

RV Investigator Voyage Plan

Voyage #:	IN2016_E01		
Voyage title:	East Tasman Plateau – key to unravelling the onset of the Antarctic Circumpolar Current MNF Equipment Sea Trials		
Mobilisation:	As compatible with port period activities		
Depart:	Hobart: 1800 Wednesday 17 August, 2016		
Return:	Hobart: 08:00 Monday 22 August, 2016		
Demobilisation:	Monday 22 August, 2016		
Voyage Manager:	Doug Thost	Contact details:	Doug.thost@csiro.au
Chief Scientist:	Joanne Whittaker		
Affiliation:	Institute for Marine & Antarctic Studies, University of Tasmania	Contact details:	Jo.whittaker@utas.edu.au

Scientific objectives

- 1) Dredge volcanic and sedimentary rocks to obtain new, rigorous age and paleo-depth constraints for the Cascade Seamount. Underway bathymetric data will be used to refine dredge targets.
- 2) Collect sediment cores across a depth transect to enable work investigating paleo-oceanographic conditions using proxies. Preferably at least a multicore proximal to IODP site 1172, and piston cores at the mid- and shallow-depth sites.
- 3) Collect high resolution swath bathymetry and sub-bottom profile data to see how far recent sediment flows extend from the Cascade Seamount towards IODP site 1172, to test the hypothesis that downslope transport resulted in the observed sediment patterns in core 1172. Existing coverage and resolution of bathymetry across the East Tasman Plateau is insufficient to resolve this question.
- 4) CTD to complement the sediment core data if possible. Alternative is for clean underway surface supply samples to be taken where CTD not possible.

Voyage objectives

Aspects of the MNF equipment testing tie in with the objectives of the supplementary science program. The voyage objectives of both the science and the equipment testing share equal priority and therefore determined to share as the primary objective.

Voyage objectives listed in order of priority

1. Deploy and test/calibrate a range of key MNF equipment utilised on science voyages and retrieve samples to be utilised by supplementary program:
 - I. Seagoing Instrumentation/Supplementary Voyage
 - Test following equipment:
 - Rock dredge: Test gallows modification and develop procedure for use at target locations as identified under science objectives (see Figure 2 & 3).
 - CTD System Testing and deployment
 1. Automatic Pay out / Pay-in to pressure values rather than wire-out values (this used to work, but got broken somewhere with one of their upgrades).
 2. Heave compensation review – make sure that this can be selected and works.
 3. Spooling review in deep water – at the moment the crew have to keep adjusting the spooling manually.
 4. Constant Tension mode during the boom movement during deployment and retrieval (as the crew have lost confidence in this and don't use it, since the CTD wire was broken).
 5. Min of 2 x casts at up to 4000m (~4 hours per cast for 8 hours total) (Figure 2&3)
 - Sediment Coring System testing and deployment:
 1. Multicorer: 3 possible target sites ranging from 2500-700m with the 2500m site at location 1172 the priority. Minimal use on previous voyages and some changes to the system requires testing. Listed for IN2017_V01 (see Figure 3). NOTE: deep site with multicorer will only be possible in calm sea state.
 - Whole cores to be stored in CT Lab at 3-5 degrees Celsius
 - Samples will be sectioned into bags using core extruder and frozen.
 2. Piston corer (long corer): Test of system in preparation for IN2017_V01 (see Figure 3)

3. Kasten corer: Test of recent modifications (see Figure 3)
 - Whole-core sample taken with U-channel and stored in CT Lab at 3-5 degrees Celsius
 - Sub samples to be taken and stored in freezer
 - GP Towing Winch Spooling Test
 - Other
 1. Stabilised platform: Test stabilisation range, mechanical strength, motor drive and water tightness. Testing in rough conditions or deliberate course deviations/accentuating pitch and roll of vessel is required.
 2. Calibration of ships compass: Will be conducted upon leaving the wharf prior to reaching the Echo sounding calibration site.
- II. Geophysical Survey and Mapping (GSM)
- Calibrate EK-60 Echo sounder in Storm Bay (Figure 1)
 - Seabed mapping at designated locations (Figure 1)
- III. Supplementary Voyage
- Bathymetry of the seafloor south of drill site 1172 (see Figure 2)
- IV. Other
1. Sonardyne USBL Beacons: Test range of beacons by deploying trawling winch opportunistically
 2. ADCP bottom track collection in approx. 150-200m depth of water, where opportunity presents.
2. DAP (*no dedicated time allocation required*)
- Commence seagoing training for 3 new recruits.
 - Testing port period updates as follows. The tests will mostly involve monitoring normal operations and attending to any issues that surface:
 - Netequalizer Bandwidth Management device
 - New Investigator domain & server OS upgrade
 - Commbox upgrade
 - New firewalls & server switches
 - SAN expansion & virtual server storage
 - Visage
 - Polarion/Resources sync & intranet linkage
3. Provide vessel familiarisation and training opportunities to new MNF personnel.

