



2010 RV Southern Surveyor program

voyageplan SS06-2010

Continental slope and shelf processes along the south-west region of Western Australia during winter

Itinerary

Mobilise Fremantle 0800hrs, Thursday 29 July, 2010

Depart Fremantle 1600hrs, Thursday 29 July, 2010

Arrive Fremantle 0800hrs, Monday 9 August, 2010 and demobilise

Principal Investigators

Prof Charitha Pattiaratchi (Chief Scientist)

School of Environmental Systems Engineering and UWA Oceans Institute

Mailstop MO15, The University of Western Australia,

35 Stirling Highway Crawley, WA 6009 AUSTRALIA

Phone: (+618) 6488-3179 **Fax:** (+618) 9380-1015 **E-mail:** chari.pattiaratchi@uwa.edu.au

Dr Christine Hanson

School of Environmental Systems Engineering and UWA Oceans Institute

Mailstop M470, The University of Western Australia,

35 Stirling Highway Crawley, WA 6009 AUSTRALIA

Phone: (+618) 6488-7252 **Fax:** (+618) 9380-1015 **Email:** christine.hanson@uwa.edu.au



Scientific Objectives

- Define the structure and in particular the volume flux of the Leeuwin Current (LC), including the geostrophic inflow
- Define the structure and the volume flux of the Leeuwin Undercurrent (LU)
- Examine the dynamics of Dense Shelf Water Cascades (DSWC)
 - spatial extent, transport volume, nutrient fluxes
- Determine the interaction of the LC, coastal currents, DSWC and primary production dynamics during winter
- Obtain water samples to calibrate the bio-optical WET Labs sensors on ocean gliders

Voyage Objectives

After departing Fremantle, *Southern Surveyor* will conduct 8 cross-shelf transects (Fig. 1) between Jurien Bay and Cape Naturaliste. For each transect, 10 - 15 CTD stations will be occupied depending on the shelf width (with a total of 98 stations over the duration of the voyage). The transects will extend from the coast (20 m isobath) to beyond the 2000 m contour to capture the entire width of the LC. As in previous SS voyages, stations will be located at 50m depth intervals, especially along the continental slope. In addition to the standard CTD and fluorescence, water samples for nutrient analyses and phytoplankton measurements will be collected using the Niskin bottles. Experimental work will likely include ¹⁴C uptake measurements and nutrient uptake measurements.

The high priority areas of operation are off Perth, Rottnest Island and the Two Rocks region. The lower priority areas are at the northern (Transect A) and southern (Transect H) portions of the proposed study track.

Voyage Track

The area of operation and proposed voyage track are indicated in Figure 1. After departing Fremantle, *Southern Surveyor* will transit to the inshore end of Transect A (off Jurien Bay; Fig. 1) and conduct a cross-shelf transect. This will be followed by transects B to H.



Figure 1: Proposed voyage track.

Time Estimates

	Steaming time (at 11 kn)	'On station' time
Transit to D	11.8	-
Transect D	6.4	11
Transit to E	7.7	-
Transect E	5.7	11
Transit to F	7.4	-
Transect F	5.8	11
Transit to G	6.5	-
Transect G	4.7	11
Transit to Pth Canyon	0.8	-
Transect Pth Canyon	5.1	11
Transit to H	3.1	-
Transect H	6.1	11
Transit to J	7.5	-
Transect J	5.6	11
Transit to K	5.6	-
Transect K	6.5	11
Transit to Perth	12.0	-
Transit time	108	
On station	88	
Process studies	0	
Voyage TOTAL (h)	196.5	
Contingency	35.6	

Southern Surveyor Equipment

- 1) Navigational: GPS, DGPS (where possible),
- 2) Sounder
- 3) Underway data from thermosalinograph with fluorometer
- 4) Meteorological station (temperature, relative humidity, wind speed, wind direction, barometric pressure, PAR, rainfall, radiation)
- 5) ADCP
- 6) LADCP
- 7) CTD (Seabird SBE 911 plus)
- 8) Rosette (24 bottles up to 10 litres)
- 9) Transmissometer
- 10) Fluorometer (requires support from users for calibration)
- 11) Light (PAR)
- 12) Dissolved oxygen
- 13) Hydrochemistry data for salinity, oxygen, nitrate, nitrite, silicate, phosphate
- 14) Fish laboratory/geosciences laboratory
- 15) Walk-in Freezer
- 16) Blast freezer
- 17) Laboratory Fridges and Freezer
- 18) Milli-Q Water Supply (used in hydrochem analysis)
- 19) Scintillation counter
- 20) General purpose PC's
- 21) 100Mb Ethernet throughout
- 22) UNIX Computers, (Sun Ultra 10)
- 23) Starboard (forward) CTD winch
- 24) SeaSoar
- 25) Hydrographic A-frame (stbd)

User Equipment

1. Optical instrumentation for vertical profiles (Eco puck)
2. Photosynthetron for laboratory use
3. Turner Designs laboratory fluorometer
4. Deck incubators (for nutrient uptake experiments)

Special Requests

EcoPuck to be mounted on rosette (check depth rating).

