

MARINE
NATIONAL FACILITY

voyageplan

2005 RV *Southern Surveyor* program

SS05/2005

GA Survey 282 – Marine National Facility Research Charter
by Geoscience Australia and National Oceans Office

Arafura Sea Marine Survey: Identifying potential natural hydrocarbon seeps and petroleum resources, including sea floor mapping and classification of Australia's central northern EEZ.

Itinerary

- Darwin, Thursday 28th April 2005. Begin mobilising GA carry-on by hand equipment.
- Darwin, Friday 29th April 2005. Begin mobilising heavy equipment.
- Darwin, Saturday 30th April 2005. Complete mobilising and depart when ready.
- Arrive Darwin 0700hrs Saturday 28 May 2005. Demobilise vessel.

Principal Investigator

Dr Graham Logan – Project Leader

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Scientific Objectives

The scientific objectives of this voyage (GA Survey 282) are to:

1. improve our understanding of the petroleum resources in the Arafura Sea
2. identify and sample natural hydrocarbon seepage
3. document modern sedimentary / environmental settings of the Arafura Sea northern margins for bio-regionalization and regional marine planning (Fig.1).

Natural hydrocarbon seepage can provide evidence for an active petroleum system within the subsurface. Sites of seepage can also provide highly diverse ecosystems due to nutrients, biogeochemical cycles and changes in sediment substrate.

Initially areas (Fig. 1) have been selected for detailed mapping using Swath bathymetry, side scan sonar, 3.5kHz sub-bottom profiles and seismic reflection data. This data will provide information on the nature of the sea floor, variation in sediment type and bathymetry, and evidence for shallow gas and faulting. All of these data will then be used to select specific sample sites. These will be chosen to reflect a range of benthic habitats for environmental and sedimentological sampling and areas of suspected natural hydrocarbon seepage for geochemical and environmental sampling.

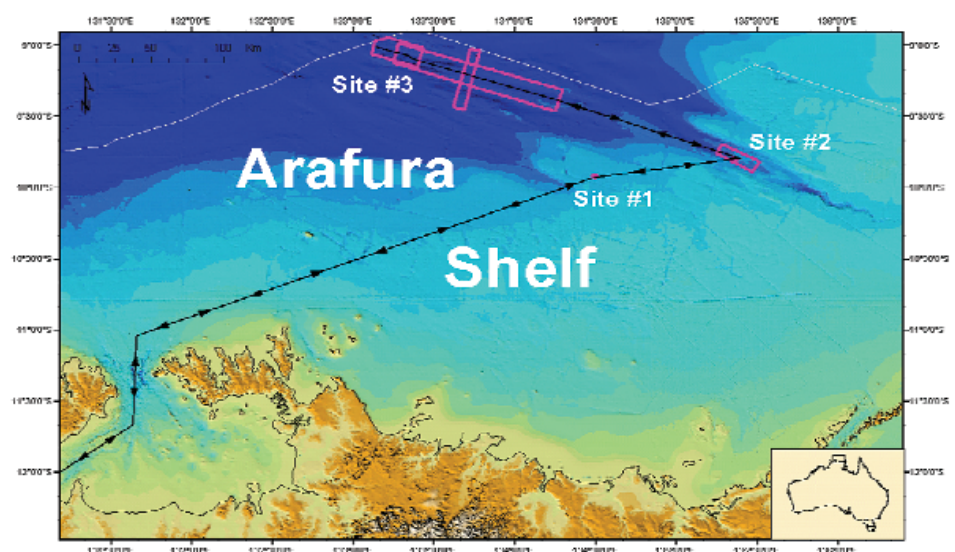


Figure 1: The location of survey 282, the ship tracks and acquisition areas

Voyage Objectives

Site #1 (~0.25 days) Depth ~70m

Deployment of the Acoustic Doppler Current Profiler (ADCP), a CTD cast, and a sediment grab and video.

