

MARINE
NATIONAL FACILITY

2013

RV Southern Surveyor
program



voyagesummaryss2013_t02

SS2013_t02

Transit voyage: The benthic fauna of the
Great Australian Bight

Voyage period

Start: 17/06/2013

End: 29/06/2013

Port of departure: Hobart, Australia

Port of return: Fremantle, Australia

Responsible laboratory

Dr Sebastian Holmes (not on transit voyage)

Water and Wildlife Ecology Group (WWEG), The University of Western Sydney,
School of Science and Health, Locked Bag 1797, Penrith, NSW, 2751 Australia.

Chief Scientist

Dr Alan Williams (CSIRO) (departed vessel at Port Lincoln)

Dr Sabine Piller (UWS)

Scientific Objectives

The main focus of the program was to give students a taste of what it is like to live and work on an ocean going research vessel and to expose them to various different sampling techniques used in oceanographic research. The students had three quasi scientific aims including 1) to sample and characterise the benthic communities in the Great Australian Bight, 2) to investigate surface and water column productivity along Australia's Southern seaboard, and 3) to map Australia's seafloor. Students were to be involved in all aspects of the research conducted on the voyage and opportunities for watching marine mammals as well as some research lectures were to be provided if possible.

Voyage Objectives

1. Pelagic sampling:

- surface water filtering to look at the isotopic signature of surface particulate organic matter (POM);
- CPR – continuous plankton recording throughout the voyage
- deployment of 6 ARGO floats;
- at each station, standard hydrocasts with water collected from 120m, 60m, and 5m and oxygen, salinity and macronutrients (NO₂, NO₃, NH₃, PO₄, SiO₂) analysed.

2. Swath mapping:

- continuous operation of the swath to provide a track at the 500m depth contour;
- mapping a series of canyons off Esperance.

3. Benthic sampling:

- at 10 stations, use successive beam trawls to sample the benthic macro-fauna;
- Station 8: take a sediment sample using the Smith McIntyre grab.

4. Greenhouse gas recordings:

- continuous measurements of carbon dioxide, methane, nitrous oxide, carbon monoxide and ozone throughout the voyage.

Results

1. Pelagic sampling:

- Surface water filtering to look at the isotopic signature of surface particulate organic matter (POM) was performed throughout the entire voyage in 4 hourly intervals (with the exception of time spent in or within 6-9 hours of any port). A total of 61 filters were collected, frozen at -80 degree and will be analysed (stable isotopes) at the University of Western Sydney (SH) and compared with filters collected on previous voyages along the same transects in 2011 and 2012.
- The CPR was deployed throughout the voyage. A total of 4 cartridges were used for a total of 1640 Nautical miles. One of the cartridges (185-1) had a defective screw and could not be re-deployed after it was retrieved.
- Six ARGO floats were successfully deployed at the specified latitudes.
- The CTD was deployed twice, once to 800m and the second time to 500m for the students to learn about CTD. At the first deployment, 5 water samples were collected and analysed for dissolved oxygen and salinity by the students. A demonstration of how to analyse macronutrients was also provided to the students. Because of the medical evacuation of a student and the departure of the benthic sampling team and equipment at Port Lincoln, CTDs were not deployed at any of the pre-designated stations.

2. Swath mapping:

- Continuous operation of the swath was performed although the track was altered due to the medical evacuation of one of the students at Port Lincoln.
- Mapping a series of canyons off Esperance could not be completed due to bad weather which required the shortest possible route to Fremantle.

3. Benthic sampling:

- No benthic sampling was undertaken because of the medical evacuation of a student, and the departure of the benthic sampling team and equipment at Port Lincoln.

4. Greenhouse gas recordings:

- Continuous measurements of carbon dioxide, methane, nitrous oxide, carbon monoxide and ozone were successfully performed and will be analysed and compared to data from previous voyages by Dr Dagmar Kubistin at the University of Wollongong.

Voyage Narrative

The voyage started on June 17, 2013 when we left Hobart as scheduled at 18:00 EST. We had a muster at 19:00 EST followed by a science meeting and a “toolbox” (safety meeting) for CPR deployment. Leaving Hobart we encountered some bad weather which caused most of the students to be sick.