Operational Risk Management

No potentially high risk work has been identified outside standard operations. Coring and dredging activities will be conducted by experienced personnel.

Overall activity plan including details for first 24 hours of voyage

Personnel new to the vessel or those who have not sailed in the previous 6 months will undergo an ASP Seagoing Induction at 14:00 on the 17th August.

The vessel will depart Princes Wharf, Hobart, at approx. 1800 on the 17th August 2016 and undertake calibration of the ship's compass in the River Derwent. Following this, the vessel will make way for Storm Bay to undertake calibration of the EK60 Echo sounder (GSM). This activity is expected to take up to 12 hours and will be undertaken, weather permitting, at approximate coordinates: -42.973167, 147.379333 (see Figure 1).



Figure 1: EK60 Calibration Site

Should the calibration be completed earlier than the allocated 12 hours, the vessel will take a direct route to the Cascade Seamount's planned area of operations, according to prevailing conditions at the Master's discretion with an approximate steaming time of 10 hours. Seabed mapping activities will take place along a designated track prior to arrival at Drill Site 1172.

Initial operations at the Seamount are outlined in Figure 2 and will consist of:

- Seabed mapping between set points leading up to the first sediment site,
- Sediment site 1 (S1) with multicorer deployment (approx. 2500m depth)
- Recommence seabed mapping up to approach to dredge site 1 (D1)
- Completion of dredge sites 2 and 3.
- CTD Casts



