RV *Investigator* Voyage Plan

Voyage #:	**IN2016_V06**		
Voyage title:	Sustained monitoring of the EAC: mass, heat and freshwater transports		
Mobilisation:	Brisbane, Friday, 28 October 2016		
Depart:	Brisbane, 0800 Saturday, 29 October 2016		
Return:	Brisbane, 1800 Sunday, 13 November 2016 (16 Days)		
Demobilisation:	Brisbane, Monday , 14 November 2016		
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Supplementary Principal Investigators:	Dr Remo Cossu		
Project name:	Turbulence scales and horizontal variability in the surface layer of the Ocean		
Affiliation:	University of Queensland	**Contact details:**	r.cossu@uq.edu.au
Supplementary Principal Investigators:	Dr Eric Woehler and Nicholas Carlile		
Project name:	Spatial and temporal variability in the distribution and abundance of seabirds		
Affiliation:	Australasian Seabird Group (BirdLife Australia) and University of Tasmania	**Contact details:**	eric.woehler@gmail.com Nicholas.Carlile@environment.nsw.gov.au

Scientific objectives

The East Australian Current (EAC) is a complex and highly energetic western boundary system in the south-western Pacific off eastern Australia. It closes the South Pacific subtropical gyre, transporting heat, salt and other nutrients southward and onto the continental shelf. Off Brisbane (27°S) the EAC, is north of the high eddy variability region, approaches its maximum strength and is relatively uniform and coherent. The mooring array is located near the existing long-term XBT transect and satellite altimetry ground tracks. The aim of this observing system is to capture the mean and time-varying flow of the EAC.

This EAC mooring array is a component of IMOS. These observation will provide an intensive reference set of measurements of the EAC over a sustained period for improved understanding of the relationship of EAC with the basin-scale South Pacific gyre, its impact of the coastal marine ecosystem, and validation and interpretation of the current system in numerous climate and ocean models.

Voyage objectives

This voyage will recover and re-deploy an array of six full-depth current meter and property (temperature, salinity and pressure) moorings from the continental slope to the abyssal waters off Brisbane (27°S). The observing system is designed to capture the mean and time-varying flow of the EAC. In order to resolve interannual and decadal signals we aim to maintain a multi-year deployment of the array.

The following specific objectives will be performed:

1. Recover and deploy moorings at appropriate locations
2. Complete CTD/rosette stations at each mooring location, with LADCP
3. Complete a number of Ship ADCP sections along the mooring line

Table 1. Positions and depth of mooring locations

	EAC_500 (M1)	**EAC_2000 (M2)**	**EAC_3200 (M3)**	**EAC_4200 (M4)**	**EAC_4700 (M5)**	**EAC_4800 (M6)**
Longitude	153.8993 (153° 53.958'E)	154.0026 (154° 0.156' E)	154.1356 (154° 8.136' E)	154.2971 (154° 17.8260' E)	154.6471 (154° 38.826' E)	155.2993 (155° 17.958' E)
Latitude	-27.327 (27° 19.620' S)	-27.3157 (27° 18.942' S)	-27.2853 (27° 17.118' S)	-27.2498 (27° 14.988' S)	-27.2086 (27° 12.516' S)	-27.102 (27° 6.120' S)
MNF Swath Depth (m) - correction	541	1887	3187-30	4266-10	4777-10	4791-10
Build depth	**541**	**1887**	**3157**	**4256**	**4767**	**4781**

Operational Risk Management

- Mooring deployment and recovery
  The planned operations with moorings have been identified as potentially high risk work and will therefore trigger MNF procedures for potentially high risk operations inclnding toolbox meeting before each operations, operational summary meeting immediately following each operation.
- CTD operations
- Over-the-side turbulence and CTD profiles

Overall activity plan including details for first 24 hours of voyage

The general plan is a staged recovery and redeployment of the six EAC moorings along the mooirng deployment line. We will undertake a CTD stations prior to recovery of moorings and after a mooring deployment; Therefore there we will undertake a total of 12 CTD stations on the voyage. We will also complete a number of ship ADCP sections along the mooring line during the voyage.

First 24 hours

Steam from Brisbane to 27.33S, 153.8E and begin a SADCP section along the mooring line between this location and 27.10 S 155.35S. During the SADCP section we will continue to setup mooring gear and instruments. We will undertake a CTD station at the location of EAC_4800 (M6) prior to beginning mooring recovery operations.

