



2008 RV Southern Surveyor program

voyageplan SS12-2008

Submarine Landslides and Sedimentation Model for the SE Australian Margin

Itinerary

Mobilize Newcastle, 0800 hrs, Tuesday November 4, 2008
Depart Newcastle 1000 hrs, Wednesday November 5, 2008
Arrive Sydney 0800 hrs, Friday November 21, 2008

Principal Investigators

Chief Scientist – Associate Professor Ron Boyd, University of Newcastle,
Geology Building University of Newcastle, NSW, 2308
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Scientific Objectives

We plan to 1): investigate the potential for underwater landslides to generate tsunamis that would impact the coastline of NSW and Queensland; 2) develop and test a model for gravity driven sedimentation on the deep water margin of SE Australia. Our recent work indicates that underwater landslides have occurred on this margin before and will occur again in the future. We aim to estimate the size of the slides, their likely location and frequency of occurrence. This will enable an assessment of the threat posed by tsunamis in eastern Australia, a potential natural disaster capable of affecting national infrastructure and productivity.



Voyage Objectives

The scientific objectives will be met on the SS 12/2008 voyage by:

- 1) Conducting a regional survey using EM300 multibeam (MBES) and Topas high resolution seismic (HRS) equipment to map the seabed of the eastern Australian margin seaward of the second most populated coastal region of Australia between northern NSW and the Sunshine Coast, including the Brisbane and Gold Coast regions (see voyage track). We will concentrate on the continental slope, the steepest and most landslide-prone region of the margin lying approximately between 100 m and 4500 m water depth (PRIORITY 1)
- 2) Once most of this region has been mapped (around 10 days total), we will identify the locations of any major landslides found on the multibeam and seismic data. We will investigate the sediment distribution in these regions by means of S-M grab samples (PRIORITY 2). We will identify landslide scars with minimum sediment cover and attempt to core these regions to determine the age of the landslides (PRIORITY 1).
- 3) Finally we will attempt to ground truth the MB and Topas data with a number of regional sediment grab samples to determine sediment composition and dispersal mechanisms on the margin, followed by dredging in any major canyons discovered to determine the makeup of the margin stratigraphy in this area (PRIORITY 2).

Additional Objectives

While transiting between Newcastle and Ballina, the ship will steam over several pinnacles and reefs that are located on bathymetric charts but have never been surveyed previously by multibeam or Topas data. These targets will make good training sites for survey personnel prior to arriving in the study area. The locations are on the shelf edge east of Forster and on the upper slope off Port Macquarie. Their positions are approximately 32 deg 04'18" S, 153 deg 04'35" E, and 31 deg 24'05" S, 153deg 20'59" E, and they are located directly on the transit line, hence requiring no extra time on the voyage. Any other unusual bathymetric features along the track line will also be targeted.

The survey area contains a known wreck location approximately offshore from Stradbroke Island, Qld. This wreck is within the capabilities of the EM 300 system to image and also for the backscatter properties to pick up. As a test of these capabilities the wreck location will be closely observed on the voyage and if located will possibly require a second pass over to confirm, while taking a sediment grab sample in the area to ground truth the backscatter data (part of the original voyage plan).

153°E 154°E 155°E

26°S 27°S 28°S 29°S

GOSHEADS

BRISBANE

BYRON BAY

1545 WEST05MV
WEST05MV
R/V Melville

356634
EW9910
R/V Ewing

346714
Trace2
SS11/2005
Southern Surveyor

356594
SS201409
Southern Surveyor

356545
N.Fil.1
SS10/2004
Southern Surveyor

436243
Brisbane-Tomboyville Transit
KM0702
Kile Moana

40781
Kinn Plateau
S305/2004
Southern Surveyor

356631
EW0201
EW0201
R/V Ewing

391592
AUSFAIR
MD153.L1
Marion Dufresne

449850
Mackay-Newcastle Transit
SST06/2007
R/V Southern Surveyor

362795
MR03K04_Len1
MR03K04L1
Mirai

1573
EW9202
EW9202
R/V Ewing

R/V Southern Surveyor
SS12/2008 study area

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Time Estimates

The ship time will be used primarily to acquire the grid of MBES and Topas data. Depending on the depth distribution of the margin to be encountered this is estimated to take around 10 days of steaming at 10 knots (approximately 2400 miles averaging 240 miles per day). To keep to this time estimate, we will modify the lengths of lines at the northern and southern ends, and at the shallow and deep edges of the survey. We estimate a total of around 10-15 grab samples averaging around 2 hours each, 4-8 cores averaging around 6 hours each, and 4 dredges averaging around 6 hours each. Total sediment sampling time is thus estimated at around 4 days. Steaming time between sampling sites should be minimal as we will position the sites as part of our later grid survey and time them to take advantage of favourable weather windows. Data collection is thus estimated to take 10 days of seabed mapping, 4 days of sampling, and transit time is estimated at 1.5 days of transit from Newcastle to the southern end of the survey area, and 1.5 days from the southern end of the survey area to Sydney.