Unsealed ¹⁴C radioisotope will be used for primary production work in the laboratory. Approvals have been obtained from both CSIRO Marine and Atmospheric Research (4/5/2010) and UWA Health and Safety Office (28/5/2010).

Personnel List

Charitha Pattiaratchi	UWA	Chief Scientist, Physical Oceanography
Christine Hanson	UWA	Biological Oceanography
Mun Woo	UWA	Physical Oceanography
Shari Gallop	UWA	Physical Oceanography
Soheila Taebi	UWA	Physical Oceanography
Yasha Hetzel	UWA	Physical Oceanography
Thisara Welhena	UWA	Physical Oceanography
Asha De Vos	UWA	Biological Oceanography
Liza Roger	UWA	Biological Oceanography
Anton Kuret	UWA	Biological Oceanography
Matilda Taylor	UWA	Biological Oceanography
Drew Mills	CSIRO MNF	Voyage Manager/Electronics support
Hiski Kippo	CSIRO MNF	Computing support
Mark Rayner	CSIRO MNF	Hydrochemistry
Dave Terhell	CSIRO MNF	Hydrochemistry

As per AMSA requirements for additional berths on *Southern Surveyor*, the following personnel are designated as System Support Technicians and are required to carry their original AMSA medical and AMSA Certificate of Safety Training on the voyage:

Name	AMSA Certificate of Safety Training No.
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Drew Mills	AS02348
Hiski Kippo	AS040836
Mark Rayner	AS02432
Dave Terhell	AS02843

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

Charitha Pattiaratchi

Chief Scientist

Voyage Plan – SS06/2010

 = production stn, which includes extra water samples (but note final locations TBA)

Transect	Station	Lat	Long	Max depth	# sampling depths	Nominal sampling depths
D	1	114.9264	-30.2938	29	2	0, 25
	2	114.8343	-30.3168	52	4	0, 10, 25, 50
	3	114.7611	-30.3345	48	3	0, 25, 50
	4	114.6775	-30.3537	104	5	0, 25, 50, 75, 100
	5	114.6436	-30.3607	151	7	0, 25, 50, 75, 100, 125, 150
	6	114.6432	-30.36	150	7	0, 25, 50, 75, 100, 125, 150
	7	114.6052	-30.363	254	9	0, 10, 25, 50, 75, 100, 125, 150, 250
	8	114.5933	-30.37	337	8	0, 25, 50, 75, 100, 125, 150, 250
	9	114.5722	-30.3771	512	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	10	114.508	-30.3942	748	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	11	114.4397	-30.4086	1003	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	12	114.3183	-30.4371	1831	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
E	13	115.1336	-30.8372	33	2	0, 25
	14	115.0484	-30.848	42	3	0, 25, 40
	15	114.9481	-30.8602	52	4	0, 10, 25, 50
	16	114.8919	-30.8687	105	5	0, 25, 50, 75, 100
	17	114.8421	-30.8822	151	7	0, 25, 50, 75, 100, 125, 150
	18	114.7894	-30.8832	203	9	0, 10, 25, 50, 75, 100, 125, 150, 200
	19	114.7818	-30.8815	292	8	0, 25, 50, 75, 100, 125, 150, 250
	20	114.7556	-30.8832	513	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	21	114.7004	-30.8885	749	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	22	114.6035	-30.9014	1026	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	23	114.4677	-30.9179	2021	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
F	24	115.3577	-31.2999	25	2	0, 25
	25	115.2714	-31.3235	41	3	0, 25, 40
	26	115.1049	-31.3729	51	4	0, 10, 25, 50
	27	115.067	-31.3872	99	5	0, 25, 50, 75, 100
	28	115.0265	-31.3992	143	7	0, 25, 50, 75, 100, 125, 150
	29	114.9712	-31.4137	199	8	0, 25, 50, 75, 100, 125, 150, 200
	30	114.9414	-31.4246	253	9	0, 10, 25, 50, 75, 100, 125, 150, 200
	31	114.9248	-31.4278	304	8	0, 25, 50, 75, 100, 125, 150, 250
	32	114.8735	-31.4435	507	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	33	114.7926	-31.4667	764	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	34	114.7178	-31.4907	1010	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	35	114.6254	-31.5135	2054	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
G	36	115.5583	-31.5379	20	2	0, 20
	37	115.2556	-31.6748	51	4	0, 10, 25, 50
	38	115.223	-31.6797	101	5	0, 25, 50, 75, 100
	39	115.1457	-31.7173	152	7	0, 25, 50, 75, 100, 125, 150
	40	115.0502	-31.7594	196	8	0, 25, 50, 75, 100, 125, 150, 200
	41	115.0365	-31.7672	237	9	0, 10, 25, 50, 75, 100, 125, 150, 200
	42	115.0216	-31.7784	318	8	0, 25, 50, 75, 100, 125, 150, 250
	43	114.9523	-31.805	497	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	44	114.8929	-31.8318	754	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	45	114.7944	-31.8611	1024	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	46	114.7164	-31.8997	2000	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000

