Australia's Marine National Facility

VOYAGE SUMMARY ss2012_t05

The benthic fauna of the Great Australian Bight

Voyage period:
30/07/2012 to 09/08/2012

Port of departure:
Hobart, Australia

Port of return:
Freemantle, Australia

Responsible laboratory:
Water & Wildlife Ecology Group (WWEG),

The University of Western Sydney,
School of Science & Health,
Locked Bag 1797, Penrith,
NSW, 2751. Australia.

Chief Scientist
Dr Sebastian Holmes,
University of Western Sydney

CSIRO

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Scientific Objectives

The focus of this program is 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 some of the different sampling methods and equipment that are used in oceanographic research. The students will have two (quasi) scientific aims, all of which will contribute to our knowledge about Australian waters, as follows: 1) to characterise the macro-fauna inhabiting the benthos at range of deep water (~500 m) sites along Australia's southern coast; 2) to investigate regional surface productivity (POM) along the southern shelf of Australia.

For Kloser, the voyage provides an ongoing opportunity to use vessel transit time to complete a national mapping of the upper-mid slope seabed with multi-beam mapping and associated ecological interpretation. The upper-slope and mid-slope seabed 100 m to 1500 m depth range, are regions important for regional marine planning, biodiversity and conservation assessments and fisheries habitat mapping. The swath mapping will be integrated as a part of the student activities.

Voyage Objectives

The voyage objectives fall into three categories, pelagic sampling, benthic sampling and swath mapping.

Pelagic sampling

Throughout the voyage, surface seawater will be filtered (using the onboard seawater supply) to look at the isotopic signature of surface particulate organic matter (POM) along the transect path.

At each of the stations, a standard hydrocast will be made. XBT's may deployed at some stations rather than a CTD to calibrate the swath mapper. Throughout the voyage the CPR will be deployed (retrieval and re-deployment will depend on station arrival/departure and the necessity to replace silks (every ~250 Nm)

Benthic sampling

At each station, three Smith-McIntyre grabs, 500 m water depth, will be taken to collect both benthic macro-fauna and infauna. Grabs will be carefully sieved and all fauna collected and identified. In addition, the epi-benthic sled will be deployed to collect macro-fauna and/or salp carcasses, both of which will feed into research on the trophic nature of offshore benthic communities and the extent of bentho-pelagic coupling.

Swath mapping

Throughout the voyage the swath will be continuously operated, providing another valuable track, at the 500 m depth contour, outlining Australia's continental shelf.

Results

Pelagic sampling

Surface POM was collected throughout the whole voyage using the onboard seawater supply system. The CPR was deployed and retrieved successfully throughout the voyage and will provide a 2nd year of data for this route. Due to time constraints only four CTD casts were made, however the nitrate sensor is fantastic and should become a permanent feature. No large salps, Thetys vagina, were noticed or recovered.

Benthic sampling

Because of time constraints, benthic sampling was very limited, 1 grab and 2 sleds throughout the whole voyage.

Swath mapping

Again because of time constraints only ~50% of the pre-designated transect was swathed, i.e. throughout the voyage we made substantial deviations to try to make up time. The "essential" region (canyons) in the Bight were swathed and the through water sonar determined that there was at least one active methane seep in the Bremer Sub-basin (Figure 1).

Student experience

Apart from station activities, all students took a turn in operating the swath. For them the voyage was very enjoyable and a resounding success perhaps best exemplified in their answers to some questions for a UWS online article after the voyage, as follows:

What was the most important thing you feel you did get out of the experience?

I learnt a lot on board, it's amazing what you can learn just by talking to other people. All on board were lovely and really helpful.

I really enjoyed learning how to Swath Map. I had seen the finish maps before I went on board but had never see the other side of how they are created. Thanks to my time on board the RV Southern Surveyor I am now looking into a career as a Swath Mapper with CMAR.

It would definitely be the hands on learning. We can sit and look at pictures and read reports on research done at sea, but nothing compares to actually leaving the port and going out there and doing it yourself.

Working on the deck made me realise how important it was to really focus on the job to ensure that safety was not compromised.

Would you do it again?

Definitely. I have already asked Dr Seb Holmes if I can do it again next year.