The first CPR was deployed and filtering of surface seawater commenced on June 18, 2013 at 9:45 EST. The weather improved and so did the student’s conditions who started to get used to being on the boat and most coped well enough to perform duties although the majority continued taking seasickness medication. The transit continued at good speed and on schedule towards station 1 with continuing swath data collection along the proposed track and ARGO deployments as per latitude requirements. Students and scientific staff were rostered in 12 hour shifts (2am-2pm and 2pm-2am) taking into account their expertise and cabin allocation to allow for all duties being able to be performed around the clock. The students settled into their shifts and performed the 4 hourly filter changes as well as other ongoing tasks (swath) and ARGO deployments (Figure 1) as required.

The weather turned bad again with rough seas and 5-6m swell on June 21, 2013. All on board participated in the fire drill. At a toolbox for CTD on the bridge at 13:00 EST there was a slip incident involving one of the students. A decision was made to divert from the planned voyage course and head for Port Lincoln to get the student to a hospital for medical attention. Once on course for Port Lincoln the conditions improved quickly and the other students who had struggled with various degrees of mild seasickness in the rough conditions got better and were able to continue to perform their duties as well as help look after the injured student in shifts. We met the pilot at 11:30 and docked at 12:30 on June 22, 2013 in Port Lincoln. The ambulance arrived at 13:00 and it took almost 2 hours to evacuate the student off the boat. We left Port Lincoln at 15:00 after the decision was made to cancel the benthic sampling program of the voyage completely due to time lost and impending bad weather forecast.

The Chief Scientist (Alan Williams) departed and with him his support staff of 3 scientists. Sabine Piller took over as the nominal chief scientist. A new voyage track was put together to deploy the last ARGO float and to ensure that the swath, CPR (Figure 3) and filtering of surface seawater (Figure 4) was continued.

On Monday June 24, 2013 the CTD was deployed to 800m and 5 water samples were collected at 800m, 550m, 400m, 120m, and 5m depth. The seawater samples collected were prepared for hydrochemistry analysis for dissolved oxygen, salinity and nutrients. Students were actively involved in the deployment and retrieval of the CTD (Figure 2), the computer control of the live recording and the water sample preparation.

On the following day (June 26, 2013) the students were shown how to and analysed one water sample each for dissolved oxygen and salinity. When requesting the recorded data from the CTD, the technical team discovered that the frequency settings for the recording were not correct and hence the data could not be analysed using the usual algorithm. Based on this, the correct frequency settings were applied and another CTD was deployed on Friday June 28, 2013 to a depth of 500m. Although

some water samples were taken they were not analysed. However, the newly installed Doppler instrument (ADCP) which allows to measure currents, which had been mounted on the CTD was tested as it was required for the next voyage. As there was time left before arriving in port on Saturday morning in Fremantle, some extra swath lines were taken to complement the existing mapping outside of Rottnest Island. We arrived in Fremantle and docked on Saturday June 29, 2013 at 7:00am.

