



2010 RV Southern Surveyor program

voyageplan SS03-2010

Physical forcing of productivity on the Kimberley Shelf

Itinerary

Mobilise equipment Hobart 0900hrs, Monday March 29, 2010.

Add some equipment (amount to be confirmed) during 6h
in Fremantle on Wednesday April 7, 2010.

Load science crew and depart Broome on Wednesday, April 14, 2010 at 1600 hours.

Arrive Port Hedland and disembark science crew and some equipment
(amount to be confirmed) on Wednesday, May 5, 2010 at 1600.

Principal Investigator

Dr. Peter Thompson (Chief Scientist) – CSIRO Marine and Atmospheric Research

Phone: 03 6232 5298 **Email:** peter.a.thompson@csiro.au

Other PIs

Dr Ming Feng

Dr Martin Lourey

Dr Jim Greenwood

Dr John Keesing

Associate Professor Anya Waite

Associate Professor Lynnath Beckley



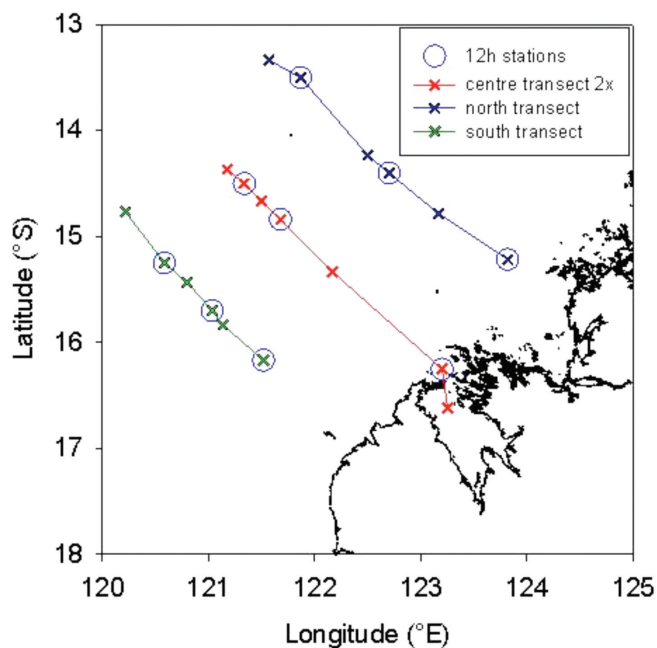
Scientific Objectives

We propose to investigate the biogeochemical (BGC) cycling in the shallow seas of the Kimberley shelf. Our conceptual model of the region links primary production to the balance between light limitation (due to turbidity), nutrient supply and water column stability. The interaction of these factors can generate aggregations of zooplankton and larval fish communities at the turbidity maxima. A major focus will be quantifying the nutrient inputs from the tidal forcing at the shelf break, from terrestrial runoff or benthic recycling. Based upon the observations and modelling we will assess the impact of climate variability on nutrient pumping across the shelf break. In addition the interaction between the river outflow and tides on two time scales (single tidal cycle [12h] and spring-neap cycle) will be investigated in terms of physics (including underwater light), chemistry and biology.

Voyage Objectives

The voyage requires 4 transects from the coast to ~ 2000m deep water. The centre transect from King Sound will be repeated 2 times. The highest priority for the voyage is to sample this centre transect first during the April 14 spring tide and again 14 days later during the neap tide. This transect includes a station inside King Sound. We have consulted the high resolution charts and the Pilot's Handbook in selecting the stations close to shore. While sufficient time should be available to sample the adjacent side transects these are a lower priority. First station is proposed to be the outer station on the centre transect (2000m station at ~ 14°20'S and 121°10'60"E, see figure below).

Voyage Track



The map shows the stations along the centre transect and approximate locations of the 7 proposed stations: 30-50m depth inside King Sound, 30-50m outside King Sound, 100m (80), 200m, 500m, 1000m and 2000m. The 1000m, 200m and 50m stations will be occupied for ~ 15h. Other stations are ~ 2h. Six stations at 6 similar depths will be occupied on north and south transects.

Time Estimates

Each transect is expected to take ~ 55 hours of station time and ~30 hours of steaming. Time has been estimated for 4 onshore – offshore transects with 6 (or 7) stations per transect at water depths of: ~ 2000, 1000, 500, 200, 100, 50 (50) meters. The list below gives the list of operations at each station. On the 12h stations the order of the operations carried out between the repeat CTDs will vary depending upon time of day as some operations are better in the light (e.g. optical profiles) and others are better in the dark (e.g. bongos).

Transect #1. Centre transect to commence at 2000 m station ~ 14.36°S & 121.17°E.

Second transect is the northern transect, similar to centre one but without the shallowest station or mooring deployment.

Third transect is the repeat of the centre transect with mooring recovery scheduled for after completion of the transect.

Fourth is transect is the southern transect commencing at the offshore end.