I have also approached two other voyage leaders to see if I can join them on their expeditions at the end of this year and early next year.

As much as I could.

Yes. It was enjoyable.

What were the biggest challenges of the trip and how were they overcome?

Being sea-sick on the first night (for the first time in my life).

Thanks to Seb and the crew I managed to my spirits up and get some food and sea-sickness tablets down, and then I was fine for the rest of the trip.

The biggest challenge of the trip was finding something to with the gaps in between each station of the journey. We overcame this by making a family type of bond with one another, making jokes, playing little games and the like.

Boredom was difficult to overcome (nothing much happens in between sampling stations) and we tried to alleviate it by watching lots of movies and TV shows.

What do you see yourself doing in your future career? Do you think this trip has been a helpful experience in getting you on the path to that career or has helped you choose a path?

I had always wanted to do research in the deep-ocean and hydrothermal vents, but after coming across the Swath Mapping I am seriously thinking about doing that instead. Either way, the time on board has given me an amazing learning experience and one I have recommended to several other students to do if they get the opportunity.

It has definitely given me some more idea. I'm most interesting in deep sea research, of what, however, remains to be seen. This trip has helped by showing many more pathways that can be taken into oceanographic studies.

Probably in academic research related to marine science, hopefully with a chance to get on board a research vessel once in a while. Yes, this trip has been an eye-opener.

What did you enjoy most about the trip?

Working with such a close nit team. It's amazing to see the scientists and crew working closely together and their willingness to teach us.

Learning how to use and then operate the specialised equipment.

The journey as a whole will always be remembered and cherished, but I don't think it would've been half as good if we weren't under the watchful eye of Sebastian Holmes who made all the days enjoyable whether there was science to be had or not.

The company. People onboard were friendly and great to chat with. It wouldn't have been enjoyable if everyone kept to themselves and simply did their jobs.

What did you least enjoy?

The sea-sickness on the first night and having to leave the boat in Fremantle.

Getting off the vessel in Fremantle and calling the trip to an end!

There was a lot waiting involved between sampling stations – and we did watch a lot of movies in the entertainment room to pass the time. However one can only watch that many shows before even that activity itself becomes boring. When that happened, it wasn't thrilling...

Voyage Narrative

A daily blog of the voyage activities can be found at:

http://www.uws.edu.au/newscentre/news_centre/more_news_stories/rv_southern_surveyor_voyage_august_2012

and a link to the UWS online article can be found here:

http://www.uws.edu.au/nuws/cl/past_stories/july_to_september_2012/lecturer_spotlight_on_chris_lonsdale/science_at_sea.

Monday the 30th of July

Everyone is onboard by 1300 and settled in their cabins. We undergo a tour of the ship followed by a safety briefing and then it is time to cast off. By 1800 we are sailing down the Derwent, hitting Storm Bay for 2040 where we make our first deployment of the voyage, the continuous plankton recorder (CPR). The weather is good, a slight swell and we have a few green faces.

Tuesday the 31st of July

Concerned about time we decide to abandon our first station of the voyage planned for today, Elliot Bay. Instead we steam on to our 2nd station (Port Lincoln), deploying an XBT after lunch to calibrate the swath. The weather is good with a slight swell.

Wednesday the 1st of August

Still steaming for Port Lincoln, we slow down after lunch (1400) to retrieve the CPR and do a short plankton tow. We change the cassette in the CPR, redeploy it and carrying on steaming deploying a second XBT to calibrate the swath. Good weather with little swell.

Thursday the 2nd of August

A beautiful day with little swell and time to stop for a station in the evening. We arrive on site (Port Lincoln) just after 2230 and the first piece of gear to go in the water is the CTD, followed by the Smith McIntyre grab (fine muddy sand sediment), then the epibenthic sled (a meagre haul unfortunately) followed by a final plankton and tow and redeployment of the CPR. By 0200 we are all finished and steam off to Eucla.

Friday the 3rd of August

A full day of steaming with an XBT deployed after lunch and the CPR checked in the evening. Weather is good.

Saturday the 4th of August

Cabin fever is setting in, but we have a station this evening. After lunch we deploy the XBT to calibrate the swath and anticipation builds. Just after tea we arrive on station (Eucla) around 1900, CTD is the first piece of gear in the water, followed by a plankton tow and the CPR is redeployed. Our slow progress along the Southern seaboards means that we have to cut activities to try to maintain pace. Weather is picking up.