Voyage track example

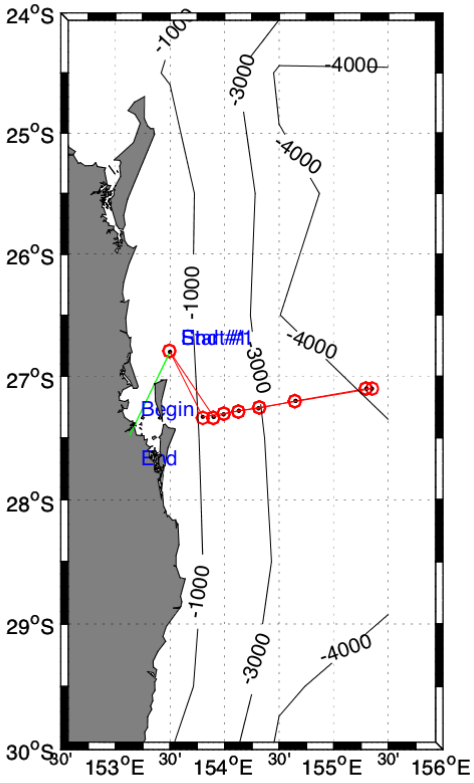

Figure 1: Voyage track and location of moorings

Waypoints and stations

Table 2. List of waypoint, ship ADCP line, mooring operations (recover and deploy) and CTD stations at mooring locations. The time given is the time for each operation. Please refer to Table 3 (Time Estimates) for actual planned daily schedule as mooring operations will be conducted between the hours of 0600 and 1700hrs. Thus there will be overnight hours when no operations are taking place. Transit times are based on a steaming speed of 10 knots.

	Decimal Latitude	Decimal Longitude	Distance (nm)	Total Distance (nm)	Steaming/ CTD/ mooring time (hrs)	Total time (hrs)
Brisbane	-27.48	153.13	0	0	0	0
Colandra	-26.8	153.5	45.3	45.3	6	6
Start SADCP line	-27.33	153.8	35.6	80.9	3.56	9.56
End SADCP line	-27.10	155.35	83.8	164.8	8.4	17.96
Transit EAC_4800 (M6)	-27.102	155.299	2.7	167.5	0.5	18.46
CTD @ EAC_4800 (M6)	-27.102	155.299	0	167.5	3.9	22.36
Recover EAC_4800 (M6)	-27.102	155.299	0	167.5	8.0	30.36
Transit EAC_4700 (M5)	-27.209	154.647	35.4	202.9	3.5	33.86
CTD @ EAC_4700 (M5)	-27.209	154.647	0	202.9	3.9	37.76
Transit EAC_4800 (M6)	-27.102	155.299	35.4	238.3	3.5	41.26
Deploy EAC_4800 (M6)	-27.102	155.299	0	238.3	10.0	51.26
CTD @ EAC_4800 (M6)	-27.102	155.299	0	238.3	3.9	55.16
Transit EAC_4700 (M5)	-27.209	154.647	35.4	273.7	3.5	58.66
Recovery EAC_4700 (M5)	-27.209	154.647	0	273.7	8.0	66.66
Transit EAC_4200 (M4)	-27.2498	154.2971	18.8	292.5	1.9	68.56
CTD @ EAC_4200 (M4)	-27.2498	154.2971	0	292.5	3.6	72.16
Transit EAC_4700 (M5)	-27.209	154.647	18.8	311.4	1.9	74.06