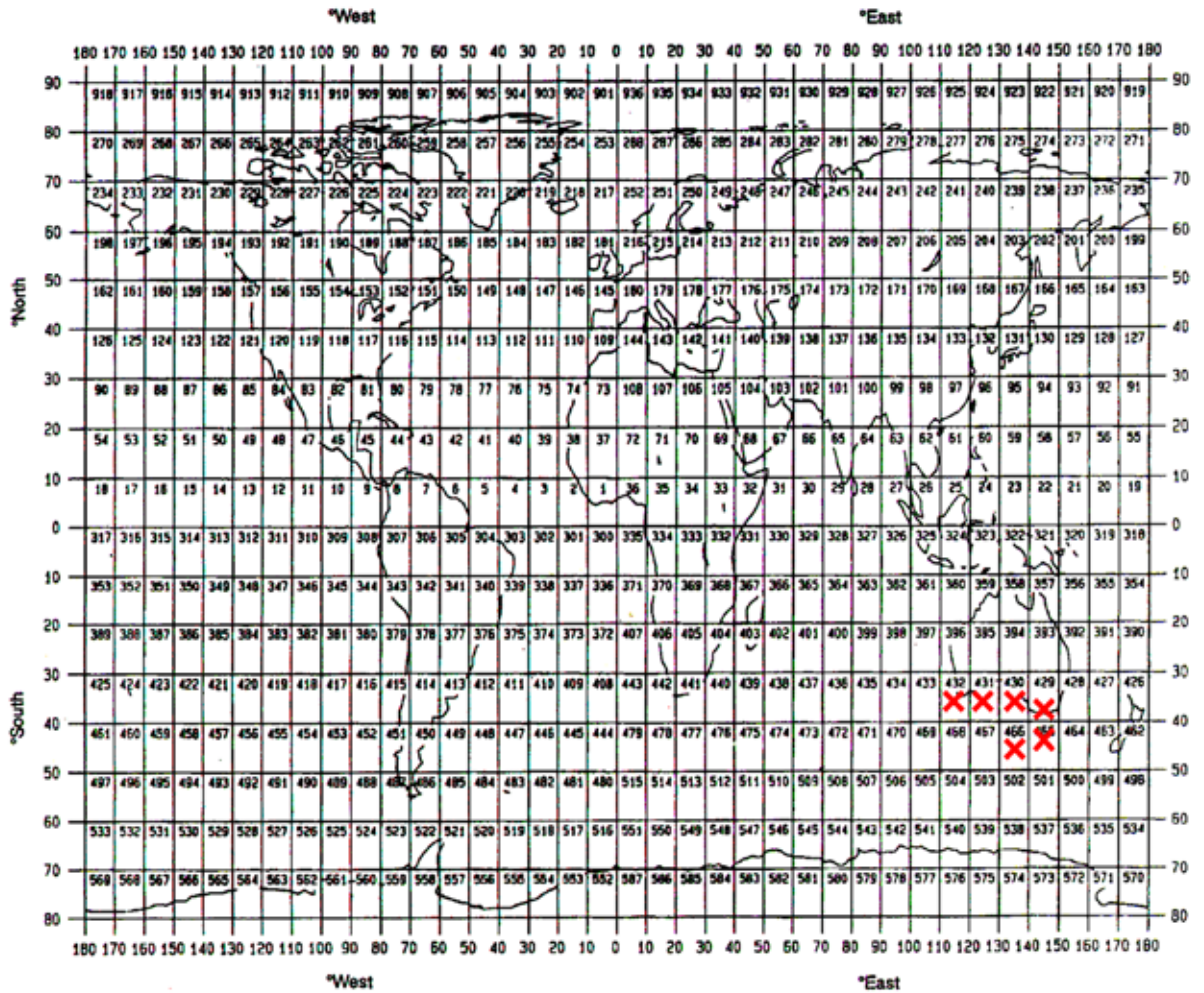
Summary

The main scientific goal was to provide students with an opportunity to experience what it is like to live and work on an ocean going research vessel and to introduce them and engage them in as many research activities and techniques used on board as possible. This goal was successfully achieved, despite the unfortunate accident of one of the students who slipped and then subsequently required a medical evacuation off the *Southern Surveyor* at Port Lincoln which delayed the transit to the point that the planned benthic sampling program was abandoned due to time constraints and bad weather forecast for the remainder of the transit. The 3 remaining students who finished the transit, were interviewed individually on the second last day and confirmed that the voyage not only met their expectations but really gave them a good understanding, insight and first hand experience of what it is like to work on a marine research vessel. For one of the students, this experience has confirmed that she will pursue a career in marine science and she hopes to undertake post-graduate studies and making a life at sea her career. Although the benthic sampling at all the stations was abandoned, students still were given the opportunity to be involved in two CTD deployments (Figure 2) and water analysis in the hydrochemistry lab, extensive training and practise on the swath mapping, the deployment of ARGO floats (Figure 1), deployment and retrieval of CPR (Figure 3), continuous filtering of surface seawater (Figure 4) with 4 hourly filter changes throughout the transit, and a research lecture on greenhouse gas measurements. In addition, they have experienced first hand how to manage accidents and emergencies on the ocean and have a better understanding of the remoteness and inherent dangers of working on a marine research vessel.

