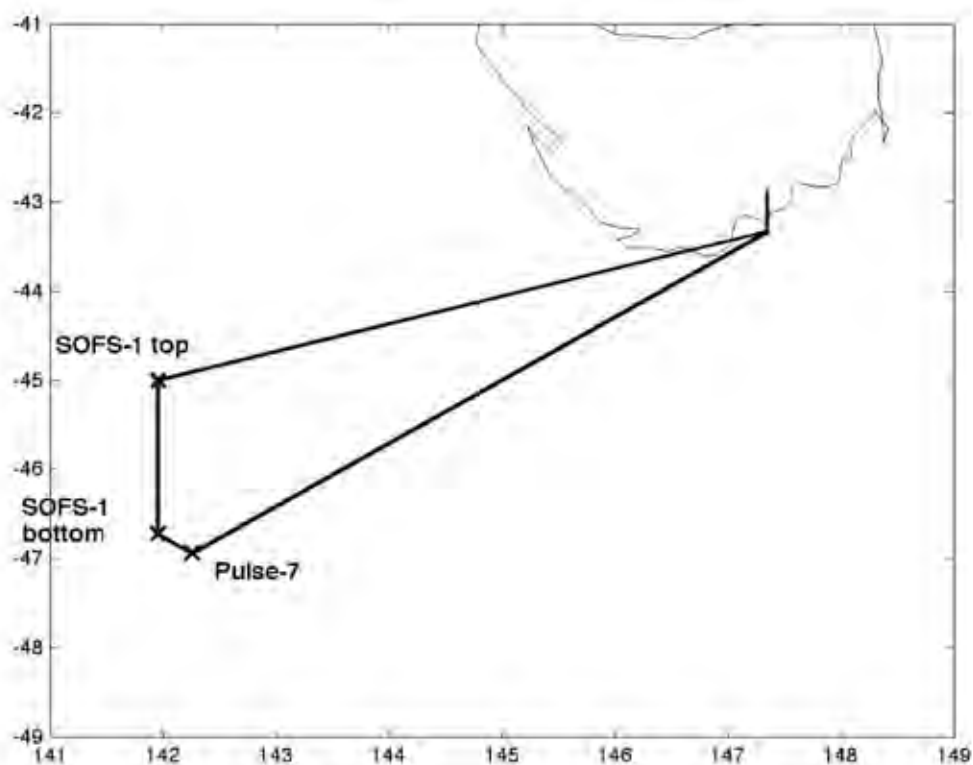
Sequential list of tasks to achieve the overall objectives:

1. Install hydraulic winch tuggers? Test A-frame and winch hydraulics in port?
2. Perform test CTD cast in Storm Bay
3. Transit to Pulse-7 mooring site
4. Recover Pulse-7
5. Perform CTD cast to 1000m at Pulse-7 site (with O₂, PAR, transmissometer sensors) and sample for salinity, nutrients, alkalinity, DIC.
6. Near Pulse-7 site, deploy one or two autonomous profilers
7. Transit to SOFS-1 bottom mooring site
8. Unspool net drum
9. Recover SOFS-1 bottom mooring
10. Transit to SOFS-1 top mooring (float) – free drifting
11. Obtain ship-based meteorological measurements near SOFS-1 mooring, by holding ship head-to- weather near mooring for up to 24 hours (schedule permitting, and no line floating on surface.)
12. Perform CTD cast to 1000m at SOFS-1 site (with O₂, PAR, transmissometer sensors) and sample for salinity, nutrients, alkalinity, DIC. If weather excludes CTD then collect underway water samples.
13. Recover SOFS-1 top mooring using workboat to capture float if possible
14. Near SOFS-1, deploy ANFOG ocean glider from stern A-frame

Priority Ranking:

1. Recover SOFS-1 mooring
2. Recover Pulse-7 mooring
3. Deploy floats and glider
4. CTD casts
5. Underway measurements

Voyage Track



SOFS-1, Pulse-7 locations

Locations

Recover Pulse-7

46° 56.115'S

142° 15.066'E

4407m water depth watch radius 1.1 Nm

Recover SOFS-1 Bottom

46° 43.384'S

141° 57.231'E

4624m water depth

Recover SOFS-1 top (drifting float). Position estimated based on trajectory 3-25 March 2011.