Sunday the 5th of August

A full day of steaming with an XBT after lunch. Weather is blustery with a moderate swell.

Monday the 6th of August

Concerned about our sailing speed and our need to be in Port by Thursday, we abandon the next station, Esperance, and carry on steaming with cassette

change on the CPR in the early hours of the morning. Weather is blustery with a moderate swell.

Tuesday the 7th of August

We still aren't making sufficient speed (7-8 knots) so we come in closer to the coast to try and make up time. Weather begins to improve. No deployments.

Wednesday the 8th of August

We have made some time up, so stop for an impromptu station in lieu of Augusta. CTD is first in the water, followed by an epibenthic sled (nice haul) and then a plankton tow. Off station by 2130 for the last leg.

Thursday the 9th of August

With a little time to spare, it is time to shrink some polystyrene. You should see the frantic activity. Early morning start and CTD is deployed to 914 m, everyone gets a shrunken shape and is happy and the weather couldn't be more perfect. A leisurely sail into Fremantle and we are alongside ready to demobilise by 1600.

Summary

Our inability to maintain a reasonable speed (for much of the voyage we were making less than 8.5 knots) and the tight timeline meant that >50% of the planned activities (including the swath track) had to be cut. We did obtain a second year of POM along the whole transect which we can compare to last year's collection. In terms of the collection of benthic fauna the voyage was of marginal value. The trough water sonar did pick up methane seep in the Bremer Sub-basin, which is notable, and the nitrate sensor added to the CTD gave some nice trends worthy of further investigation.

Principal Investigators

A. Dr Sebastian Holmes (SH). Water & Wildlife Ecology Group (WWEG), School of Science & Health, The University of Western Sydney, Locked Bag 1797, Penrith, NSW 2751, Australia.

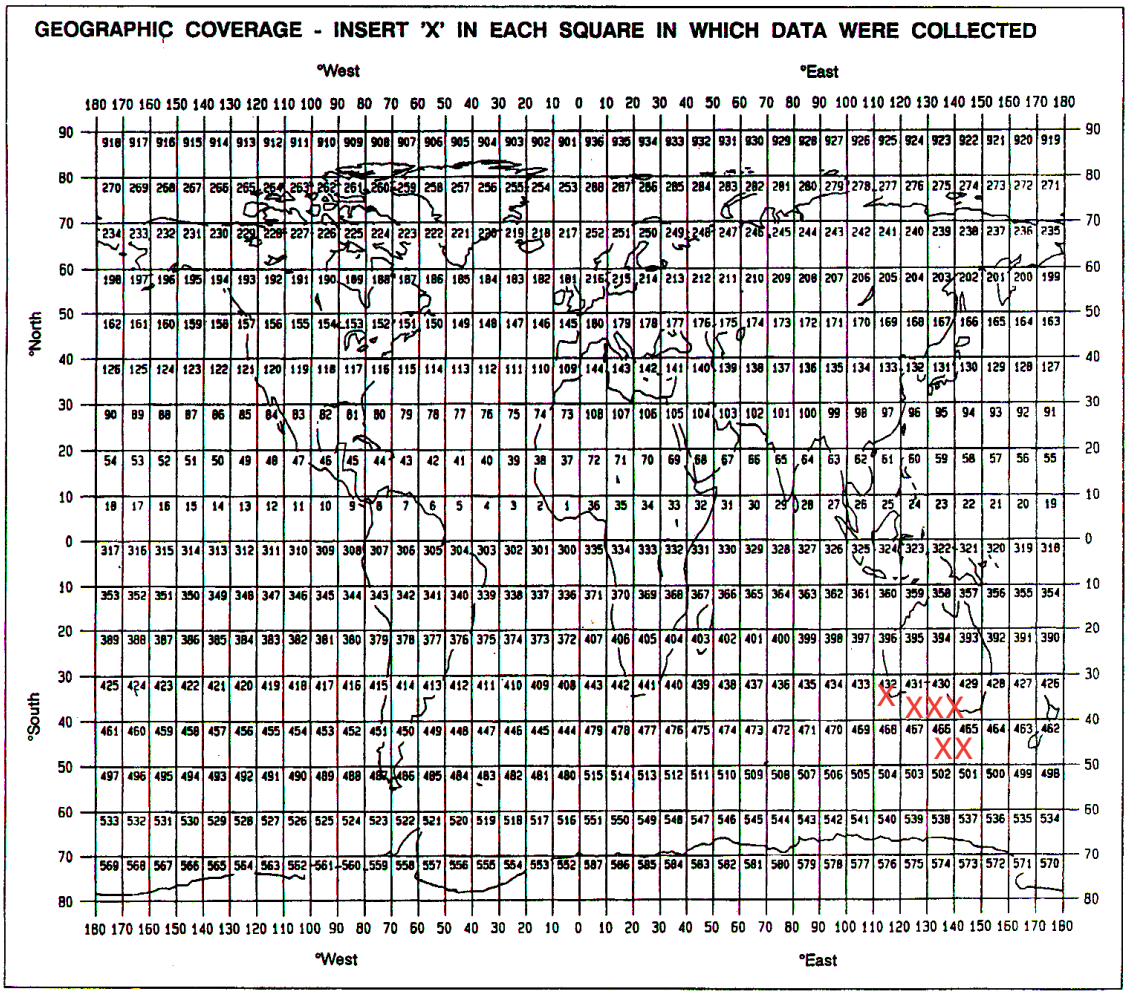
B. Ms Lucy Quayle/ Dr Kerrie Swadling (KS). The University of Tasmania, Private Bag 50, Hobart, TAS 7001, Australia.

