

VOYAGE SUMMARY ss2011_t03

**The distribution of pelagic and benthic fauna
along Australia's southern seaboard**

Voyage period:

12/08/2011 to 23/08/2011

Port of departure:

Hobart, Australia

Port of return:

Fremantle, Australia

Responsible laboratory:

Dr Sebastian Holmes
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(WWE) Group,
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The University of Western Sydney,
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NSW 2751, Australia.

Chief Scientist(s)

Dr Sebastian Holmes
The University of Western Sydney

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 depths along Australia's southern coast;
- 2) to investigate regional surface productivity (POM) and the distribution of pelagic organisms 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.

For Reisser, the voyage will facilitate her ongoing research on the distribution, abundance and composition of floating marine debris (FMD) around Australia. Marine debris has become a major hazard to marine life and is also leading to aesthetic degradation, economic losses and human health hazards. At present, limited data exist to quantify and explain the geographical range and content of marine debris in our oceans.

The collection of benthic isopods under the benthic component of the voyage will facilitate the research of Luana Lins (Ph.D. student USYD), who is investigating isopod phylogeny and their gut flora. The collection of salps, if present, are likely to contribute to an ongoing Ph.D. (Natasha Henschke, UNSW). Sponges and corals collected will contribute to

a Ph.D. in natural products chemistry at the University of Wollongong and provide samples for ongoing work examining trophic interactions (stable isotopes) in deep sea communities.

Voyage Objectives

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

Pelagic sampling

Sampling will be carried out throughout the whole voyage. At regular intervals, every 100 Nm, 20 minute surface tows with a neuston net will be made to examine the distribution of microscopic floating marine debris along the southern seaboard of Australia (Julia Reisser). This will be supplemented by visual surveys for larger floating marine debris (trees, barrels etc.) from the bridge. 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 (Seb Holmes).

At each of the stations the EZ net will be deployed to three depths, 500, 300 & 100 m (10 minute tows), to examine both the spatial and vertical distribution of pelagic fauna (salps and gelatinous fauna are of particular interest) and a standard hydrocast made. XBT's may be deployed at some stations rather than a CTD to calibrate the swath mapper.

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. Of particular interest are any isopods for further phylogenetic analysis and identification of their gut flora (Luana Lins/Nate Lo). 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 extent of benthic-pelagic coupling (Seb Holmes).

Swath mapping

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

Results

Pelagic sampling

The sampling carried out by Reisser, using the neuston net, to determine the amount, distribution and types of floating marine debris present in Australian waters was very successful. She attained a reasonable level of coverage and recovered plastics, much to the surprise of many of us, in most tows.

The EZ-net performed flawlessly but catches tended to be very low. Increasing tow speed (> 3 knots) resulted in the fragmentation of zooplankton rather than higher capture rates. Salps were not caught by the EZ-net but were caught by the neuston net. In particular a bloom of *Thetys vagina* was noticed from Esperance across to Augusta.

Surface POM was successfully collected throughout the whole voyage using the onboard seawater supply system.

Benthic sampling

Because of time considerations and the gear available, the success of the benthic sampling was patchy. However, sufficient samples were obtained to satisfy the needs of Lins (infaunal isopods). For Holmes, the haul at Esperance was particularly good and interesting, a deep water reef in 500+ m of water. Given the biodiversity observed in a single haul from the epibenthic sled, this site and region is worthy of further investigation in the future.

Swath mapping

Between Matt, Mailie & Lindsay, the majority of the pre-designated transect (ignoring vessel deviations) from Hobart to Fremantle was successfully swathed.

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.

Voyage Narrative

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

<http://uwsfieldresearch.wordpress.com/>

Friday the 12th of August

Everyone is onboard by 1 pm and settled in their cabins. We undergo a thorough tour of the ship followed by a safety briefing and then it is time to cast off. By 6 pm we are sailing down the Derwent, hitting Storm Bay for 19:20 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. A full two days steam ahead of us until we hit our first station (Warrnambool), broken by some shorts stops for some neuston tows and silk changes in the CPR.

Saturday the 13th of August

Everyone is up early for the first deployment of the day (3 neuston tows) at 07:00, followed by breakfast. The weather is good with a moderate swell and some rolling (yesterday's green faces get greener). At 10:30 we stop briefly for a CTD deployment, in the main to calibrate the swath (salinity), followed by a second stop just after lunch at 12:30 to change over the CPR silk, followed by an XBT on the fly at 13:45. Last deployment of the day is at 21:00, 3 neuston tows and then bed.