	Decimal Latitude	Decimal Longitude	Distance (nm)	Total Distance (nm)	Steaming/ CTD/ mooring time (hrs)	Total time (hrs)
Deploy EAC_4700 (M5)	-27.209	154.647	0	311.4	10.0	84.06
CTD @ EAC_4700 (M5)	-27.209	154.647	0	311.4	3.9	87.96
Transit EAC_4200 (M4)	-27.2498	154.2971	18.8	330.2	1.9	89.86
Recover EAC_4200 (M4)	-27.2498	154.2971	0	330.2	8.0	97.86
Transit EAC_3200 (M3)	-27.2853	154.1356	8.9	339.1	0.89	98.75
CTD@ EAC_3200 (M3)	-27.2853	154.1356	0	339.1	3.0	101.75
Transit EAC_4200 (M4)	-27.2498	154.2971	8.9	348.0	0.89	102.64
Deploy EAC_4200 (M4)	-27.2498	154.2971	0	348.0	10.0	112.64
CTD @ EAC_4200 (M4)	-27.2498	154.2971	0	348.0	3.6	116.24
Transit EAC_3200 (M3)	-27.2853	154.1356	8.9	356.8	0.89	117.13
Recover EAC_3200 (M3)	-27.2853	154.1356	0	356.8	7.0	124.13
Deploy EAC_3200 (M3)	-27.2853	154.1356	0	356.8	9.0	133.13
CTD@ EAC_3200 (M3)	-27.2853	154.1356	0	356.8	3.0	136.13
Transit EAC_2000 (M2)	-27.3157	154.0026	7.3	364.2	0.73	136.86
CTD @ EAC_2000 (M2)	-27.3157	154.0026	0	364.2	2.2	139.06
Transit EAC_500 (M1)	-27.3270	153.8993	5.5	369.7	0.55	139.61
CTD@ EAC_500 (M1)	-27.3270	153.8993	0	369.7	1.4	141.10
Transit EAC_2000 (M2)	-27.3157	154.0026	5.5	375.2	0.55	141.65

	Decimal Latitude	Decimal Longitude	Distance (nm)	Total Distance (nm)	Steaming/ CTD/ mooring time (hrs)	Total time (hrs)
Recover EAC_2000 (M2)	-27.3157	154.0026	0	375.2	6.00	147.65
Transit EAC_500 (M1)	-27.3270	153.8993	5.5	380.8	0.55	148.20
Recover EAC_500 (M1)	-27.3270	153.8993	0	380.8	3.0	151.2
Transit Start SADCP line	-27.33	153.8	5.3	386.1	0.53	151.73
End SADCP line, Begin SADCP line	-27.10	155.35	83.8	469.9	8.4	160.13
End SADCP line	-27.33	153.8	83.8	553.7	8.4	168.53
Transit EAC_2000 (M2)	-27.3157	154.0026	10.8	564.50	1.1	169.63
Deploy EAC_2000 (M2)	-27.3157	154.0026	0	564.50	6.0	175.63
Transit EAC_500 (M1)	-27.3270	153.8993	5.5	570	0.55	176.18
Deploy EAC_500 (M1)	-27.3270	153.8993	0	570	3.0	179.18
CTD@ EAC_500 (M1)	-27.3270	153.8993	0	570	1.4	180.58
Transit EAC_2000 (M2)	-27.3157	154.0026	5.5	575.5	0.55	181.13
CTD @ EAC_2000 (M2)	-27.3157	154.0026	0	0	2.2	183.33
Transit Colandra	-26.8	153.5	41.0	616.5	4.1	187.43
Transit Brisbane	-27.48	153.13	45.3	661.8	4.5	191.93

Time estimates

Table 3. Pre- and post-voyage activities and daily voyage activities.

<table>
<tr><th>Date</th><th>Time</th><th>Activity</th></tr>
<tr><td>27 October</td><td>0900 - 1700</td><td>Shipping containers delivered to wharf.

Inspect vessel to ensure the net drum feeder and drum splitter are fitted to the net drum. If not, request that this is completed or the task will have to be added to the job list on the mobilisation day.