Site #2 (~5 days) Depth ~90m

After deployment of GA's benthic current meter (BRUCE), the area will be Swath mapped concurrently with side scan sonar and 3.5 kHz sub bottom profiling. This information assists with targeting the sampling program of cores, grabs, video imagery, benthic sleds, rock dredges, and if required, CTDs. On completion of mapping and sampling of site #2, the survey proceeds to the larger site region #3.

Site #3 (~ 20 days) Depth up to ~250m

An extensive Swath survey with the fluorometer and seismic being deployed, along with side scan sonar and the 3.5 kHz sub bottom profiler. This information assists in the second phase of site #3 by identifying the targets for the sampling program. This includes sediment cores, sediment grabs, video imagery, benthic sleds, rock dredges, and CTDs. Should time allow, a series of vibrocores will be taken in the areas of interest in site #3, on route back to Site #2 and #1 respectively. On completion of this work, the ship returns to Site #2 for the collection of 'BRUCE' and then Site #1 for the collection of the ADCP. Upon successful capture of the scientific instruments the survey returns to port, continuously acquiring Swath data.

Voyage Track

(See Figure 1 and Time Estimates)

Time Estimates

Transit from Darwin, to and from Site #1 – 3.5 days

Acquisition

Seismic profiling: 2000 km – 10 days

Side-scan: 2500 km – 12 days

Towed fluorometer: 2000km – 10 days

Swath bathymetry – entire survey

3.5kHz sub-bottom profiles – entire survey (depending on interference with swath)

Sampling 11 days

Dredging (20 dredges)

Coring (60 gravity cores, 20 vibro-cores as a fallback for gravity cores)

Grab samples (50 grabs)

Benthic sled (10 dredges)

Transits during sampling program – 3 days

Scientific Staff Program

Date	Activity/Description
28 Apr 2005	Begin mobilisation carry on equipment
29 Apr 2005	Begin mobilisation heavy equipment depart when ready
30 Apr 2005	Transit to site #1 (134 30' E, 9 55' S) ~ 33hrs (11 knots)
1 May 2005	Deploy ADCP, CTD, SM Grabs (X2) ~4 hrs (WD ~70m)
1 May 2005	Transit to Site #2, 135 22' E 9 48' S. ~ 6 hrs. @11 knots. (WD ~95m) Deploy BRUCE, CTD, SM Grabs (X2) video, rock dredge / sled (~6 hrs) continue with Swath, Side scan sonar in box surrounding Site #2 for 3 days
2 May 2005	Continue Swath mapping, Side Scan Sonar, 3.5, Seismic of surrounding area. (10 knots)
3 May 2005	Continue acquisition.
4 May 2005	Sediment acquisition program CTD SM Grabs, gravity core, video image, dredge/sled.
5 May 2005	Continue physical acquisition.
6 May 2005	Transit to site #3 (134 30' E, 9 55' S) ~ 7 hrs (11 knots)
7 May 2005	Continue Swath mapping, 3.5 sub bottom profiler, deploy Side Scan Sonar, fluorometer , Seismic equipment begin mapping surrounding area. (5-6 knots)
8 May 2005	Continue
9 May 2005	Continue
10 May 2005	Continue
11 May 2005	Continue
12 May 2005	Sediment acquisition, CTD, SM Grabs, core, image, Benthic dredge
13 May 2005	Sampling program continued
14 May 2005	Sampling program continued
15 May 2005	Sampling program continued
16 May 2005	Sampling program continued
17 May 2005	Western deeper water site
17 May 2005	Swath mapping, 3.5, Seismic of surrounding area. (10 knots)
18 May 2005	Continue
19 May 2005	Continue
20 May 2005	Sediment acquisition grab CTD SM Grabs, core image, Benthic dredge
21 May 2005	Sampling program continued
22 May 2005	Sampling program continued
23 May 2005	Sampling program continued
24 May 2005	Sampling program continued
25 May 2005	Sampling program continued
26 May 2005	Transit to site #2 135 22' E 9 48' S. ~7 hrs (11 knots)
26 May 2005	Retrieve BRUCE 2 hrs
26 May 2005	Transit to site #1 (134 30' E, 9 55' S) 5.5hrs (11 knots)
26 May 2005	Retrieve ADCP 2 hrs
27 May 2005	Transit Darwin
28 May 2005	Arrive Darwin 0700hrs and demob