Sunday the 14th of August

Following a solid 20 hour steam and some fine weather with an easing swell, we arrive at our first station, Warrnambool, just after tea (18:00). First gear in the water is the EZ-net, followed by 4 neuston tows, the CTD and the Smith-McIntyre grab, which

fails and we subsequently break (good job we have a spare). We abandon the subsequent grabs until we can move the second grab down from the monkey deck during daylight hours and deploy the epibenthic sled, lots of mud! Final deployment just before the witching hour is the CPR before we begin the next two days steam.

Monday the 15th of August

A beautiful day with little swell and hence some happier looking faces. After lunch following a late rising by most, we stop at 14:00 for three neuston nets and then it is full steam ahead to the next station.

Tuesday the 16th of August

Another beautiful day, with little swell and everyone eating. After a 24 h steam we arrive at the next station, Port Lincoln, at 14:00. First piece of gear in the water is the epibenthic sled, more mud, followed by the CTD, the EZ-net and then 3 neuston tows. The Smith-McIntyre is deployed next, 3 times and we manage not to break it, followed by the CPR just before we move off station at 19:00.

Wednesday the 17th of August

A nice day but the swell begins to pick up. Cabin fever begins to set in, with a break in the morning (09:30) for three neuston tows.

Thursday the 18th of August

Overcast day with mild showers, moderate swell. Another day of solid steaming, skipping the next station (Eucla) because of concerns about the weather and the remaining ship-time. We break the day with 3 neuston tows at 20:00 followed by a silk change of the CPR at 21:00.

Friday the 19th of August

A full days steam, overcast with moderate swell (some green faces again) and we arrive on station, Esperance, at

23:00. First piece of gear in the water is the epibenthic sled, bringing up a very interesting haul of reef fauna and fragments. This is followed by 2 neuston tows, a CTD cast, 3 Smith-McIntyre grabs, the EZ net, 3 more neuston tows and then finally 03:00 the deployment of the CPR before we steam off. Some happy but tired faces and some good hauls, including *Thetys vagina*!

Saturday the 20th of August

Following the late night last night, everyone (except Matt Sherlock of course) sleeps in. A full day of steaming, the weather improves, the swells drops and we stop at 22:00 for 3 neuston tows.

Sunday the 21st of August

With concerns over timing, we steam all day to the next station. Weather is good with little swell.

Monday the 22nd of August

Weather begins to pick up with mild swell. We arrive on station, Augusta, at 13:00. First gear in the water is epibenthic sled, followed by a CTD cast, 3 Smith McIntyre grabs and finally 3 neuston tows. We move off station at 17:00.