Confirm the work plan for the mobilisation day with the Captain and Boatswain.</td></tr>
<tr><td>28 October</td><td>0800-1700</td><td>Load 5 shipping containers on the back deck. Setup CSIRO mooring winch and test working order. Setup back deck for mooring operations and unload instruments into dirty wet lab and sheltered science area. The specific working order for the mobilisation day for crane lifts is:
<table>
<tr><td>Task/Equipment</td><td>Weigth</td><td>Number of lifts</td><td>Estimated Time (min)</td></tr>
<tr><td>Load and secure ADCP container on ship</td><td>7.2 T</td><td>1</td><td>25</td></tr>
<tr><td>Load and secure Syntactic container on ship</td><td>3 T</td><td>1</td><td>25</td></tr>
<tr><td>Land winch container on back deck</td><td>8.3 T</td><td>1</td><td>25</td></tr>
<tr><td>Remove contents of winch container</td><td></td><td>7</td><td>60</td></tr>
<tr><td>Relocate empty winch container</td><td>2.4T</td><td>1</td><td>25</td></tr>
<tr><td>Land anchor container on ship deck</td><td>18.6T</td><td>1</td><td>25</td></tr>
<tr><td>Remove contents of anchor container</td><td></td><td>12</td><td>120</td></tr>
<tr><td>Relocate empty anchor container</td><td>2.4T</td><td>1</td><td>25</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Date</th><th>Time</th><th>Activity</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Load and secure glass float container on ship</td><td>6.25T</td><td>1</td><td>25</td></tr>
<tr><td>Load and secure glass float container on ship</td><td>5.4 T</td><td>1</td><td>25</td></tr>
<tr><td>Load ADCP floats</td><td>450 kg</td><td>10</td><td>100</td></tr>
<tr><td>Fit yellow block to A frame</td><td>50 kg</td><td>1</td><td>60</td></tr>
<tr><td>Fit yellow H bits to back deck</td><td>200 kg</td><td>1</td><td>30</td></tr>
<tr><td></td><td></td><td>Total time (hrs)</td><td>9.5</td></tr>
</table>
Full containers will be loaded onto the vessel, unpacked and then lifted into a storage location on the ship as per the deck plan (see figure 2). Syntatic spheres will be loaded onto the deck and moved to storage positions.

We will also hand carry on a number of instrument boxes. Instrument will be secured on tables in the dirty wet lab and sheltered science area.

Science crew will unload, store and secure equipment.
</td></tr>
<tr><td>29 October
(Day 1)</td><td>0800
1400

1800</td><td>Depart Brisbane
Offload pilot at Colandra and transit to beginning of Ship ADCP transect
During transit to the beginning of the Ship ADCP, finish setting up deck and instruments. Prepare for EAC_4800 (M6) mooring recovery

Begin Ship ADCP transect</td></tr>
<tr><td>30 October
(Day 2)</td><td>0230

0300</td><td>Complete ship ADCP section

Transit to EAC_4800 (M6) location and begin CTD station
Complete CTD.</td></tr>
<tr><td>30 October
(Day 2)</td><td>0700

0800</td><td>Have mooring toolbox and position vessel for mooring recovery

Begin mooring recovery operation</td></tr>
</table>

Date	Time	Activity
	1600	Complete mooring recovery operations. Clean back deck and instruments. Begin transit to EAC_4700 (M5).
	2000	Arrive at EAC_4700 (M5). Hove-to at mooring location
31 October (Day 3)	0730	Begin CTD station. Clean instrument and prepare back deck for mooring deployment
	1130	Complete CTD Station. Clean instrument and prepare back deck for mooring deployment.
	1230	Turbomap and CTD (Seabird19+) profiling near EAC_4700 (M5). After completion of this operation begin transit to EAC_4800 (M6).
	2400	Arrive at EAC_4800 (M6) location
1 November (Day 4)	0130	Assess weather and current conditions. The mooring will take 8 hours to deploy. Determine location to begin mooring operations based on current and weather conditions and time required to deploy mooring allowing for a speed speed through the water of 1.5-2 knts.
	0630	Bridge mooring deployment toolbox meeting
	0730	Begin mooring deployment
	1530	Complete mooring deployment including mooring positon triangulation. Begin CTD station. Prepare back deck for mooring recovery
	1930	Complete CTD station. Begin transit to EAC_4700 (M5)
	2300	Arrive at EAC_4700 (M5) mooring location. Wait on site.
2 November (Day 5)	0630	Bridge mooring recovery toolbox meeting
	0730	Begin mooring recovery operation
	1530	Complete mooring recovery operations. Begin cleaning recovered mooring gear.
	1630	Turbomap and CTD (Seabird19+) profiling at EAC 4700 (M5).
	2200	Begin transit to EAC_4200 (M4).
3 November (Day 6)	01:30	Arrive EAC_4200 (M4) location. Hove-to at mooring location