Stations by depth	Approx Station location	approx time on station	operations	notes
2000m	14.36S 121.17E	2 to 3h	<ul style="list-style-type: none"> • 1 CTD (possibly 2) • 2 bongo tows • Optical profile to 100m 	
1000m	14.5E 121.33S	15h	Repeat CTDs interspaced with other operations. The order of these will vary as some of the optical work requires daylight. Other operations include: <ul style="list-style-type: none"> • 3 bongo net tows • 1 neuston net tow • 1 EZ net tow • 1 optical profile to 100m • Floating optical device • 3 bongo tows 	One CTD per hour when possible.
500m	14.67S 121.5S	1 to 2h	<ul style="list-style-type: none"> • 1 CTD (possibly 2) • 2 bongo tows • Optical profile to 100m 	same as 2000m
200m	14.84S 121.67E	15h	Repeat CTDs interspaced with other operations. The order of these will vary as some of the optical work requires daylight. Other operations include: <ul style="list-style-type: none"> • 3 bongo net tows • 1 neuston net tow • 1 EZ net tow • 1 optical profile to 100m • Floating optical device • 1 sled tow (shot) • 3 bongo tows 	Same as 1000m, except with 1 sherman sled tow (shot)
100m			Deploy/recover mooring on central transect	
100m (~ 80m)	15.33S 122.17E	1 to 2h	<ul style="list-style-type: none"> • 1 CTD (possibly 2) • 2 bongo tows • Optical profile to 100m 	same as 2000m
30 to 50m outside King Sound	16.25S 123.20E	15h	Repeat CTDs interspaced with other operations. The order of these will vary as some of the optical work requires daylight. Other operations include: <ul style="list-style-type: none"> • 3 bongo net tows • 1 neuston net tow • 1 EZ net tow • 1 optical profile to 100m • Floating optical device • 1 sled tow (shot) • 3 bongo tows 	
30 to 50m inside King Sound	16.62S 123.25E	1 to 2 h	<ul style="list-style-type: none"> • 1 CTD (possibly 2) • 2 bongo tows • Optical profile to 100m 	

If the voyage runs ahead of schedule we will undertake sampling in regions of high phytoplankton, at edges of turbidity fronts and anywhere colder water reaches the surface. Underway and daily satellite updates will be used to search for these features.

If the voyage runs behind schedule the 2000m stations on the north and south transects will be dropped. If even more time is required 1000m 12h stations on the north and south transects will be shortened by 6h each by deleting some operations.

Southern Surveyor Equipment

- 1) Underway data from thermosalinograph with fluorometer;
meteorological station (temperature, relative humidity, wind speed,
wind direction, barometric pressure, PAR, rainfall, radiation)
- 2) Hydrochemistry data for salinity, oxygen, nitrate, nitrite, silicate, phosphate.
- 3) Fish laboratory/geosciences laboratory
- 4) Dark room
- 5) Photo/Preservation Lab
- 6) Walk-in Freezer
- 7) Blast freezer
- 8) Laboratory Fridges and Freezer
- 9) Milli-Q Water Supply (used in hydrochem analysis)
- 10) Scintillation counter
- 11) Simrad EK 500 sounder (38 and 120 KHz)
- 12) Simrad EA 500 sounder (12 kHz)
- 13) Sonardata Echolog and Echowiew software to log and view echograms.
- 14) Acoustic Doppler Current Profiler (ADCP)
- 15) General purpose PC's
- 16) 100Mb Ethernet throughout
- 17) Ships Network
- 18) Towed Body winch for EZ net
- 19) Starboard (forward) CTD winch
- 20) Starboard (aft) Hydro winch for bongos, optical profiles, neuston tows.
- 21) Hydrographic A-frame (stbd)
- 22) Stern A-frame (SWL 15 tonnes)
- 23) 7 tonne knuckleboom crane
- 24) CTD (Seabird SBE 911 plus)
- 25) Rosette (24 bottles up to 10 litres)
- 26) Transmissometer
- 27) Fluorometer (requires support from users for calibration)
- 28) Light (PAR)
- 29) Dissolved oxygen
- 30) EZ Net (multiple plankton net system)
- 31) Small Epibenthic Sled
- 32) Smith-McIntyre sediment grab

User Equipment

1. Two incubators for roof of wheelhouse.
2. Sherman Sled
3. Bongos with own deck box
4. Neuston net
5. optical equipment for vertical profiles
6. floating optical package
7. coring device
8. nitrate sensor
9. mooring for deployment and recovery – at 100m station, central transect.
10. Instruments and equipment to be loaded into storage consisting of ~ 20 pallets.

Special Requests

Some instruments will be used during transit voyages by Trull and Waite. These will need to be set up prior to departure at Hobart. Some equipment will be required by Waite (SS04/2010 and SS05/2010) and will be left on board at end of SS03/2010. Nitrate sensor to be mounted on CTD for casts less than 1000m deep. Running seawater on deck for incubators.

Personnel List

Peter Thompson	CMAR	Chief Scientist
Pru Bonham	CMAR	Phytoplankton ecology
Martin Lourey	CMAR	Watch Leader & Nitrogen uptake
James McLaughlin	CMAR	Primary production
Joanna Strzelecki	CMAR	Zooplankton and benthic inverts
Evan Weller	CMAR	Physics
Lynnath Beckley	Murdoch University	Watch Leader & Larval fish
David Holliday	Murdoch University	Larval fish
Nicole Patten	UWA	Flow cytometry
Daniel Paul	CLW	Optics
Nagur Cherukuru	CLW	Optics
Peter Dunn	CSIRO MNF	Electronics Support/voyage manager
Anoosh Sarraf	CSIRO MNF	Computing support
Mark Rayner	CSIRO MNF	Hydrochemistry
Alicia Navidad	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.

Peter Dunn	ASO3164
Annosh Sarraf	BB02298
Mark Rayner	AS02432
Alicia Navidad	AS04836

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

Peter Thompson
Chief Scientist