C. Mr David McLeod (DM). CSIRO Marine and Atmospheric Research, GPO Box 1538, Hobart, TAS, 7001, Australia.

D. Dr Rudy Kloser (RK). CSIRO Marine and Atmospheric Research, GPO Box 1538, Hobart, TAS, 7001, Australia.

Marsden Squares

A red "x" indicates where data was collected.



DETAILS OF ALL DEPLOYMENTS DURING THE TRANSIT

ITEM NO	PI SEE PAGE ABOVE	APPROXIMATE POSITION LATITUDE DEG	LATITUDE MIN	LATITUDE N/S	LONGITUDE DEG	LONGITUDE MIN	LONGITUDE E/W	DATA TYPE ENTER CODES FROM LIST ON LAST PAGE	DESCRIPTION
Vessel departs port, deployments performed underway.									
1	DM	43	15	S	147	28	E	B08/B09	Initial deployment of CPR
2	SH	42	36	S	144	35	E	H71	XBT for salinity (swath) calibration.
3	KS	39	26	S	140	35	E	B08/B09	Plankton net (10 min)
4	DM	39	24	S	140	33	E	B08/B09	Cassette change on CPR
5	SH	39	23	S	140	32	E	H71	XBT for salinity (swath) calibration.
On station 2:									
6	SH	36	02	S	135	43	E	H10	CTD from 350m, water column profile and test nitrate sensor.
7	SH	36	02	S	135	43	E	B18	Smith-McIntyre grab (~400 m), deployment
8	SH	36	02	S	135	43	E	B18	Epibenthic sled (20 minute tow @ ~400 m)
9	KS	36	02	S	135	43	E	B08/B09	Plankton net (10 min)
10	DM	36	01	S	135	43	E	B08/B09	CPR re-deploymen
Off station									
11	SH	35	07	S	133	93	E	H71	XBT for salinity (swath) calibration.
12	DM	34	31	S	132	57	E	B08/B09	Cassette check on CPR
13	SH	33	24	S	130	19	E	H71	XBT for salinity (swath) calibration.
On station 3									
14	SH	33	24	S	129	19	E	H10	CTD from 400m, water column profile, 2nd test nitrate sensor.
15	KS	33	25	S	129	19	E	B08/B09	Plankton net (15 min)
16	DM	33	24	S	129	19	E	B08/B09	CPR re-deployment
Off station									
17	SH	33	32	S	126	67	E	H71	XBT for salinity (swath) calibration.
18	DM	34	20	S	124	16	E	B08/B09	CPR cassette change over.
On station x:									
19	SH	33	37	S	114	26	E	H10	CTD from 490m, water column profile, 3rd test nitrate sensor.
20	SH	33	37	S	114	26	E	B18	Epibenthic sled (20 minute tow @ ~400 m
21	KS	33	37	S	114	26	E	B08/B09	Plankton net (15 min)
Off station									
22	SH	31	58	S	115	08	E	H10	CTD from 900m, water column profile only.
Arrive at Fremantle port 16:00 h, 09/08/12									