Date	Time	Activity
	0730	Begin CTD station. Clean instrument and prepare back deck for mooring deployment
	1130	Complete CTD Station. Clean instrument and prepare back deck for mooring deployment.
	1230	Turbomap and CTD (Seabird19+) profiling near EAC 4200 (M4).
	2200	Begin transit to EAC_4700 (M5) location
4 November (Day 7)	0130	Arrive EAC_4700 (M5) mooring site. Assess weather and current conditions. The mooring will take 8 hours to deploy. Determine location to begin mooring operations based on current and weather conditions and time required to deploy mooirng allowing for a speed speed through the water of 1.5-2 knts.
	0630	Bridge mooring deployment toolbox meeting
	0730	Begin mooring deployment
	1530	Complete mooring deployment including mooring triangulation. Begin CTD station. Prepare back deck for mooring recovery
	1930	Complete CTD station. Begin transit to EAC_4200 (M4)
	2300	Arrive at EAC_4200 (M4) mooring location. Wait on site.
5 November (Day 8)	0630	Bridge mooring recovery toolbox meeting
	0730	Begin mooring recovery operation
	1530	Complete mooring recovery operations. Begin cleaning recovered mooring gear.
	16:30	Turbomap and CTD (Seabird19+) near EAC_4200 (M4) location.
	2200	Begin transit to EAC_3200 (M3).
6 November (Day 9)	0130	Arrive EAC_3200 (M3) location. Hove-to at mooring location
	0730	Begin CTD station. Clean instrument and prepare back deck for mooring deployment

Date	Time	Activity
	1130 12:30 2200	Complete CTD Station. Clean instrument and prepare back deck for mooring deployment. Turbomap and CTD (Seabird19+) profiling near EAC 3200 (M3). Begin transit to EAC_4200 (M4) location
7 November (Day 10)	0130 0630 0730 1530 1930 2300	Arrive EAC_4200 (M4) mooring site. Assess weather and current conditions. The mooring will take 8 hours to deploy. Determine location to begin mooring operations based on current and weather conditions and time required to deploy mooirng allowing for a speed speed through the water of 1.5-2 knts. Bridge mooring deployment toolbox meeting Begin mooring deployment Complete mooring deployment including mooring triangulation. Begin CTD station. Complete CTD station. Begin transit to EAC_3200 (M3) Arrive at EAC_3200 (M3) mooring location. Wait on site.
8 November (Day 11)	0630 0730 1530 1630 2200	Bridge mooring recovery toolbox meeting Begin mooring recovery operation Complete mooring recovery operations. Begin cleaning recovered mooring gear and preparing back deck for mooring deployment. Cleaning instruments and preparing back deck for mooring deployment Turbomap and CTD (Seabird19+) profiling near EAC 3200 (M3). Hove to at EAC 3200 (M3)
9 November (Day 12)	0000-0600 0700 0800 1530	Assess weather and current conditions. The mooring will take 8 hours to deploy. Determine location to begin mooring operations based on current and weather conditions and time required to deploy mooirng allowing for a speed speed through the water of 1.5-2 knts. Bridge mooring deployment toolbox meeting Begin mooring deployment Complete mooring deployment including mooring triangulation. Begin CTD station.

Date	Time	Activity
	1830	Complete CTD station. Begin transit to EAC_2000 (M2)
	1930	Arrive at EAC_2000 (M2) mooring location. Begin CTD station
	2130	Complete CTD station. Begin transit to EAC_500 (M1)
	2230	Arrive EAC_500(M1). Begin CTD station
	2330	Complete CTD station. Transit to EAC_2000 (M2)
10 November (Day 13)	0030	Arrive EAC_2000 (M2) location. Hove-to at mooring location
	0630	Bridge mooring recovery toolbox meeting
	0730	Begin mooring recovery.
	1230	Complete mooring recovery. Transit to EAC_500 (M1)
	1330	Arrive EAC_500 (M 1).
	1400	Begin mooring recovery.
	1600	Complete mooring recovery. Transit to beginning of Ship ADCP line
	1700	Begin ship ADCP line
11 November (Day 14)	0200	End ship ADCP line, begin ship ADCP line
	1100	End ship ADCP line. Transit to EAC_2000 (M2). During the day we will be cleaning instruments, packing mooring instruments for return to Hobart, and preparing for mooring deployment operations.
	1230	Turbomap and CTD (Seabird19+) profiling near EAC 2000.
12 November (Day 15)	0000-0600	Assess weather and current conditions. The mooring will take 6 hours to deploy. Determine location to begin mooring operations based on current and weather conditions and time required to deploy mooirng allowing for a speed speed through the water of 1.5-2 knts.
	0630	Bridge mooring deployment toolbox meeting
	0730	Begin mooring deployment