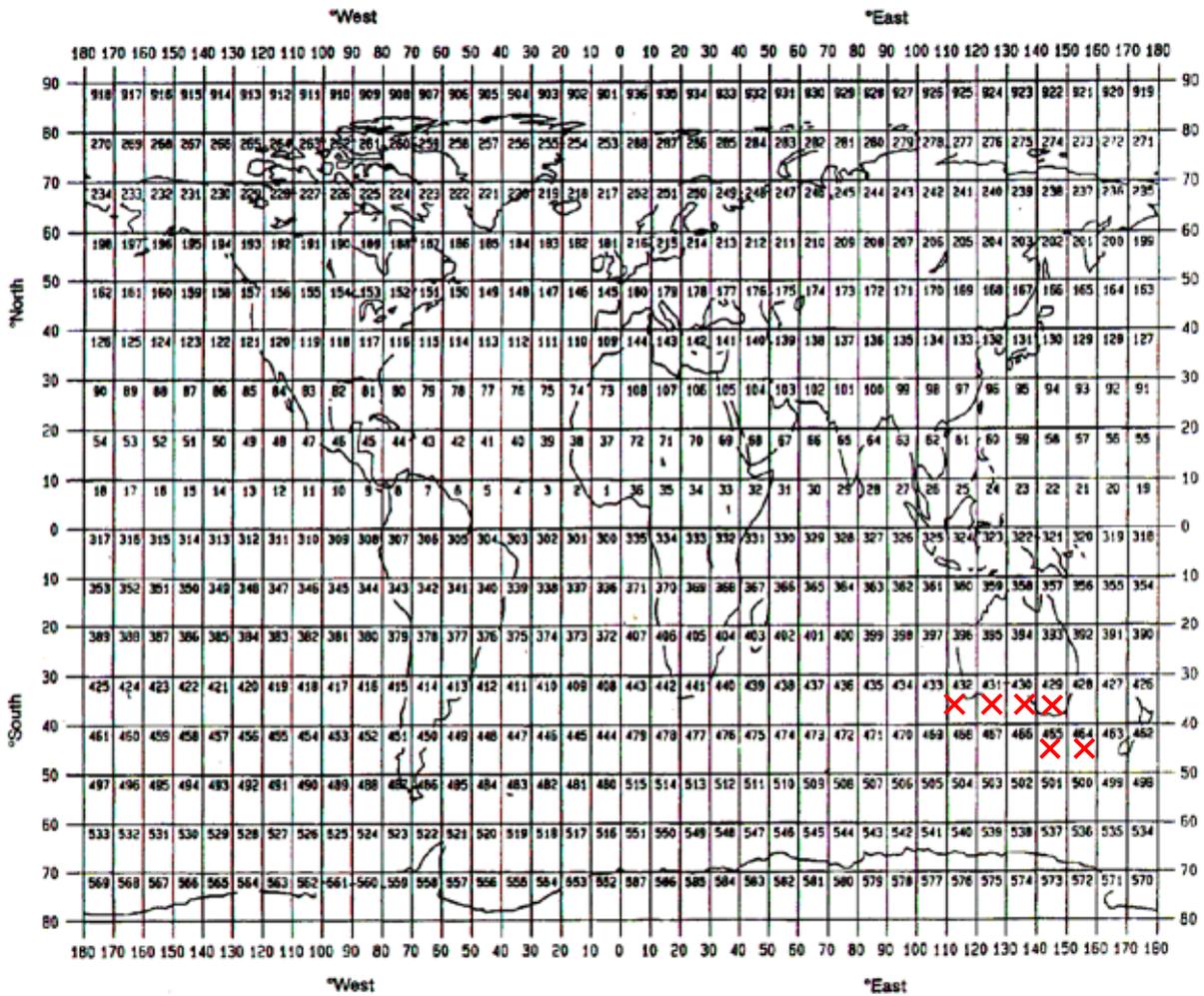
Tuesday the 23rd of August

We arrive in port alongside at 05:00 am and demobilise.

Summary

The voyage was very successful for Ms Julia Ressler and for Ms Luana Lins and similarly so for the CPR. From a benthic perspective, it would have been nicer to get better and more frequent hauls. However given the time limitations, the gear available and the hit and miss nature of benthic sampling everything was within expectation. The material recovered is of considerable value and will add to information about the nature of Australia's benthic fauna and links between pelagic productivity and benthic production/biodiversity.

A red "x" indicates where data was collected.



