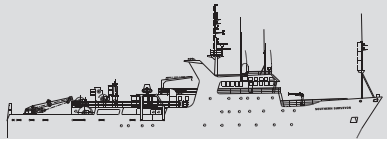

MARINE
NATIONAL FACILITY

2007 program

RV *Southern Surveyor*

voyageplan
SS01-2007

Marine National Facility Research
Charter by Geoscience Australia

Bight Basin geological sampling and seepage survey: sampling the Cretaceous section of the Bight Basin, and investigating potential natural hydrocarbon seeps.

Itinerary

Mobilise: Port Lincoln Friday 23 February 2007
ETD: Port Lincoln 0800 hrs, Saturday 24 February, 2007
ETA: Port Lincoln 0800 hrs, Saturday 17 March, 2007 and demobilise

Principal Investigator

Mr Cameron Mitchell (Chief Scientist) – Petroleum and Marine Division, Geoscience Australia GPO Box 378 Canberra ACT 2601 Australia
Phone: +61 2 6249 9778 **Fax:** +61 2 6249 9980 **Email:** Cameron.Mitchell@ga.gov.au

CSIRO

Scientific Objectives

- Increase our understanding of the geological evolution and petroleum potential of the Bight Basin;
- Acquire geological samples from the pre-Campanian section of the basin;
- Investigate, identify, characterise and sample sites of potential natural hydrocarbon seepage.

The main survey objective is to address existing knowledge gaps regarding the nature and distribution of potential source rock intervals in the Bight Basin. Our current knowledge of the source potential of the basin is based on samples from wells drilled in proximal areas of the basin and geological models of the basin fill derived from seismic interpretation. This survey aims to sample the distal facies of potential source intervals of Albian-Santonian age at locations on the seaward edges of the Ceduna and Eyre Terraces. Furthermore, this survey aims to investigate potential natural hydrocarbon seepage at sites across the Ceduna Sub-basin, which may provide evidence for the presence of active petroleum systems.

Voyage Objectives

Areas of geological significance, where potential source rock intervals outcrop at the seabed, and possible hydrocarbon seepage sites have been identified from existing seismic, sampling, bathymetry and Synthetic Aperture Radar (SAR) data (Fig. 1.). Nine areas of interest will be surveyed and sampled, using swath bathymetry, side-scan sonar, 12 & 120 kHz echo-sounder, 3.5 kHz sub-bottom profiles, gravity cores and dredge sampling. Information and sampling priorities will be swath, sub-bottom profiler, side-scan sonar to identify potential targets, followed by dredging, coring, and camera. In terms of equipment, success of the survey will rely on fully operational dredging, coring, swath and sub-bottom profiler systems.

Area 1. Continental shelf-break, northeastern margin of the Ceduna Sub-basin: Investigate and sample potential seepage sites above the pinch-out edge of Cretaceous units and basin-margin fault system;

Area 2. Northern and central Ceduna Sub-basin: Investigate and sample potential seepage and palaeo-seepage sites associated with SAR slicks, and above possible shallow gas accumulations;

Area 3. Northern margin of the Ceduna Sub-basin: Investigate and sample potential seepage sites above reactivated basin-margin faults;

Area 4. Cenozoic volcanic build-ups in the northern Ceduna Sub-basin: sample for age dating;

Area 5. Seaward edge of the Eyre Terrace: dredge sampling of Albian-Santonian age rocks exposed by faulting and canyons;

Area 6. Lower continental slope above the northern Ceduna-Recherche sub-basin transition: Sampling of exposed interpreted Turonian-Santonian age rocks, and mounded seabed features overlying Albian-Cenomanian mud diapirs and toe-thrusts;

Area 7. Seaward edge of the central Ceduna Terrace: Investigate and sample potential seepage sites associated with late Cretaceous growth faults cutting to the seafloor;

Area 8. Lower continental slope above the central Ceduna-Recherche sub-basin transition: Sampling of exposed interpreted Santonian-Maastrichtian age rocks, and potential seepage sites above Late Cretaceous shale ridges;

Area 9. Southern Ceduna Sub-basin: Investigate and sample potential seepage targets where late Cretaceous faults exposed by canyons.

Priorities: The highest priority sampling sites are those in area 5 on the margin of the Eyre Terrace (Figure 1), where faulting, slumping and erosion in canyons provide access to rocks of Albian-Santonian age. Other high priority sampling sites are areas 2, 6 and 3. The lesser priority areas are 1, 7, 8, and 9 in that order.