CURATION REPORT

ITEM NO.	PI SEE ABOVE	NO SEE ABOVE	UNITS SEE ABOVE	DATA TYPE ENTER CODE(S) FROM LIST	DESCRIPTION
SmithMcIntyre grab samples					
7	SH	1	Individual hauls.	B18	Collection of benthic fauna and sediment. All fauna collected frozen.
Plankton nets					
3	KS	4	Individual hauls.	B08/B09	Collect plankton, preserved in formalin
9					
15					
21					
CTD					
6	SH	4	Individual hauls.	H10	Standard CTD data, inclusive of nitrate profiles, from 900 m up. Water samples taken at some sites.
14					
19					
22					
Epi-benthic sled					
8	SH	2	Individual hauls.	B18	20 minute bottoms tows for benthic macrofauna. All fauna frozen.
20					
XBT					
2	CSIRO	4	Individual deployments	H11	Standard XBT data for swath calibration.
5					
11					
13					
17					
CPR					
1	DM	6	ndividual deployments	B08/B09	All material preserved as standard CPR practice (formalin and then ethanol)
4					
10					
16					
12					
18					

DESCRIPTION

ITEM NO.	
CTD/XBT data	
	Data requests should be directed to: http://www.marine.csiro.au/datacentre/request.htm or data-requests-hf@csiro.au
Swath	
RK	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
Macro fauna from dredge/ Smith-McIntyre grabs	
SH	All fauna that was collected, will donated to the Australia Museum where it will be curated. NB SH has taken tissue for stable isotope and phylogenetic analysis. All material collected was frozen.
CPR data	
DM	CPR data requests should be directed to David McLeod (CSIRO).
Plankton net	
KS	All material collected in the plankton net tows have been retained by KS, preserved in formalin.
Particulate organic matter (POM)	
SH	POM collected by filtering seawater supplied form the underway seawater supply has been retained by SH (frozen) for future SI analysis.

Voyage Track

General Ocean Area(s)

Great Australia Bight (area 62)

Specific Area

The majority of the voyage was focused around the 500 m contour from Hobart along the Great Australia Bight to Fremantle.

Personnel list

Scientific Participants

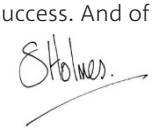
Sebastian Holmes	UWS	Chief Scientist
Amber-Louise Burberry	UTS	Undergraduate student
Lucy Quayle	UTAS	Ph.D. student
Januar Harianto	JCU	Ph.D. student
Graeme Poleweskii	UTS	Undergraduate student
Cristin Sheehan	UTS	Undergraduate student
Rod Palmer	CMAR	MNF Voyage Manager
Jeff Cordell	CMAR	MNF Electronics Support
Sascha Frydman	CMAR	MNF Swath Mapping Support
Tara Martin	CMAR	MNF Swath Mapping Suppor
Anoosh Sarraf	CMAR	MNF Computing Support
Mark Rayner	CMAR	MNF Hydrochemistry Support

Marine Crew

Name	Role
John Barr	Master
Mick Tuck	Chief Mate
Paul Iddon	Second Mate
Nick Fleming	Chief Engineer
Paul Buffett	First Engineer
William Hollingworth	Second Engineer
Bob Dittko	Chief Cook
Rebecca Lee	Second Cook
Charmayne Aylett	Chief Steward
Tony Hearne	CIR
John Allwood	Integrated Rating
Kel Lewis	Integrated Rating
Rueben Ifill	Integrated Rating
Peter Taylo	Integrated Rating r
Tyron Grasso	Cadet
Reid Hall	Cadet