DETAILS OF ALL DEPLOYMENTS DURING THE TRANSIT

ITEM No.	PI	APPROXIMATE POSITION						DATA TYPE	DESCRIPTION
		LATITUDE			LONGITUDE				
		deg	min	N/S	deg	min	E/W		
Vessel departs port, deployments performed underway									
1	KS	43	27	S	147	27	E	B09	Initial deployment of CPR
2	JR	43	34	S	145	47	E	B10/PO1	Neuston net to collect FMD, tow 1 (15 min)
3	JR	43	34	S	145	47	E	B10/PO1	Neuston net to collect FMD, tow 2 (15 min)
4	JR	43	34	S	145	47	E	B10/PO1	Neuston net to collect FMD, tow 3 (15 min)
5	JS	43	24	S	145	26	E	H10	CTD from 600m to collect water and for salinity calibration
6	KS	39	02	S	142	27	E	B09	Redeployment of CPR
7	SH	43	03	S	145	05	E	H71	XBT for salinity calibration
8	JR	41	55	S	144	32	E	B10/PO1	Neuston net to collect FMD, tow 1 (15 min)
9	JR	41	55	S	144	32	E	B10/PO1	Neuston net to collect FMD, tow 2 (15 min)
10	JR	41	55	S	144	32	E	B10/PO1	Neuston net to collect FMD, tow 3 (15 min)
On station: Warrnambool									
11	SH	39	02	S	142	25	E	B90	EZ net 400 – 200 – 100 m + obliques
12	JR	39	02	S	142	25	E	B10/PO1	Neuston net to collect FMD, tow 1 (15 min)
13	JR	39	02	S	142	25	E	B10/PO1	Neuston net to collect FMD, tow 2 (15 min)
14	JR	39	02	S	142	25	E	B10/PO1	Neuston net to collect FMD, tow 3 (15 min)
15	JR	39	02	S	142	25	E	B10/PO1	Neuston net to collect FMD, tow 4 (15 min)
16	JS	39	02	S	142	25	E	H10	CTD from 600m to collect water
17	NL	39	02	S	142	25	E	B18	Smith-McIntyre grab: failed (broken)
18	SH/NL	39	02	S	142	25	E	B18	Epibenthic sled (20 minute tow @ 700 m)
19	KS	39	02	S	142	25	E	B09	Redeployment of CPR
Station end, subsequent deployments performed underway									
20	JR	37	53	S	139	49	E	B10/PO1	Neuston net to collect FMD, tow 1 (15 min)
21	JR	37	53	S	139	49	E	B10/PO1	Neuston net to collect FMD, tow 2 (15 min)
22	JR	37	53	S	139	49	E	B10/PO1	Neuston net to collect FMD, tow 3 (15 min)
On station: Port Lincoln									
23	SH/NL	36	04	S	135	49	E	B18	Epi-benthic sled (10 min to @ 500 m)
24	JS	36	03	S	135	41	E	H10	CTD from 500 m to collect water
25	SH	36	03	S	135	41	E	B90	EZ net 450 – 300 – 100 m + obliques
26	JR	36	03	S	135	41	E	B10/PO1	Neuston net to collect FMD, tow 1 (15 min)
27	JR	36	03	S	135	41	E	B10/PO1	Neuston net to collect FMD, tow 2 (15 min)
28	JR	36	03	S	135	41	E	B10/PO1	Neuston net to collect FMD, tow 3 (15 min)
29	NL	36	01	S	135	41	E	B18	Smith-McIntyre grab (425 m), deployment 1
30	NL	36	01	S	135	41	E	B18	Smith-McIntyre grab (425 m), deployment 2

On station: Port Lincoln <i>(continued)</i>									
31	NL	36	01	S	135	41	E	B18	Smith-McIntyre grab (425 m), deployment 3
32	KS	36	00	S	135	40	E	B09	Redeployment of CPR
Station end, subsequent deployments performed underway									
33	JR	35	28	S	132	10	E	B10/P01	Neuston net to collect FMD, tow 1 (15 min)
34	JR	35	28	S	132	10	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
35	JR	35	28	S	132	10	E	B10/P01	Neuston net to collect FMD, tow 3 (15 min)
36	JR	35	04	S	127	15	E	B10/P01	Neuston net to collect FMD, tow 1 (15 min)
37	JR	35	04	S	127	15	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
38	JR	35	04	S	127	15	E	B10/P01	Neuston net to collect FMD, tow 3 (15 min)
39	KS	35	04	S	127	12	E	B09	Redeployment of CPR
On station: Esperance									
40	NL/SH	34	36	S	121	49	E	B18	Epibenthic sled (10 minute tow @ 525 m)
41	JR	34	36	S	121	49	E	B10/P01	Neuston net to collect FMD, tow 1 (15 min)
42	JR	34	36	S	121	49	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
43	JS	34	36	S	121	49	E	H10	CTD from 500 m to collect water
44	NL	34	36	S	121	47	E	B18	Smith-McIntyre grab (570 m), deployment 1
45	NL	34	36	S	121	47	E	B18	Smith-McIntyre grab (570 m), deployment 2
46	NL	34	36	S	121	47	E	B18	Smith-McIntyre grab (570 m), deployment 3
47	SH	34	36	S	121	47	E	B90	EZ net 500 – 300 – 100 m + obliques
48	JR	34	37	S	121	48	E	B10/P01	Neuston net to collect FMD, tow 1 (15 min)
49	JR	34	37	S	121	48	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
50	JR	34	37	S	121	48	E	B10/P01	Neuston net to collect FMD, tow 3 (15 min)
51	KS	34	36	S	121	50	E	B09	Redeployment of CPR
52	JR	34	36	S	121	51	E	B10/P01	Neuston net to collect FMD, tow (15 min)
Station end, subsequent deployments performed underway									
53	JR	35	19	S	118	37	E	B10/P01	Neuston net to collect FMD, tow 1 (15 min)
54	JR	35	19	S	118	37	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
55	JR	35	19	S	118	37	E	B10/P01	Neuston net to collect FMD, tow 3 (15 min)
On station: Augusta									
56	NL/SH	33	04	S	114	31	E	B18	Epibenthic sled (10 minute tow @ 540 m)
57	JS	33	05	S	114	30	E	H10	CTD from 500m to collect water
58	NL	33	05	S	141	30	E	B18	Smith-McIntyre grab (590 m), deployment 1
59	NL	33	05	S	141	30	E	B18	Smith-McIntyre grab (570 m), deployment 2, empty
60	NL	33	05	S	141	30	E	B18	Smith-McIntyre grab (570 m), deployment 3
61	JR	33	07	S	141	27	E	B10/P01	Neuston net to collect FMD, tow 1 (15 min)
62	JR	33	07	S	141	27	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
63	JR	33	07	S	141	27	E	B10/P01	Neuston net to collect FMD, tow 2 (15 min)
End of station, steam to Fremantle									
Full details of swath path given are given in the original voyage plan.									