PRINCIPAL INVESTIGATORS

- A) Dr Sebastian Holmes (POM). Water and Wildlife Ecology Group (WWEG), School of Science and Health, The University of Western Sydney, Locked Bag 1797, Penrith, NSW 2751, Australia.
- B) Dr Gordon Keith (swath track) – CSIRO Marine and Atmospheric Research, PO Box 1538, Hobart, TAS 7001, Australia.
- C) Frank Coman (CPR) – CSIRO Marine and Atmospheric Research, PO Box 120, Cleveland, Australia.
- D) Dr Dagmar Kubistin (greenhouse gases) – School of Chemistry, University of Wollongong, NSW, 2522, Australia.
- E) Dr Alan Williams (benthic fauna) – CSIRO Marine and Atmospheric Research, PO Box 1538, Hobart, TAS 7001, Australia (departed at Port Lincoln – with no material collected).

GEOGRAPHIC COVERAGE - INSERT 'X' IN EACH SQUARE IN WHICH DATA WERE COLLECTED



MOORINGS, BOTTOM MOUNTED GEAR AND DRIFTING SYSTEMS

Item No.	PI	Approximate position						Data Type	DESCRIPTION
		deg	Latitude min	N/S	deg	Longitude min	E/W		
1	B	41	18	S	141	00	E	ARGO Hull# 6379	
2	B	40	18	S	139	00	E	ARGO Hull# 6380	
3	B	39	00	S	137	00	E	ARGO Hull# 6638	
4	B	37	45	S	135	00	E	ARGO Hull# 6382	
5	B	36	24	S	133	00	E	ARGO Hull# 6636	
6	B	35	06	S	131	00	E	ARGO Hull# 6637	

