

MARINE
NATIONAL FACILITY

2007

RV Southern Surveyor
program



voyagesummaryTRANSITSS06/2007

TRANSIT SS06/2007

National mapping on transit voyages of the upper and mid slope

Itinerary

Depart Mackay – 1000 hrs Wednesday 17th October 2007

Arrive Newcastle – 0800 hrs Monday 22nd October 2007

Principal Investigator

Rudy Kloser (Chief Scientist)

CSIRO Marine and Atmospheric Research, PO Box 1538, Hobart, Tasmania 7001.

Phone: +61 3 62 325222 **Fax:** +61 3 62 325000 **Email:** rudy.kloser@csiro.au

Scientific Objectives

As part of a trial national seabed mapping initiative using transit time on the MNF RV Southern Surveyor map the outer shelf, upper-slope and mid-slope seabed focusing initially on the 200 m to 1500 m depth range and regions important for regional marine planning, biodiversity and conservation assessments and fisheries habitat mapping.

Objectives for the transit voyages:

1. Using transit time, map key areas as identified in gap analysis.
2. Develop methods of improving data quality and calibrating the EM300 backscatter data.
3. Develop and test new rapid methods of “ground truthing” acoustic backscatter maps with optical and physical sampling.
4. Process bathymetry and backscatter data and create maps suitable for ecological interpretation.

Voyage Objectives

The objectives to be accomplished on this transit are to complete a swath survey line from Mackay to Newcastle, predominately along the 400m contour, map and sample reference sites at 50, 100, 200 and 400m and deploy the CTD in order to test new CTD acquisition software currently under development as well as to provide calibration data for the swath mapper.

Voyage Track

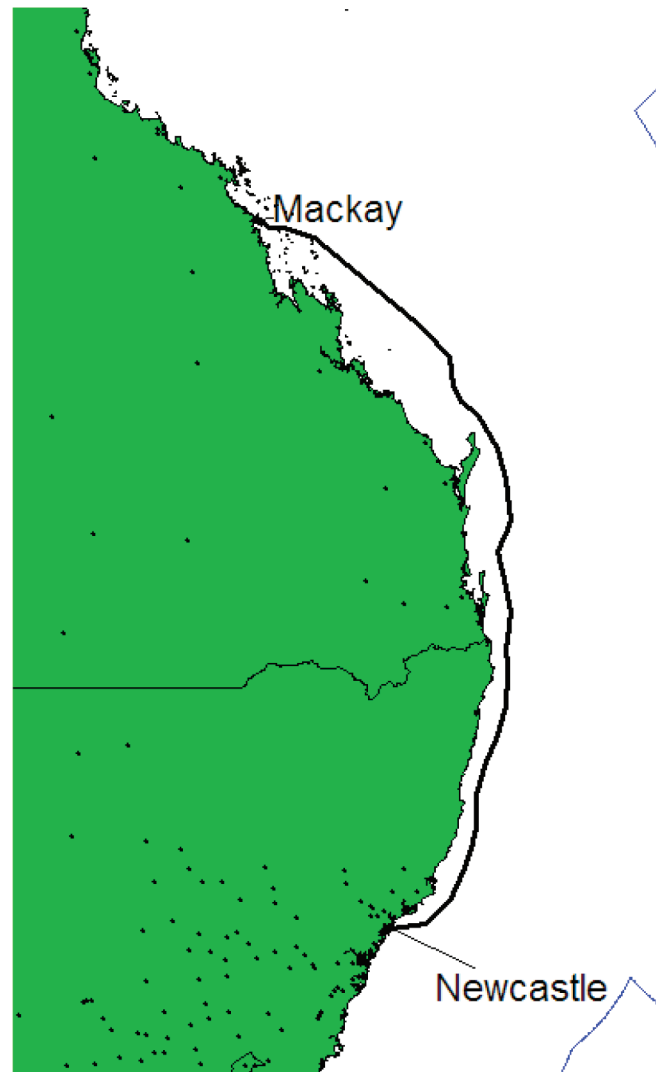


Figure 1: Map showing the vessel track following the 400 m bathymetric contour between Mackay and Newcastle

Results

The voyage mapped 980 n.miles of upper slope bathymetry, substrate type and substratum layers (Fig. 1). Detailed measurements with sediment samples to supplement the interpretation of the backscatter from the EM300 multi-beam and EK500 were obtained from 50, 100 and 200 m sites as weather permitted. On route several small canyons that incised the shelf were mapped to reveal the complexity of the features and to enable planning for targeted biological and geological sampling (Fig.2). Using the raw data logger facility on the EM300 swath mapper the interference between the sub bottom profiler and the EM300 swath mapper was visualised and quantified (Fig. 3). Details of the data recorded at the sampling sites will enable a calibration file of the EM300 backscatter to provide a standard index of seabed type. Based on this short 5 day transit mapping voyage we can provide an update to the geomorphic description being used in regional marine planning of the upper slope of the east coast of Australia. Critically we recorded the positions of new canyons not previously shown on maps and several small canyons that extended further up the slope than previously indicated. We also proved that several small seamounts shown on maps on the upper slope do not exist. Added to the geomorphic description is a mapping of the distribution of consolidated and unconsolidated sediment along the upper slope that provides important base information about the availability of habitat for fauna that prefer consolidated or unconsolidated sediment.