45° 00'.0S

141° 57.231'E

Time Estimates

	Decimal Latitude	Decimal Longitude	Distance (km)	Distance (nm)	Total Distance	Steaming time	Total Steam
Hobart	42.87	147.35					
Storm Bay	43.33	147.35	51.2	27.62	27.62	3.45	3.45
Pulse-7	46.93525	142.251	604.4	326.36	353.98	40.79	44.25
SOFS-1 bottom	46.72	141.954	32.7	17.65	371.62	2.21	46.45
SOFS-1 top	45.00	141.954	191.6	103.46	475.08	12.93	59.39
Hobart	42.87	147.35	492.6	265.99	741.07	33.25	92.63t

Work time estimates (total 3 days)

- | | |
|-------------------------------------------------|------------------------|
| 1. Communicate with and recover Pulse-7: | 4+12 hours of daylight |
| 2. Communicate with and recover SOFS-1 - bottom | 4+4 hours of daylight |
| 3. Recover SOFS-1 – top float | 8 hours of daylight |
| 4. Deploy floats and glider | 6 hours |
| 5. Two CTD casts to 1000m + 1 test cast | 8+2 hours |
| 6. Meteorological measurements near SOFS-1 | 24 hours |
| 7. Unspool net drum. pack away Pulse-7 | 12 hours of daylight |

Tentative Calendar (highly weather dependent, includes early start)

Day 1: leave Hobart at 16:00, test CTD in Storm Bay. Transit overnight and through next day to Pulse-7 Site.

Day 2: Transit to Pulse-7 site.

Day 3: Arrive at Pulse-7 site at 14:00 @ 8 knots. Perform CTD to 1000m.

Day 4: Pulse-7 Mooring recovery after breakfast. Deploy Floats. Unspool Pulse-7 during remaining daylight.

Day 5: Complete unspooling Pulse-7 and pack away. Transit to SOFS-1 bottom location. Locate SOFS-1 bottom. Release and recover SOFS-1 bottom section. Transit to SOFS-1 top float site overnight (13hr).

Day 6: Arrive SOFS-1 top float site. Perform CTD to 1000m at SOFS-1 site. Commence shipboard meteorology comparisons by standing off SOFS-1 mooring close downwind. Continue during night.

Day 7: Recover SOFS-1 after breakfast. Deploy glider.

Day 8: Transit to Hobart

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.
4. Working echosounder and recorder
5. MNF/CMAR to supply two working acoustic deck units and two working hydrophones
6. Work boat

User Equipment

1. Two Hydraulic tugger winches
1. ~10 cage pallets on trawl deck and O1 deck for storage of mooring components for SOFS-1 and Pulse-7 after recovery.

Special Requests

1. Work boat to be used to attach line to SOFS-1 mooring, weather permitting.
2. Closely coordinate the CTD casts with ship operations – specifically to avoid releasing grey water or other wastes at this time.
3. Toxic chemicals: Pulse contains HgCl₂ in small quantities, used to preserve the specimens. This is contained, but there is a risk of container failure on recovery. Mitigation is to not allow staff to come into contact with water draining out of Pulse science package housing, and to wash exterior with fresh water on recovery. MSDS will be onboard for preserving water samples from CTD or underway clean seawater water collection.
4. SOFS-1 top float recovery. This is free floating and may have up to 6km of cable, rope and buoyancy attached which may be floating on the surface. The ship will need to approach with caution. Recovery of the SOFS-1 bottom section will indicate what is attached to the top float.