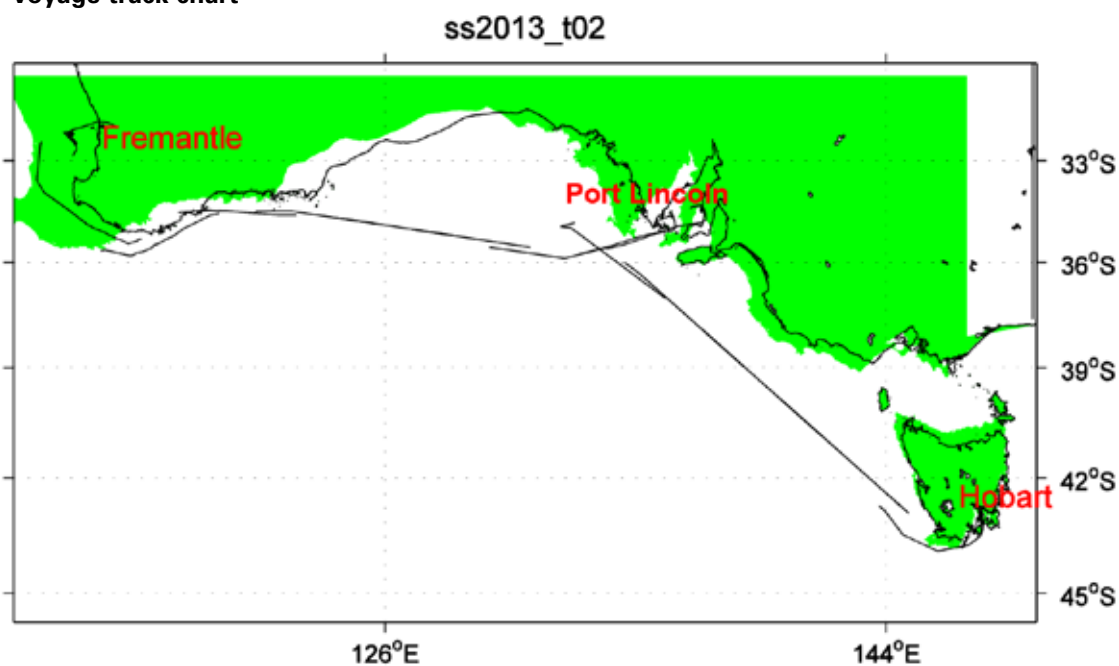
SUMMARY OF MEASUREMENTS AND SAMPLES TAKEN

Item No.	PI	No.	Units	Data Type	DESCRIPTION
1	A	61	filters	B71	Throughout the entire voyage surface seawater was filtered for POM and the filters changed every 4 hours and stored at -80° C.
2	C	4	cartridges	B08 B09	Four CPR cartridges were used throughout the voyage over 1640 Nautical miles, which will be analyzed by investigator C and compared to data from 2 previous trips (2011 & 2012) in the area.
3	B			G74	Swath was operated throughout the voyage and important additional tracks were recorded.
4	D			H74 H33	Greenhouse gasses were continuously measured on the mast of the vessel and will be analysed by investigator D.
5	A	2	CTD	H10	At two stations the CTD was deployed and water samples were prepared for hydrochemistry data analysis all of which was for demonstration to students only, i.e. no usable data was collected.

Curation Report

Item No.	DESCRIPTION
Swath	
GK	The swath data is held by CSIRO (CMAR) and Geosciences Australia, and will be available for public use 2 years after the standard moratorium for such data. Data requests should be directed to: http://www.marine.csiro.au/datacentre/request.htm or data-requests-hf@csiro.au
CPR data	
FC	CPR data requests should be directed to Frank Coman (CSIRO).
Particulate organic matter (POM)	
SH	POM collected by filtering seawater supplied from the underway seawater supply has been retained by SH (frozen) for future SI analysis.
Greenhouse gas measurements	
DK	Data requests should be directed to Dagmar Kubistin (UoW).

Voyage track chart



General ocean area(s): Great Australia Bight (area 62)

Personnel list

Scientific Participants

Name	Affiliation	Role
Alan Williams	CSIRO	Chief scientist (departed in Port Lincoln)
Rod Palmer	CSIRO MNF	MNF Voyage Manager
Tony Veness	CSIRO MNF	MNF Swath support
Brett Muir	CSIRO MNF	MNF Electronics support
Anoosh Sarraf	CSIRO MNF	MNF Computing support
Mark Rayner	CSIRO MNF	MNF Hydrochemistry support
Sabine Piller	UWS	Watchleader/Chief Scientist post Port Lincoln
Peter Fisher	UWS	Student
Bethany Ellis	UNSW	Student
Sian Bruce	USyd	Student
Amber-Louise Burberry	UTS	Student
Dagmar Kubistin	UoW	Green house gases measurements
Karen Gowlett-Holmes	CSIRO	Faunal identification & curation (departed in Port Lincoln)
Mark Lewis	CSIRO	Beam trawl support (departed in Port Lincoln)
Maylene Loo	SARDI	Faunal identification & curation (departed in Port Lincoln)

Marine Crew

Name	Role
John Barr	Master
Mick Tuck	Chief Mate
Tom Watson	Second Mate
Fred Rostron	Chief Engineer
Seamus Elder	First Engineer
Graeme Perkins	Second Engineer
Darcy Chalker	Chief Steward
Tony Hearn	Boatswain
Michael Chalk	IR
Matt Streat	IR
Jonathan Lumb	IR
Nathan Arahanga	IR
Warren Leary	Chief Cook
Bob Dittko	Second Cook

Acknowledgements

Thanks are due to all of the crew and MNF staff onboard the *Southern Surveyor* who went out of their way to ensure that we accomplished as much as possible and beyond. Additional thanks are due to Don McKenzie and Lisa Woodward, both who went beyond the call of duty, as always, to make sure the voyage was a success.