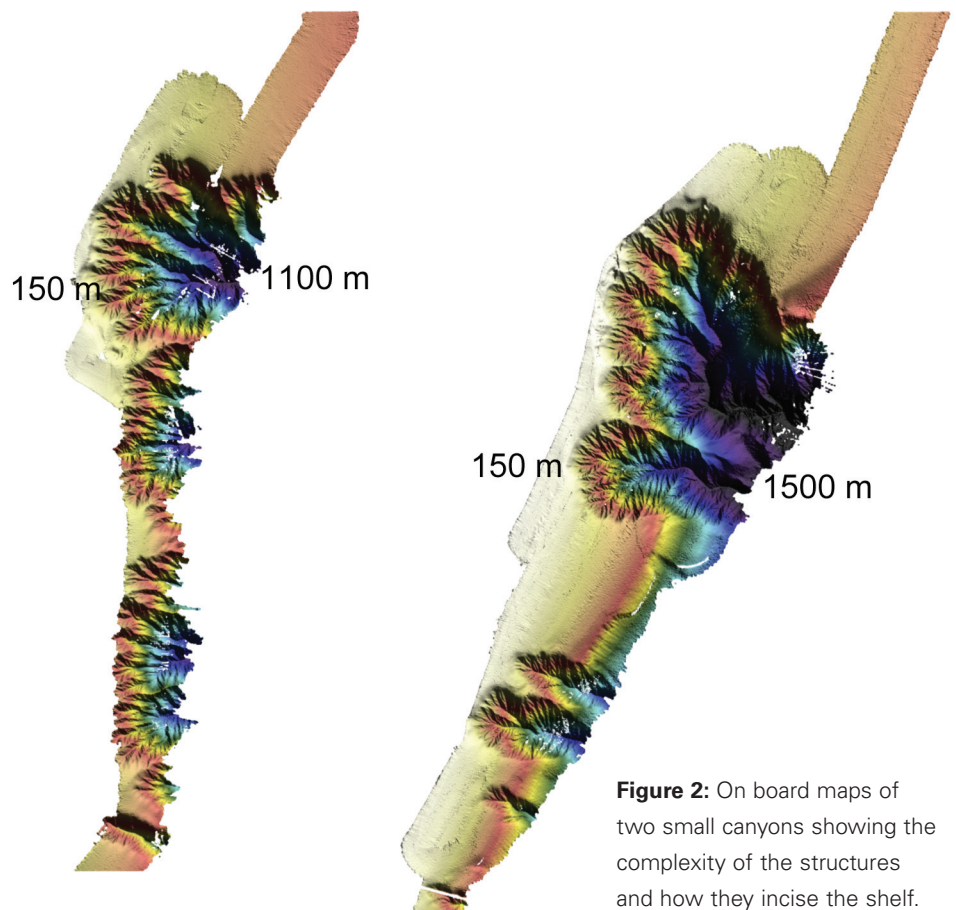


Figure 2: On board maps of two small canyons showing the complexity of the structures and how they incise the shelf.

Voyage Narrative

Wednesday 17th

Departed Mackay at 10:00 hrs and steamed via numerous coal boats south. Conditions fine and carried out interference tests in shallow water < 50 m with EM300 and other acoustic instruments. At a 50 m site ran cross transects on several settings and obtained two grab samples of mud with shell and gravel inclusions as well as a small sea snake. Swathed to the 100 and 200 m sites.

Thursday 18th

During the night the wind increased from the SE and we were unable to carry out experiments at the 100 or 200 m sampling sites. The backscatter from the EM300 deteriorated considerably and the ship slowed to 6-7 knots. Poor conditions continued throughout the day as we steamed to the 400 m contour and turned south.

Friday 19th

Conditions eased overnight as we steamed south with improvement in EM300 backscatter. On route we mapped out two small canyons that incised the shelf with expansive erosion head features. Interference from the TOPAZ sub-bottom profiler was quantified by the raw data from the EM300 when operating the EM300 in shallow and medium mode.