Date	Time	Activity
	1400	Complete mooring deployment including mooring triangulation. Transit to EAC_500 (M1)
	1500	Begin mooring deployment
	1800	Complete mooring deployment including mooring triangulation. Begin CTD station
	1930	Complete CTD station. Transit to EAC_2000(M2).
	2030	Begin CTD station.
	2300	End CTD station. Begin transit to Colandra
13 November (Day 16)	0400 1000	Arrive Colandra. Hove-to to pick up pilot Arrive Brisbane. Finish instrument clean. Pack instruments into the containers. Dismantle the winch, pack into container. Clean back deck and lab. Keep packing.
14 November (Demobilisation)	0800-1700	We will complete finally packing and securing of the containers. Lift off containers.

Notes:
The mooring operations will begin from the furtherest off-shore mooring and progress to the inshore mooring. Starting from the offshore end of the mooring line is a good option for mooring operations to get the crew familiar with the mooring operations, the two operations in one day for EAC_500 (M1) and EAC_2000 (M2) would be a more demanding first day.

The moorings will be recovered onto the netdrum (wire one side, dynex the other) using the SOFS 'Z' configuration, saving time spooling off the mooring from the mooring winch. EAC_4800 (M6) will be pre-spooled onto the winch.

From days 2 to 15 the mooring operations will require 3 marine crew in addition to the Chief IR to supervise operations, these roles will be

For Mooring operations (recovery and deployment),
1. Mooring winch operator,
2. Tag line assist,
3. Control box operator

For spooling days,
1. Mooring winch operator,
2. Control box operator,
3. Cleaning assistance and deck lashing of equipment

The mooring crew will be working 6 am to 6 pm, and the 3 crew will be required on deck for the same time.