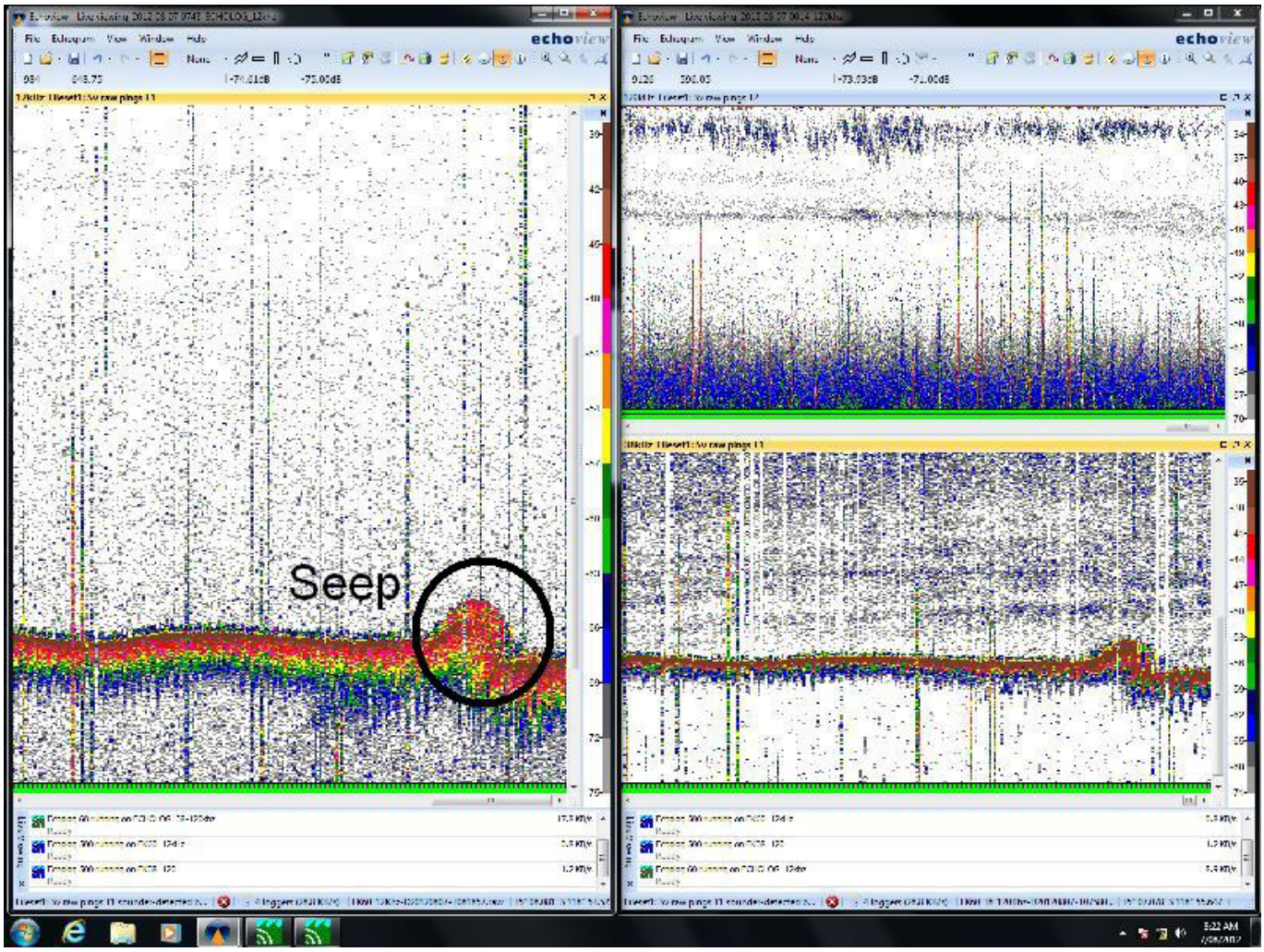
Acknowledgements

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. Especial thanks are due to Sascha Frydman, Jeff Cordell, Tara Martin and Mark Rayner for engaging the students who learnt a lot and developed new passions. 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. And of course thanks are due to the voyage manager, Rod Palmer, who did a wonderful job.



(Sebastian Holmes)
Dr Seb Holmes
Chief Scientist

Figure 1: Through water sonar showing the presence of an active methane seep in the Bremer Sub-basin



CSR/ROSCOP PARAMETER CODES

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/drifting 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