SUMMARY OF MEASUREMENTS AND SAMPLES TAKEN

ITEM No.	PI	NO	UNITS	DATA TYPE	DESCRIPTION
Smith McIntyre grab samples					
17	NL	10	individual hauls	B18	Collection of infaunal benthic isopods. All fauna collected preserved in ethanol.
Neuston nets					
2	JR	34	individual hauls	B10/PO1	Collect floating marine debris (plastics). All material collected (including fauna) preserved in ethanol.
EZ net					
11	SH	3	individual hauls	B90	Tows and various depths from 500 m to capture salps. All material collected frozen.
CTD					
5	JS	5	individual casts	H10	Standard CTD data from 500 m up. Water samples taken at each station across a range of depths.
Epi-benthic sled					
18	SH/NL	4	individual hauls	B18	5-20 minute bottoms tows for benthic macrofauna. All fauna preserved/retained either in ethanol (NL = isopods) or frozen (SH).
XBT					
7	CSIRO	1	individual deployments	H11	Standard XBT data (1 station only).
CPR					
1	KS	6	individual deployments	B09	All material preserved as standard CPR practice (formalin and then ethanol).

CURATION REPORT

ITEM No.	DESCRIPTION
	CTD/XBT data Data requests should be directed to: http://www.marine.csiro.au/datacentre/request.htm or data-requests-hf@csiro.au
	Swath 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
SH	Macro fauna from dredge/trawls With the exception of the isopods collected all fauna that was collected, will be donated to the Australia Museum where it is being curated and will be retained. NB SH has taken tissue for stable isotope and phylogenetic analysis. All material collected was frozen.
NL	Fauna from Smith-McIntyre grabs and all isopods collected All material obtained by the Smith-McIntyre grabs has been retained along with any isopods collected by NL for research by LL. All material has been preserved in ethanol.
KS	CPR data CPR data request should be directed to Kerrie Swadling (UTAS).
JR	Neuston net All material collected in the neuston net tows, with the exception of a few salps (SH), has been retained by JR, preserved in ethanol.
	EZ-net All material collected in the EZ net has been retained by SH and has been frozen.
	Particulate organic matter (POM) POM collected by filtering seawater supplied from the underway seawater supply has been retained by SH (frozen) for future SI analysis.

Track map



Personnel list

Scientific Participants

Sebastian Holmes	UWS	Chief Scientist
Jason Reynolds	UWS	Scientist
Mailie Gall	UWS	Scientist
Luana Lins	USYD	Scientist
Antony Gould	UWS	Scientist
Blaise Bratter	UNSW	Scientist
Julia Reisser	UWA/CMAR	Scientist/P.I. plastics
Tiffany Cole	UWS	Scientist
David McLeod	CSIRO	Scientist/ P.I. CPR
Trevor Goodwin	CMAR	MNF Electronics support
Matt Sherlock	CMAR	MNF Electronics support
Lindsay Pender	CMAR	MNF Voyage Manager/computing support
Dave Terhell	CMAR	MNF Hydrochemistry support

Marine Crew

Name	Role
John Barr	Master
Michael Tuck	1st Mate
Tom Watson	2nd Mate
Fred Rostron	Chief Engineer
Jarrad Taft	1st Engineer
Graham Perkins	2nd Engineer
John Howard	Chief IR
Graham McDougall	IR
Nathan Arahanga	IR
Jonathon Lumb	IR
Rod Langham	IR
Michael O'Connor	Chief Steward
Robert Dittko	Chief Cook
Stuart Mills	2nd 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. Especial thanks are due to Matt Sherlock & Trevor Goodwin for tirelessly making sure everything worked and for always having a smile on their faces. 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.

Sebastian Holmes
Chief Scientist

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/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