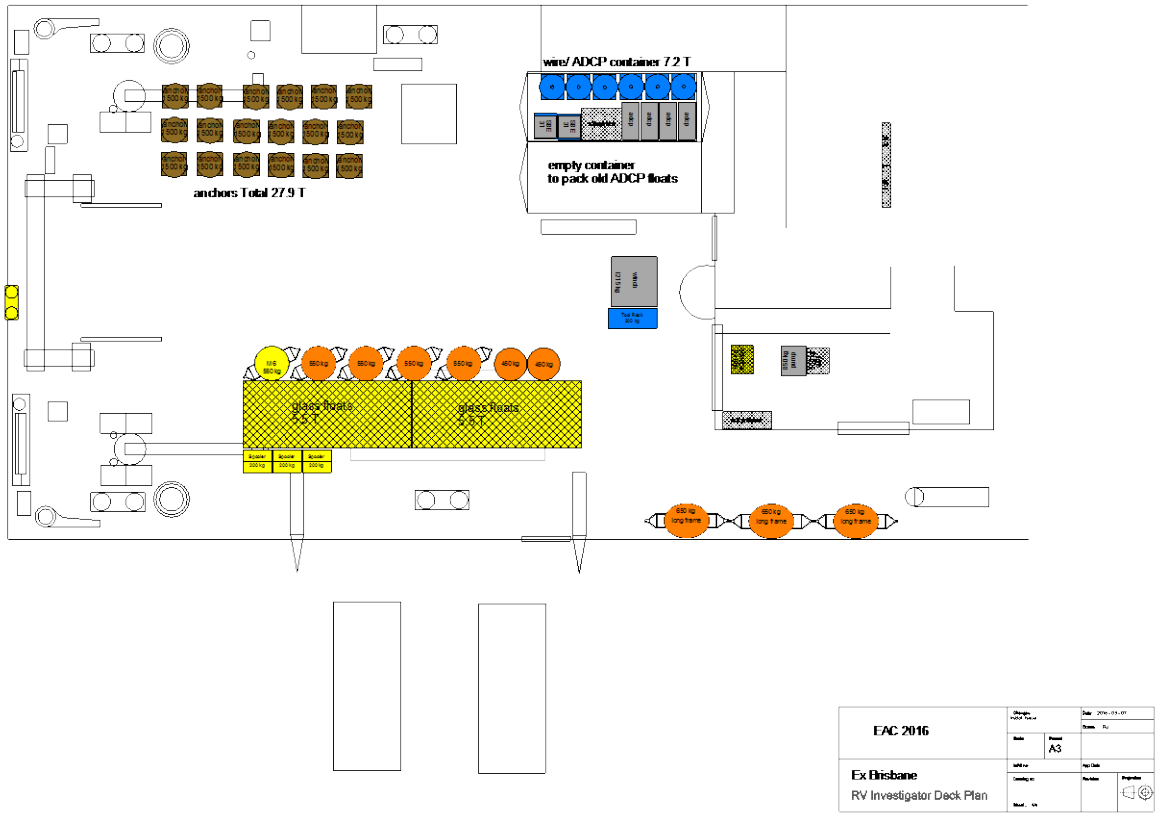

Figure 2: Deck plan for storing of mooring gear.

Supplementary projects

Project Name: Turbulence scales and horizontal variability in the surface layer of the Ocean

Objectives:

To gain more insight into turbulence scales in the upper ocean (0 – 200 m depth) across the continental shelf using a TuboMAP turbulence probe and to measure horizontal variability of CTD data in the upper ocean using a Seabird 19+ CTD unit.

The TurboMAP can record data with vertical profiling (upcast and downcast). Based on a temperature gradient and mean falling speed of the probe the levels of turbulence dissipation and mixing properties can be derived.

The CTD (Seabird 19+) unit will collect data at a fixed depth (ca. 20 m) while the ship is drifting at a speed of 0.5 – 1 m/s.

Time estimates and deployment strategy:

The vertical and horizontal profiles will be carried out at stations (waypoints) outlined in table 3. Profiling will take place after the deep-sea casts and mooring activities to avoid any danger due to entanglement.

TurboMAP

Deployment times and waypoints are outlined in table 3. At each site approximately 5 profiles up to a depth of 200 m will be taken. Each profile including setup and recovery will take between 20 to 30 min maximum.

CTD Seabird 19+ unit

Deployment times and waypoints are outlined in table 3. The profiles will be carried out after deep-sea casts and mooring recoveries. Horizontal profiling at ca. 20 m depth can be done while the vessel is drifting. The duration of each horizontal profile can be determined on board. Casts of 15 – 20 minutes will give approximately 500 m transects.

Data will undergo initial post processing on-board the vessel using a Matlab script file to generate the critical length scales or horizontal variability of CTD and allow for comparison with the vertical profile from the rosette.

Project Name: Spatial and temporal variability in the distribution and abundance of seabirds

Objectives:

The project seeks to quantify the distribution and abundance of seabirds at sea using standardised seabird survey protocols. One or two dedicated observers will collect real-time data on seabirds observed within 300m transect during daylight hours while the vessel is underway. Incidental observations will be collected while the vessel is stationary (eg CTD stations) or while the vessel is deploying moorings.

The data collected will be compatible with previous seabird at sea surveys conducted around Australia and farther south, allowing for analyses and assessments to be extended by the current surveys.

The distribution of seabirds at sea is strongly linked with oceanographic features such as convergences that concentrate prey at densities that allow for efficient foraging by seabirds. Our surveys on the voyage will link with oceanographic investigations to identify the types and strengths of oceanographic features at which we observe different species of seabirds that utilise different methods of feeding (surface seizing, diving etc).

No dedicated ship time is required for the seabird surveys. Surveys are conducted by observers while the vessel is underway during daylight hours.

Investigator equipment (MNF)

Primary Voyage: Sustained monitoring of the EAC: mass, heat and freshwater transports

Trawl Deck Equipment and Support

- MNF netdrum spooling gear for mooring recovery – requires 4 m^3 drum storage, minimum 500kg lifting capacity.
- Net drum large diameter drum dividers fitted to the net drum,
- Stern-ramp cover (“dance-floor”) without overhanging lip on aft surface installed with gap protectors and mounts for user-supplied Bull Horns fairlead.