Transect	Station	Lat	Long	Max depth	# sampling depths	Nominal sampling depths
PC	47	114.6143	-31.8295	3030	12	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000, 3000
	48	114.7498	-32.0738	2585	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
	49	114.8066	-32.1577	1928	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
	50	114.8985	-32.1168	2050	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
	51	115.0003	-32.0337	1544	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	52	115.1091	-31.9424	1288	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	53	115.1588	-31.9661	991	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	54	115.1854	-31.9708	754	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	55	115.2106	-31.977	509	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	56	115.2192	-31.9761	408	8	0, 25, 50, 75, 100, 125, 150, 250
	57	115.2232	-31.9781	334	9	0, 10, 25, 50, 75, 100, 125, 150, 250
	58	115.2326	-31.9822	188	7	0, 25, 50, 75, 100, 125, 150
	59	115.2806	-31.9949	128	6	0, 25, 50, 75, 100, 125
	60	115.3411	-31.9994	96	6	0, 25, 50, 75, 100
H	61	115.4071	-32.0167	50	4	0, 10, 25, 50
	62	115.5343	-32.5004	32	2	0, 25
	63	115.4204	-32.4571	41	3	0, 25, 40
	64	115.2653	-32.4031	52	4	0, 10, 25, 50
	65	115.2021	-32.3789	98	5	0, 25, 50, 75, 100
	66	115.1346	-32.3474	152	7	0, 25, 50, 75, 100, 125, 150
	67	115.082	-32.3277	201	9	0, 10, 25, 50, 75, 100, 125, 150, 200
	68	115.0408	-32.3154	309	8	0, 25, 50, 75, 100, 125, 150, 250
	69	114.9661	-32.29	529	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	70	114.9104	-32.2681	822	9	0, 25, 50, 75, 100, 125, 150, 250, 500
J	71	114.895	-32.2638	963	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	72	114.487	-32.1075	2000	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
	73	115.4752	-33.0003	32	2	0, 25
	74	115.2588	-32.9094	40	3	0, 25, 40
	75	115.0327	-32.8109	50	4	0, 10, 25, 50
	76	114.9493	-32.7753	103	5	0, 25, 50, 75, 100
	77	114.8665	-32.7413	151	7	0, 25, 50, 75, 100, 125, 150
	78	114.8074	-32.715	218	8	0, 25, 50, 75, 100, 125, 150, 200
	79	114.7983	-32.7084	250	9	0, 10, 25, 50, 75, 100, 125, 150, 200
	80	114.7738	-32.7002	298	8	0, 25, 50, 75, 100, 125, 150, 250
K	81	114.7266	-32.6805	494	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	82	114.5963	-32.626	755	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	83	114.4659	-32.5757	1005	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	84	114.3355	-32.5221	2278	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000
	85	115.269	-33.4998	31	2	0, 25
	86	115.1185	-33.5003	38	2	0, 25
	87	114.97	-33.4997	52	4	0, 10, 25, 50
	88	114.8693	-33.4994	47	3	0, 25, 50
	89	114.7682	-33.498	51	3	0, 25, 50
	90	114.7074	-33.4991	98	5	0, 25, 50, 75, 100
	91	114.5922	-33.4969	143	7	0, 25, 50, 75, 100, 125, 150
	92	114.4961	-33.5017	228	8	0, 25, 50, 75, 100, 125, 150, 200
	93	114.4862	-33.5017	260	9	0, 10, 25, 50, 75, 100, 125, 150, 200
	94	114.4779	-33.5001	299	8	0, 25, 50, 75, 100, 125, 150, 250
	95	114.4565	-33.5019	509	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	96	114.3839	-33.501	756	9	0, 25, 50, 75, 100, 125, 150, 250, 500
	97	114.2555	-33.5023	1006	10	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000
	98	113.7512	-33.5003	2000	11	0, 25, 50, 75, 100, 125, 150, 250, 500, 1000, 2000