Personnel List

Name	Employer	Role	Watch	Cabin
1. Eric Schulz	BOM	Chief Scientist	*	Chief Scientist
2. Peter Jansen	UTAS	Moorings and CTD		Sci 10/11
3. Andrew Tabor	CMAR	Moorings – deck lead		Sci 8/9
4. Dave Cherry	CMAR	Moorings		Sci 6/7
5. Rob Sherrington	CMAR	Moorings		Sci 4/5
6. Paul Durack	CMAR	Camera/filming for BBC		Sci 4/5
7. Lindsay Pender	CMAR	MNF Voyage Manager		Crew/Sci 3
8. Karl Forcey	CMAR	MNF Electronics Support		Crew/Sci 4
9. Hugh Barker	CMAR	MNF Computing Support		Sci 2/3
10. Rod Palmer	CMAR	MNF Electronics Support		Crew/Sci 2
11. Tara Martin	CMAR	MNF Swath Mapping		Sci 1

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

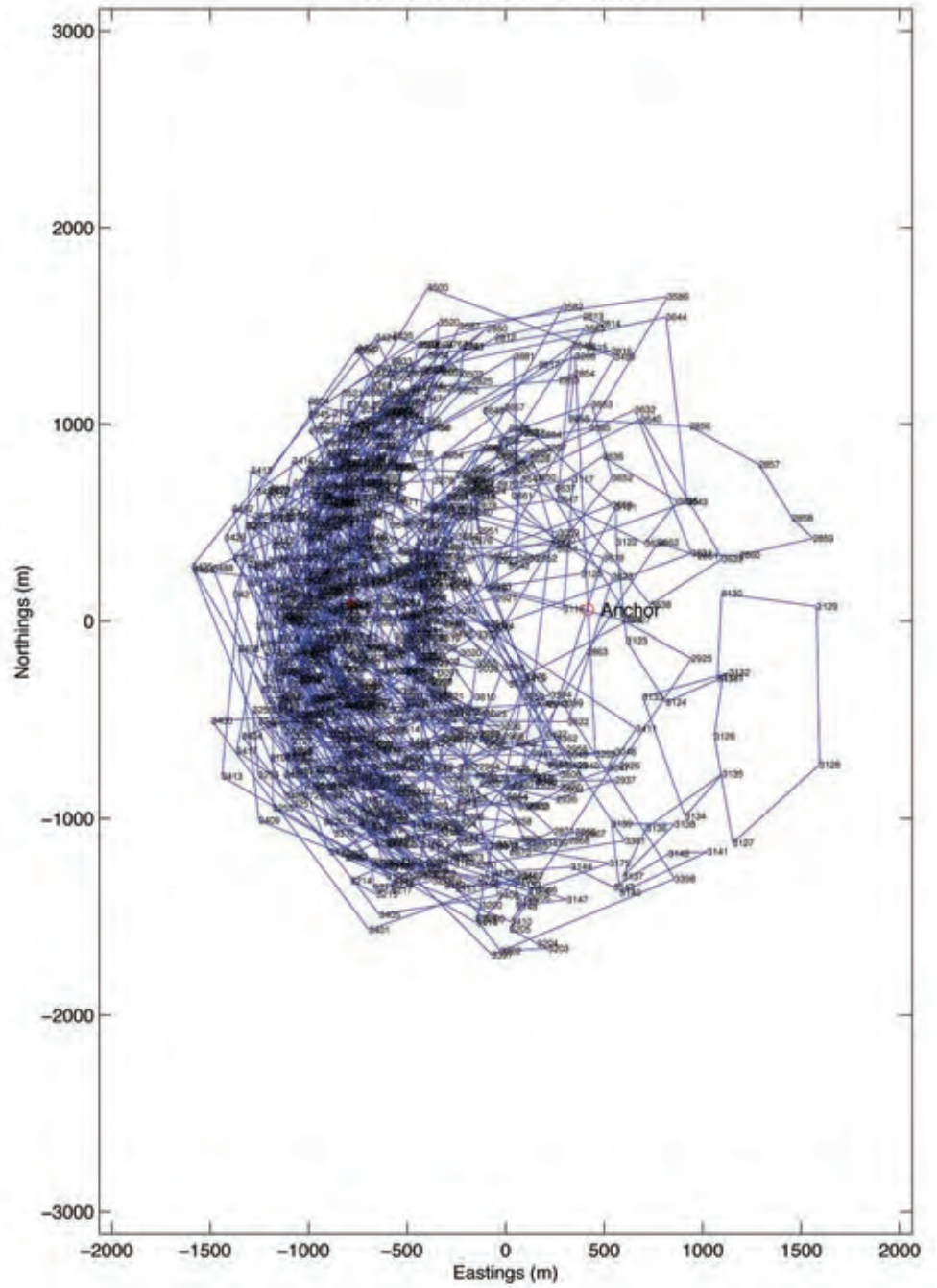
This voyage plan is in accordance with the directions of the Marine National Facility Steering Committee for the Research Vessel Southern Surveyor.