- A-frame utility winches refitted with non-elastic polymer cables and light weight heads and lifting hooks for safe working conditions.
- Tagging line cleat attachment points fitted.
- 2 container slots free for installation of user-supplied containers and deck clear for installation of a third container on starboard aft quarter

CTD Equipment and Support for 12 CTD stations

- 24-bottle CTD-rosette with 10L Niskin bottles.
- Lowered ADCP with all heads working and logging
- CTD voltage inputs calibrated to correctly log sensor inputs
- MNF supplied hydrochemists to carry out at sea salinity and nutrient analyses.
- GO-SHIP compliant CTD data processing and output files to be provided, including error estimates for oxygen and nutrient parameters
- Working winch heave compensation system

Underway Equipment and Support

- Working and logging underway echosounder with bottom detection and real-time display
- Working and logging underway ADCP (75 KHz and 150 kHz), with real-time display
- Working and logging underway thermosalinograph and fluorometer and real-time display
- Working hull mounted 12 kHz transducer for use with acoustic release deck unit
- Working drop keel for thermosalinograph
- Working and logging meteorological instruments

User Equipment

Primary Voyage: Sustained monitoring of the EAC: mass, heat and freshwater transports

For Installation on Trawl Deck (see deck loading plan)

- Bullhorn mooring fairlead to be mounted on ship stern.
- CSIRO mooring winch - requires hydraulic leads to power supply installed in shelter-shed
- MNF netdrum winch spooling gear for mooring recovery,
- 2 x half-height open-top containers to hold mooring equipment
- 3 Full height container for mooring equipment
- 18 mooring anchor stacks totalling 27t
- ~6 cage pallets of mooring equipment
- Handheld and deck mounted pneumatic line throwers (“grappling guns”)
- Video cameras installed on trawl deck
- X assorted instruments (velocity, temperature, and salinity instruments)

Supplementary Project: Turbulence profiles in the surface mixed layer of deep-ocean environments.

- CTD Seabird 19+ unit
- Turbulence Microstructure Profiler (TurboMAP)

- Portable winch system for TurboMAP and CTD Seabird 19+ unit
- Various laptops and pelican cases for aforementioned instruments

Special Requests

CSIRO mooirng winch will be setup on the back deck. We will need to enure the it is working before departing Brisbane.

Turbulence Microstructure Profiler (TurboMAP) mooring winch to be mounted to the starboard rail of the ship. Storage space for TurboMAP and winch within sheltered science area. Access to bench space and power in sheletered science area for laptop.

Permits

- Mooring locations and marking details will be provided to AMSA for notice to mariners.

Personnel List

1.	Tegan Sime	Voyage Manager	CSIRO MNF
2.	Rod Palmer	SIT Support	CSIRO MNF
3.	Will Ponsonby	SIT Support	CSIRO MNF
4.	Frances Cooke	GSM Support	CSIRO MNF
5.	Peter Hughes	Hydrochemistry	CSIRO MNF
6.	Stephen Tibben	Hydrochemistry	CSIRO MNF
7.	Pamela Brodie	DAP Support	CSIRO MNF
8.	Steve Van Grass	DAP Support	CSIRO MNF
9.	Peter Shanks	DAP Support	CSIRO MNF
10.	Bernadette Sloyan	Chief Scientist	CSIRO
11.	Rebecca Cowley	Data processing	CSIRO
12.	Jim LaDuke	Instrument techinician	CSIRO
13.	Jamie Derrick	Mooring technician	CSIRO
14.	Kurt Chalk	Mooring technician	CSIRO
15.	Madeleine Cahill	CTD/ mooring assistance	CSIRO
16.	Ana Berger	CTD/ mooring assistance	UTAS
17.	Quran Wu	CTD/ mooring assistance	CSIRO
18.	Paula Conde Pardo	CTD/ mooring assistance	UTAS
19.	Dr Eric J Woehler	Seabird survey PI	BirdLife Australia/U Tas
20.	Mr Nicholas Carlile	Seabird survey – co-investigator	BirdLife Australia
21.	Penny Beaver	Seabird survey	BirdLife Australia/U Tas TBC
22.	Larissa Perez	Seabird/TurboMap survey	UQ
23.	David Spencer	Seabird/TurboMap survey	Griffith University
24.	Andrew Friedrichs	Seabird/TurboMap survey	UC Davis

Please note: The MNF support staff numbers in this table are the absolute minimum and the numbers will increase depending on the activities being undertaken on the voyage. It may include Hydrochemists in addition to the other groups.

Signature

Your name	Bernadette Sloyan
Title	Chief Scientist
Signature	
Date:	21/09/2016