Southern Surveyor Equipment / Space

- Swath-mapper with sound velocity profiler
- Sub-bottom profiler (TOPAS)
- 12 & 200 kHz echo-sounder to be recorder digitally
- CTD (including Transmissometer)
- Trawl winch for dredging
- Smith-Macintyre grab (2)
- Coring winch (for the gravity core)
- Epibenthic sled and spare nets
- Room for microscopes in dry lab
- Space in operations room to set up seismic recorders
- Space for Swath and seismic processing
- Space for Side Scan Sonar and Fluorometer processing
- Space in wet laboratory for sedimentology (processing sed)
- Cold room for core storage (cores and grabs)

Special Requirements

- Room for compressor on deck
- Room for sampling gear on deck (core barrels, liners, spare dredges)
- Room for seismic winch on deck
- Room for Thomas (core deployment cradle)
- Room for fluorometer processing and computation
- Room for biological work in Fish Lab
- Room for vibro-corer on deck
- Room for Vibro winch
- Room for video camera winch
- 8,000 litres of diesel fuel to run compressor

Note: detailed plans for Aft Deck, Fish Lab, Ops Room, GP Lab and Chem Lab equipment location are under development.

Data sets to be collected from the National Facility's instruments

- Navigation (digital acquisition)
- Swath-bathymetry (digital) EM 300
- Water temperature and thermo-salinograph
- ADCP on vessel
- All metrological data
- Sub-bottom profiles (digital) TOPAS
- Echo-sounder with digital acquisition (12 & 200 kHz)

User Equipment

GA equipment (already on board ship)

- BRUCE instrumented frame (LISST laser particle sizer, Seabird CTD, Nortek acoustic current meter plus two OBS sensors) for deployment at site #2.
- ADCP (for deployment at site #1)
- Vibro-corer (anticipate total of 20 cores)
- Vibrocore Winch.
- Vibrocore Powerpack.
- Core deployment system (Thomas)
- Rock dredges and pipe dredges (anticipate total of 20 dredges)
- EG&G Boomer Seismic system
- Bottom video camera system with armoured cable and winch.
- Rock Saw (both large and small ones) and room for rock saw in wet laboratory and room for the larger on the mid aft deck

GA equipment (transported to the ship)

- GA airgun seismic system: compressor, guns, winch, streamer, recorders, navigation.
- Catamaran skimmer for fluorometer surface sampling with Air Compressor set.
- Gravity Corer (anticipate total of 60 cores)
- Grabs (anticipate 50 grabs)
- Sampling / storage equipment (bags buckets)
- Side Scan Sonar with associated hardware / software
- Side Scan Sonar Winch
- Microscope
- 5mm large plastic sieve (X2)

Personnel List

Graham Logan	GA	Chief Scientist
John Kennard	GA	Scientist
Kriton Glenn	GA	Scientist
Andrew Heap	GA	Scientist
Michele Spinoccia	GA	Swath operator
Georgina Burch	GA	Scientist
George Bernadell	GA	Scientist
John Stratton	GA	Science technician
Craig Wintle	GA	Mechanical technician, System Support Technician
Franz Villagran	GA	Electronics Technician
Andrew Hislop	GA	Mechanical technician
Karen Gowlett-Holmes	CMAR	Biologist
George Wilson	NTMAG	Biologist
Lindsay Pender	CMAR	Marine National Facility – Voyage Manager, Computing, System Support Technician
Drew Mills	CMAR	Marine National Facility – Electronics, System Support Technician

Note: System Support Technicians are nominated as per AMSA requirements for additional berths on vessel.

This voyage plan is in accordance with the directions of the National Facility Steering Committee for the research Vessel RV Southern Surveyor

Dr Graham Logan

Chief Scientist