Eric Schulz

Chief Scientist

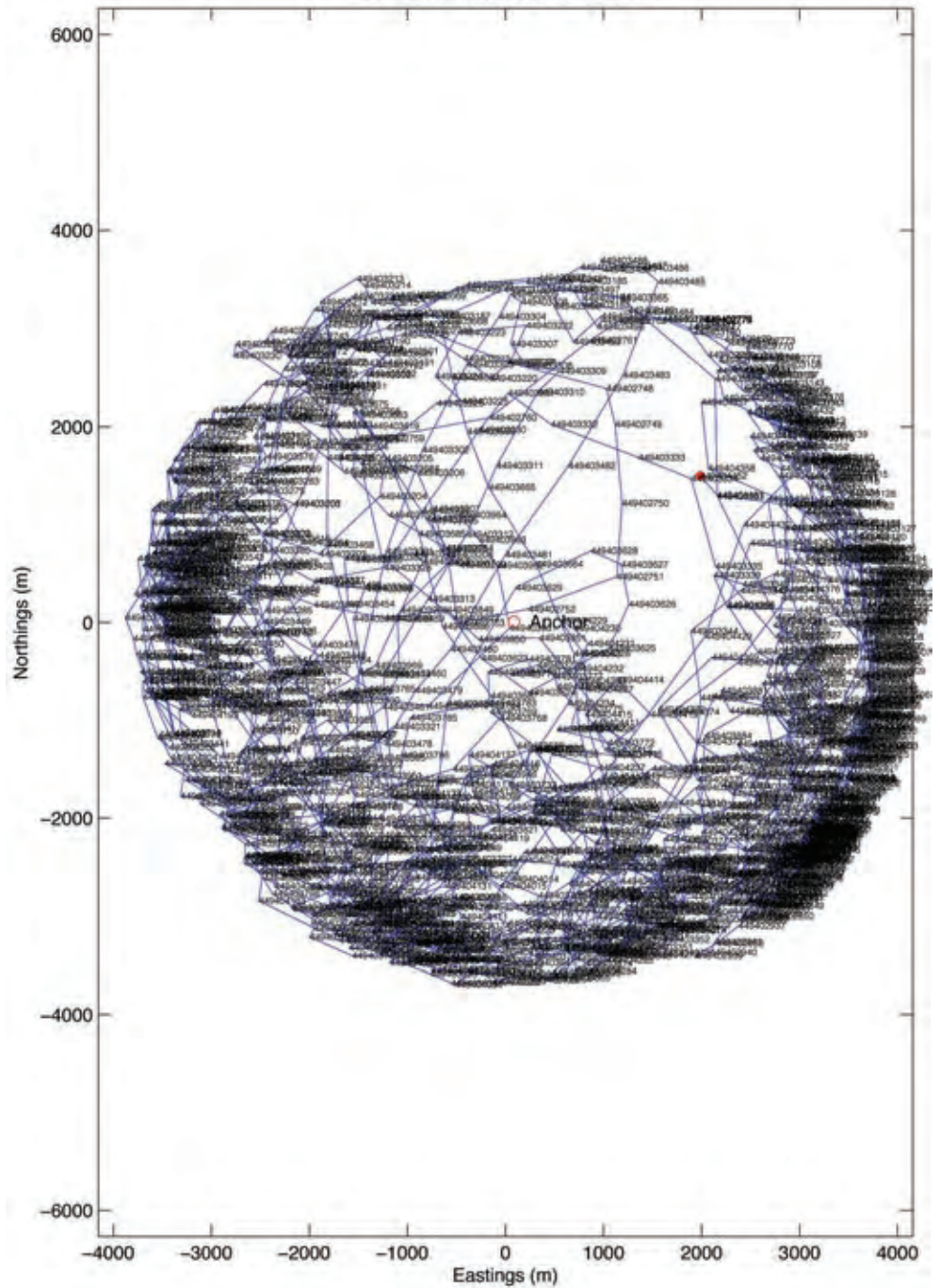
28 March 2011

Pulse 7 2686 to 3686
Centre 46° 56.115'S 142° 15.066'E