Voyage Track (See attachment 1)

Time Estimates

Transit from Port Lincoln to Area 1 (1 Day)

Area 1: Continental shelf-break, north-eastern margin of the Ceduna Sub-basin
- Swath, sub-bottom, sidescan, x4 gravity cores, grab dredge (if core unsuccessful), camera (2 Days with depths ranging from 100-900m)

Area 2: Northern Ceduna Sub-basin
- Swath, sub-bottom, sidescan, x4 gravity cores, grab? dredge (if core unscuccessful), camera (2 Days +1 Day priority buffer, including a return to the area after area 6 and transits to area with depths ranging from 1000-1700m)

Area 3: Northern margin of the Ceduna Sub-basin
- Swath, sidescan, grab, x 10 gravity cores, dredge (if core unscuccessful), (1.5 Days including transit to area with depths ranging from 650-950m)

Area 4: Cenozoic volcanic build-ups in the northern Ceduna Sub-basin
- Swath, sub-bottom, x2 dredges (0.5 Day basin including transit to area with depths ranging from 1400-2300m)

Area 5: Seaward edge of the Eyre Terrace
- Swath, sub-bottom, x15 dredges (4 Days +1 Day priority buffer, including transit to area with depths ranging from 1600-3100m)

Area 6: Lower continental slope above the northern Ceduna-Recherche sub-basin transition
- Swath, x8 gravity cores, x2 dredges. *Dredges will require the additional wire transfer method with x1 3500-3700m, and x1 3400-4100m* (2.5 Days including transit to area with depths ranging from 2700-4500m)

Area 2: Return to the Lower continental slope above the northern Ceduna-Recherche sub-basin transition (See Area 2 above).

Area 7: Lower continental slope above the central Ceduna-Recherche sub-basin transition
- Swath, sub-bottom, x5 dredges, x10 gravity cores (2.5 Days including transit to area with depths ranging from 2000-3500m)

Area 8: Central Ceduna Sub-basin
- Swath, x2 dredges. *Dredges will require the additional wire transfer method with them covering the range of depths between 3600-4500m* (1 Day +1 Day deepwater buffer including transit to area with depths ranging from 3600-4500m)

Area 9: Southern Ceduna Sub-basin
- Swath, sub-bottom, x6 gravity cores (1 Day basin including transit to area 1600-2500m)

Return Transit to Port Lincoln (1 Day)

RV *Southern Surveyor* Equipment

- Expendable Bathythermographs (XBT's) for ten sound velocity profiles
- EM300 multibeam swath (SIMRAD) with sound velocity profiler
- Topas 3.5 kHz sub-bottom profiler
- 12 & 120 kHz echo-sounder of water column data to be recorded digitally
- CTD Water temperature and thermo-salinograph profiles
- Smith-Macintyre grab (2)
- Trawl winch for dredging
- Coring winch (for the gravity core)
- Blast freezer for quick freezing of samples and storage of frozen samples
- Cold room for core storage (cores and Box cores) set at 4°C
- Camera station for video (operations room or if elsewhere with GPS feed)
- Constant Temperature Lab (CTL)

User Equipment

- Rock dredges (6)
- THOMAS Core deployment system
- Gravity/piston Corer (1 Tonne) with 6m barrels and one 8m barrel
- Geochemistry sampling equipment (Sodium Azide, Nitrogen cylinders, x400 tins, x400disrupters, sampling equipment)
- Chain block for mounting on A-frame to move 8m core barrels
- Side-scan sonar (Winch, Power pack, Side Scan fish, Acquisition system)
- Deep-water Camera system (using side-scan winch)
- Fluorometer equipment (catamaran, cables, pump, instrument and computer)
- Sampling / storage equipment (bags, buckets, pens etc.)
- Microscope, geopick, hand lenses, munsell chart, photo card
- Surface slick sampling devices supplied by Gore, rod and line
- Rock Saw (small one) and room for rock saw in wet laboratory
- Satellite Phone
- Deck plans have been provided for layout of user equipment
- Stationary and plotting materials

Special requirements

- Space for PCs used for sub-bottom profile data processing in addition to TOPAS
- Space for Swath processing
- Space in operations room for Side-scan Sonar and Fluorometer acquisition PCs
- Space in wet laboratory for sedimentology (processing sediments)
- Room for sampling gear on deck (core barrels, liners, spare dredges)
- Room for Thomas (core deployment cradle)
- Room for fluorometer processing and computation
- Room for video camera and Side-scan winch
- Room for small rock saw in wet laboratory
- Use of vessels dynamic positioning equipment will be required

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

- Navigation (digital)
- EM 300 Swath-bathymetry (digital)
- TOPAS 3.5 kHz Sub-bottom profiles (digital)
- 12 & 120 kHz Echo-sounder (digital)
- CTD Water temperature, thermo-salinograph, sound velocity profiles (digital)
- All metrological data

Personnel List

Cameron Mitchell	GA	Chief Scientist
George Bernardel	GA	Shift Leader, Geologist
Andrew Krassay	GA	Geologist
Matthew Carey	GA	Geochemist
Chris Nicholson	GA	Geologist
Michele Spinoccia	GA	Swath geophysicist
Karen Earl	GA	Geologist
Peter Haines	DOIR (WA)	Geologist
Damien Ryan	GA	Geologist
Andrew Hislop	GA	Mechanical technician
Craig Wintle	GA	Mechanical technician, *SST
Franz Villigran	GA	Electrical technician
Ian Atkinson	GA	Systems technician
Bob Beattie	CSIRO	MNF Computing, *SST
Stephen Thomas	CSIRO	MNF Voyage Manager, electronics, *SST

** System Support Technician as per AMSA requirements for additional scientific berths on* Southern Surveyor.

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

Cameron Mitchell
Chief Scientist

Attachment 1: Voyage Track