Southern Surveyor Equipment

- 1) EM 300 (plus navigational equipment as listed on ship technical specifications: Seapath Seatex 200, Trimble GPS Nav Trac XL and Ashtech 12 channel DGPS (both with DGPS capability); Furuno GD 180 course plotter, Oceantech Seaplot Chart System, two Sperry gyro compasses Mk 37. etc or current equivalents) throughout the voyage. We request access from the navigational systems to our desktop computers via the ship network and the ability to transfer EM 300 and Topas data from the ships system to our own computers for processing as soon as practicable after acquisition.
- 2) Topas High Resolution Seismic acquisition and processing system
- 3) 40 x XBT
- 3) 2x Smith Macintyre Grab. We request access to the Smith-McIntyre grabs with sufficient cable to sample in up to 4500 m water depth. We request at least one S-M grab sampler backup on board if possible in case one is lost.
- 4) 2 x GA rock dredge and winch to deploy from rear deck. We would also like to use the National Facility rock dredge for up to 6 samples in 300 – 3000 m depth, with plenty of weak links available.
- 5) Large Plotter with sufficient paper supply to print out seismic profiles for interpretation while on board
- 6) We request use of the ADCP Doppler current meter system and its data products on *Southern Surveyor* throughout the voyage as well as both echo sounders.
- 7) As this is a high resolution surveying voyage we would like to have the standard data stream (or at least position, ship heading and speed, attitude, and bathymetry) recorded as frequently as possible (at least every 5 seconds throughout the voyage if available). We would also request a photocopy of the bridge log.

- 8) Meteorological data – air temperature, humidity, wind-speed, and direction, barometric pressure and light, Oceanographic data – underway logging of sea surface temperature and salinity, General computing facilities and marine charting
- 9) We will use the Operations Room mainly for EM300 and Topas work plus plotting and analysis. We will also use the productivity lab for writing and analysis. We will use the fish sorting room for core and grab sample storage and the freezer for rock dredge storage if necessary. We will use the photography lab (i.e., the photo preservation lab off the fish lab) for photographing core, rock and grab samples.
- 10) Coring sheave to be fitted to A-frame above Thomas, Port lifting lug on the A-frame. This coring sheave to be fitted with wire out and tension meter. The coring winch to have sufficient wire to core in 4000 m water depth.
- 11) Thomas is connected to the ships Hydraulic supply. So we need to ensure that the GP Hydraulic pump is operational. This needs to be checked as it is not often used.
- 12) Please provide a swivel 5 tonne or greater to connect the wire to the coring bomb.
- 13) While we do not envisage frequent use, we wish to use the hydrographic winch with the CTD sampler for up to 5-10 stations as back up for the XBT deployments.

User Equipment

We will be using the GA Thomas coring system on SS 12/2008. This system has been used extensively on previous SS voyages and our operations will be similar in nature and layout to these earlier arrangements. Typically Thomas is deployed from the stern deck via the A-frame and winch. The stern deck will be devoted only to Thomas and to dredging operations using the GA rock dredges. Our technician for operating Thomas will be David Mitchell from University of Sydney, who will receive training from GA personnel prior to sailing. We will only operate Thomas on one shift per day. Science party members will be available to assist with extracting samples and setting up for coring. We have supplied a drawing of the Thomas coring system layout as an appendix.

We will also bring on board at least one desktop computer, and a large number of laptop computers for deployment in the ops room and productivity lab. We request that all these computers be available for connection to the ships network for downloading data and scanned documents etc.

We will bring still and video cameras for recording sediment sample properties. We will also bring buckets for transporting rock and grab samples.

Special Requests

Require store of 40 XBTs as previously arranged for MBES calibration.

No equipment requires fitting apart from GA Thomas, no special procedures or working at height or alone. EM 300 will require patch test soon after departure from Newcastle.

Personnel List

No.	Shift	Name	Affiliation	Responsibility
1	1 Noon-MidN	Ron Boyd	University of Newcastle	Chief Scientist, Voyage Report, Voyage Planning and Conduct, Data Synthesis
2	2 MidN to Noon	Jock Keene	University of Sydney	Senior Second Scientist, Voyage Report, Sampling and Sediments (Dredge, Grab and Core) plus Data Synthesis
3	2	Neville Exon	ANU/IODP	Sampling and Sediments (Dredge, Grab and Core) plus MB/Topas Operation, Data Synthesis
4	2	Asrar Talukder	CSIRO Perth	Topas Seismic acquisition, processing and interp.
5	1	Tom Hubble	University of Sydney	Topas Seismic acquisition, processing and interp.
6	2	Kev Ruming	NSW DPI	Navigation, MB Processing, Fledermaus Display, Computing and Data Base Management, Voyage Report
7	1	Jim Gardner	CCOM/UNH	Navigation, XBT, MB and Topas Processing, and Fledermaus Display, Data Synthesis
8	2	Janice Felzenberg	CCOM/UNH	Navigation, XBT, MB and Topas Processing, and Fledermaus Display
9	2	David Mitchell	University of Sydney	Coring, Grab Sampling, Dredging, Topas Seismic, T-shirts
10	1	Samantha Clarke	University of Sydney	Topas Seismic Acquisition and Processing
11	2	Michael Kinsela	University of Sydney	MB Acquisition and Processing
12		Peter Dunn	CMAR	MNF Voyage Manager and Electronics Support
13		Hiski Kippo	CMAR	MNF Computing Support
14		Tony Veness	CMAR	MNF Swath Support
15		Bernadette Heaney	CMAR	MNF Swath Support

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	AS03164
Tony Veness	BB01071
Hiski Kippo	AS02377

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

Ron Boyd
Chief Scientist

GA Thomas Deployment Figure