Saturday 20th

In good conditions, continued to map the 400 m contour down the coast with detailed mapping of canyon features on route. Of interest was the extent that canyons incised the shelf with associated fish aggregations as inferred from the Simrad EK500 echosounder. Training of the bathymetric editing software CARIS ensured that two operators were processing data clearing the backlog of data. We were also ably assisted by the east Australian current that added 3-4 knots to our speed down the coast.

Sunday 21st

In strengthening Northerly winds continued to map the 200 to 1000 m depth range from 30° 41S to 31° 54S. At Diamond Head a cross shelf transect to 100 m was created to cross calibrate the EM300 and EK500 echo sounders with sediment stations at the 100 and 210 m sites. Whilst we made very good speed heading south with the strong flowing (3-4 knots) east Australian current, turning north reduced our speed to 7-8 knots.

Monday 22nd

Vessel docked at 08:00 hrs at Newcastle.

Summary

The voyage demonstrated the enormous potential of utilising the MNF RV Southern Surveyor vessel transit time to obtain detailed maps of the seafloor around the Australian coast line. On this voyage it was possible to map the 400 m contour from Mackay to Newcastle that will build on existing data obtained around the rest of Australia. The relative calibration of the swath mapper backscatter will enable seabed type to be inferred from the instrument in a systematic and consistent way for utilisation in Australian marine planning. The data obtained can immediately update the geomorphic map being used for regional marine planning and this voyage mapped several small canyons that incised the shelf that were previously undescribed.

Personnel

Scientific participants

Rudy Kloser	CMAR	Chief Scientist
Gordon Keith	CMAR	Swath
Rick Smith	CMAR	Swath
Lindsay Pender	CMAR	MNF Computing support
Drew Mills	CMAR	MNF Electronics
Lisa Woodward	CMAR	MNF
John Walker	Consultant	
Leanne Pitt	P&O	
Solomon Foster	Work Experience	

Officers and crew

Brian Payne	Master
John Boyes	First Mate
Rob Ferries	Second Mate
John Morton	Chief Engineer
Dave Jonker	1st Engineer
Jarrad Taft	2nd Engineer
Tony Hearne	Chief IR
Paul Hanson	IR
Manfred Germann	IR
Matt Barret	IR
Joel Wilkinson	IR
Andy Goss	Chief Cook
Rebecca Lee	Second cook
Charmayne Aylett	Steward

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

Acknowledgements

The success of this voyage can be attributed to the wide variety of expertise and hard work provided by the science team, the MNF personnel and the very high standard of support given by the marine crew – especially the Bridge Officers. We would also like to acknowledge the efforts of the Director of the research vessel Fred Stein and the Steering Committee for providing the opportunity to use transit voyages to maximise the potential of the vessel and its seabed mapping equipment.

Rudy Kloser
Chief Scientist

Table 1: List of operations

Operation	Gear	Site	Depth (m)	Longitude	Latitude
				Start position (degrees decimal minutes)	
1	Grab	Mackay	50	150 51.932	21 51.499
2	Grab	Mackay	50	150 51.801	21 51.583
3	XBT		400	153.7929	26.9962
4	CTD		1000	153 39.94	30 01.655
5	Grab	Diamond Head	100	153 02.034	31 43.359
6	Grab	Diamond Head	100	153 02.027	31 43.366
7	Grab	Diamond Head	210	153 07.965	31 44.118
8	Grab	Diamond Head	210	153 07.855	31 44.376

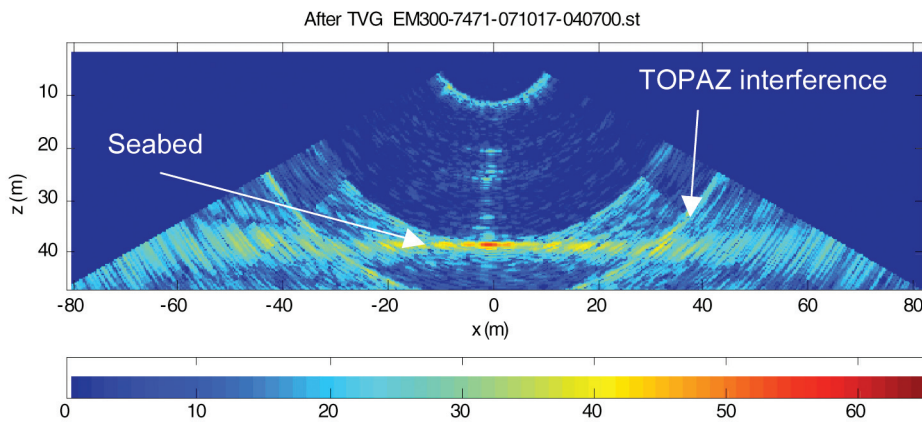


Figure 3: Image of the raw data from the EM300 raw data logger operated in shallow mode (<100 m) showing the interference from the TOPAZ sub-bottom profiler.