Dr Sabine Piller
Chief Scientist

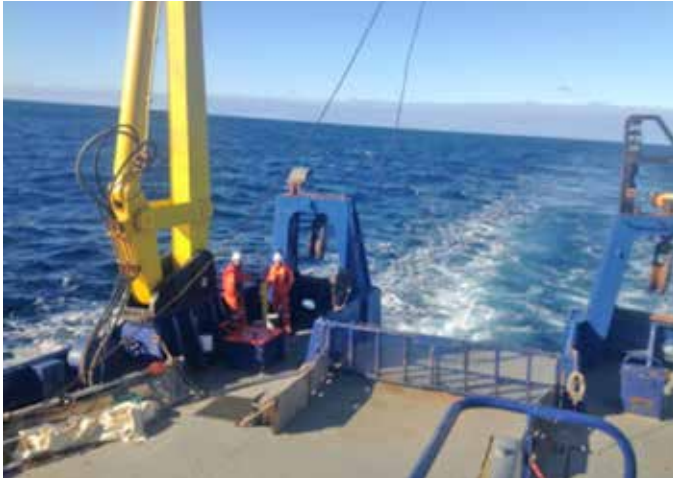


Figure 1: ARGO deployment



Figure 2: CTD deployment



Figure 3: CPR cartridge change



Figure 4: continuous seawater filtering

CSR/ROSCOP PARAMETER CODES

METEOROLOGY

M01 Upper air observations
M02 Incident radiation
M05 Occasional standard measurements
M06 Routine standard measurements
M71 Atmospheric chemistry
M90 Other meteorological measurements

PHYSICAL OCEANOGRAPHY

H71 Surface measurements underway (T,S)
H13 Bathythermograph
H09 Water bottle stations
H10 CTD stations
H11 Subsurface measurements underway (T,S)
H72 Thermistor chain
H16 Transparency (eg transmissometer)
H17 Optics (eg underwater light levels)
H73 Geochemical tracers (eg freons)
D01 Current meters
D71 Current profiler (eg ADCP)
D03 Currents measured from ship drift
D04 GEK
D05 Surface drifters/drifted buoys
D06 Neutrally buoyant floats
D09 Sea level (incl. Bottom pressure & inverted echosounder)
D72 Instrumented wave measurements
D90 Other physical oceanographic measurements

CHEMICAL OCEANOGRAPHY

H21 Oxygen
H74 Carbon dioxide
H33 Other dissolved gases
H22 Phosphate
H23 Total – P
H24 Nitrate
H25 Nitrite
H75 Total – N
H76 Ammonia
H26 Silicate
H27 Alkalinity
H28 PH
H30 Trace elements
H31 Radioactivity
H32 Isotopes
H90 Other chemical oceanographic measurements

MARINE CONTAMINANTS/POLLUTION

P01 Suspended matter
P02 Trace metals
P03 Petroleum residues
P04 Chlorinated hydrocarbons
P05 Other dissolved substances
P12 Bottom deposits
P13 Contaminants in organisms
P90 Other contaminant measurements
B01 Primary productivity
B02 Phytoplankton pigments (eg chlorophyll, fluorescence)
B71 Particulate organic matter (inc POC, PON)
B06 Dissolved organic matter (inc DOC)
B72 Biochemical measurements (eg lipids, amino acids)
B73 Sediment traps
B08 Phytoplankton
B09 Zooplankton
B03 Seston
B10 Neuston
B11 Nekton
B13 Eggs & larvae
B07 Pelagic bacteria/micro-organisms
B16 Benthic bacteria/micro-organisms
B17 Phytobenthos
B18 Zoobenthos
B25 Birds
B26 Mammals & reptiles
B14 Pelagic fish
B19 Demersal fish
B20 Molluscs
B21 Crustaceans
B28 Acoustic reflection on marine organisms
B37 Taggings
B64 Gear research
B65 Exploratory fishing
B90 Other biological/fisheries measurements

MARINE GEOLOGY/GEOPHYSICS

G01 Dredge
G02 Grab
G03 Core – rock
G04 Core – soft bottom
G08 Bottom photography
G71 In-situ seafloor measurement/sampling
G72 Geophysical measurements made at depth
G73 Single-beam echosounding
G74 Multi-beam echosounding
G24 Long/short range side scan sonar
G75 Single channel seismic reflection
G76 Multichannel seismic reflection
G26 Seismic refraction
G27 Gravity measurements
G28 Magnetic measurements
G90 Other geological/geophysical measurements