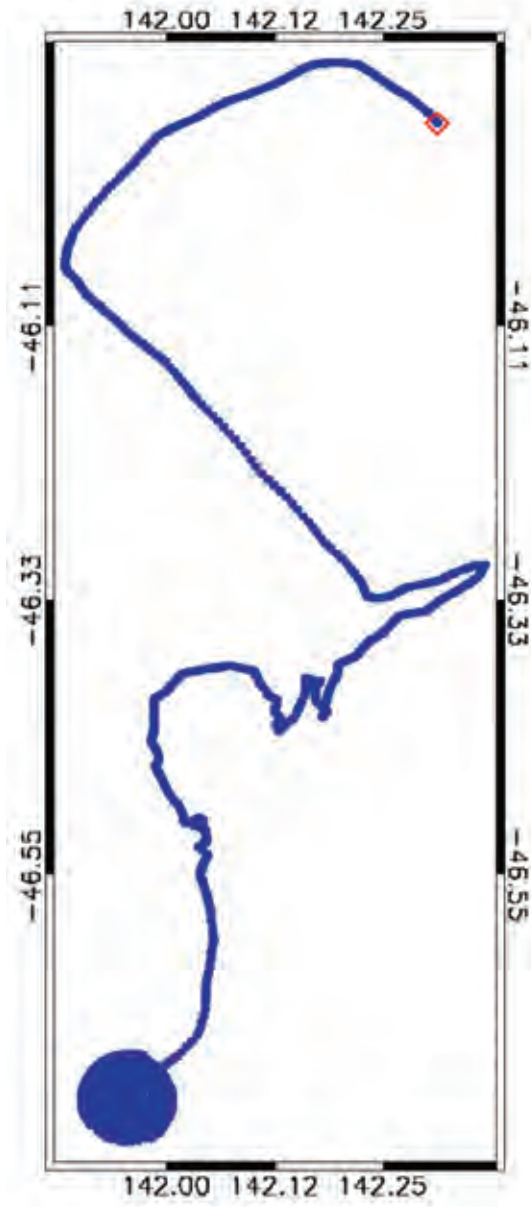


Pulse-7 Position

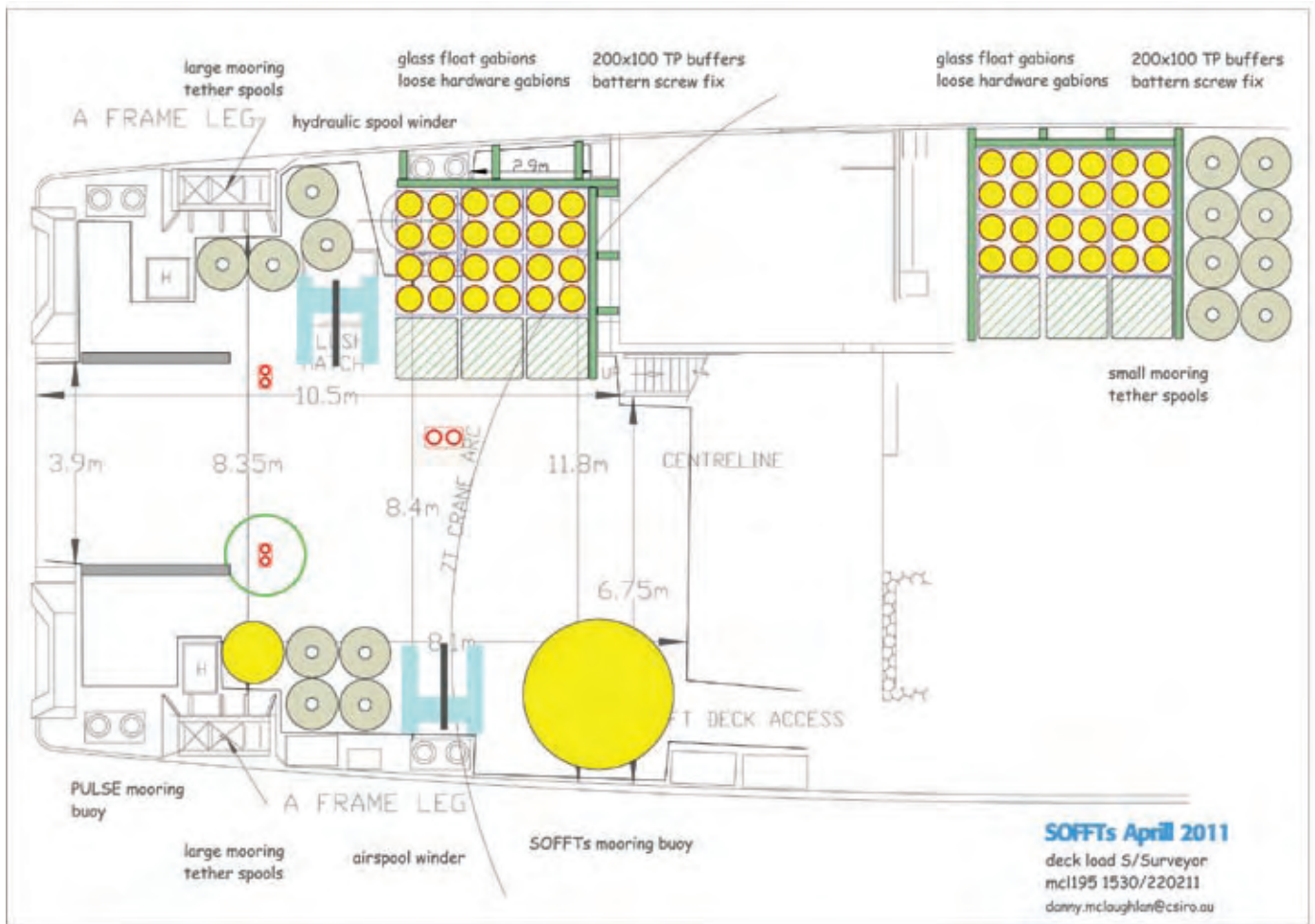
SOFS 1 449402705 to 449404452
Centre 46° 43.384'S 141° 57.231'E



Southern Ocean Flux Station Location
20100318 00 UTC to 20110327 21 UTC



SOFS-1 Position Showing moored location and drift 3-28 March 2011.



Trawl and 01 deck equipment load