Figure 2: Initial operations at Cascade

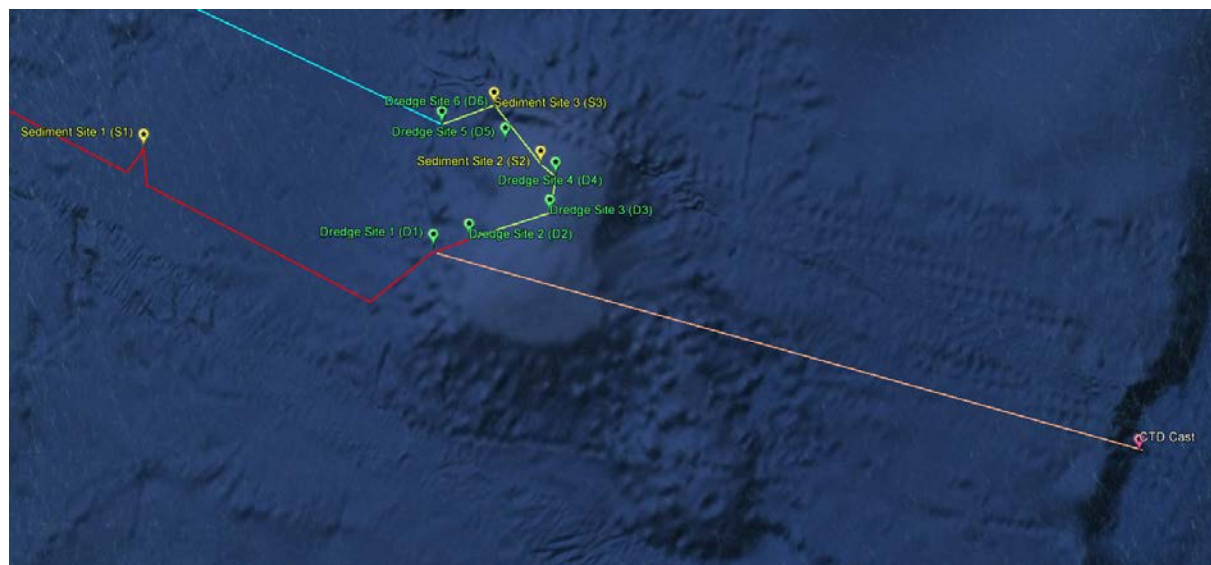
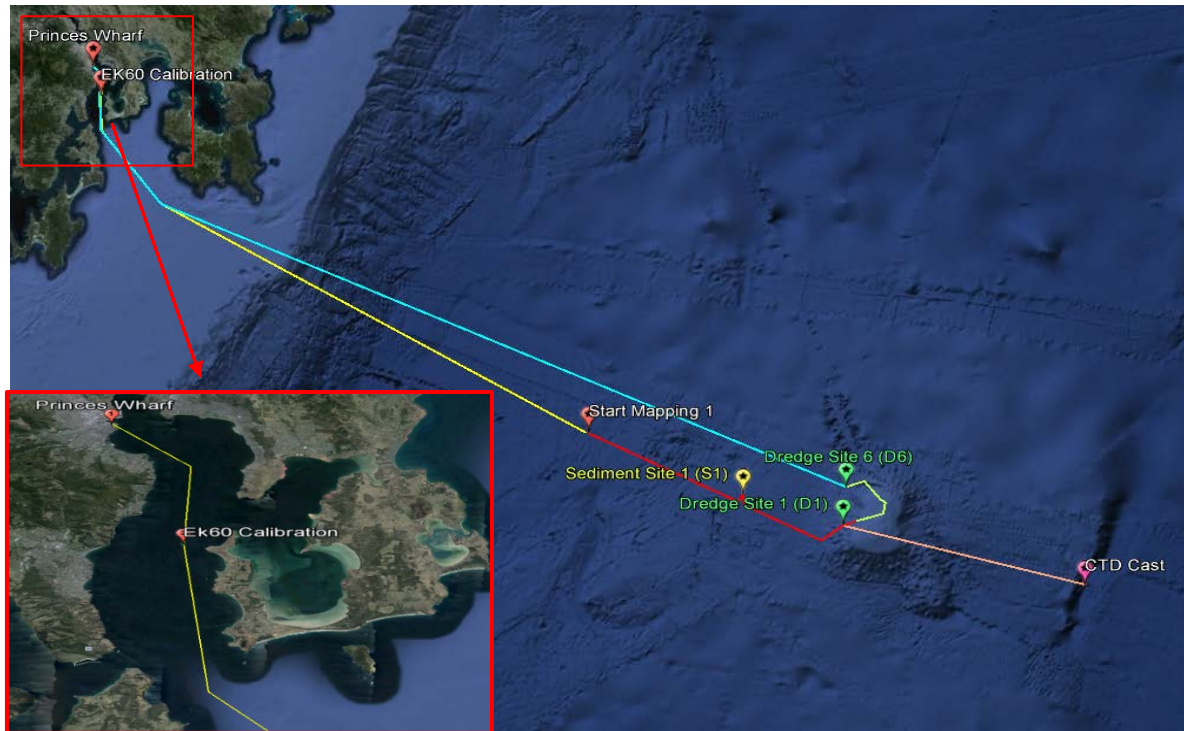


Figure 3: Dredge, Sediment and CTD sites

Voyage track example

An example of the voyage track with is shown below.



Waypoints and stations

	Decimal Latitude	Decimal Longitude	Distance (nm)	Total Distance (nm)	Steaming time (hrs)	Total Steam (hrs)
Hobart	-42.87	147.35	-	-	-	-
River Derwent	-42.91	147.29	1	1	0.5	0.5
Storm Bay	-42.9732	147.3793	5.85	6.85	1	1.5
Mapping 1 Start	-43.8293	149.335	103.37	110.22	9.4	10.9
Mapping 1 End/ Turn to S1	-43.9773	149.921	27.07	137.29	2.5	13.4
S1	-43.9531	149.938	1.65	138.94	0.15	13.55
Mapping Start 2	-43.985	149.948	1.97	140.91	0.18	13.73
Mapping 2 End	-44.0613	150.252	13.92	154.83	1.3	15.03
D1	-44.0079	150.321	4.43	159.26	0.4	15.43
CTD Cast	-44.1535S	151.2542E	40	199.26	3.5	18.93
D2	-43.9895	150.366	40	239.26	3.5	22.43
D3	-43.9566	150.407	4.66	243.92	0.4	22.83
D4	-43.9218	150.463	2.06	245.98	0.2	23.03
S2	-43.8672	150.372	1.04	247.02	0.1	23.13
D5	-43.8978	150.393	2.34	249.36	0.2	23.33
S3	-43.9138	150.442	3.08	252.44	0.3	23.63
D6	-43.8917	150.31	2.01	254.45	0.2	23.83
Hobart	-42.87	147.35	150.54	404.99	13.7	37.53

Time estimates

The following time estimates are based on a steaming speed of 11 knots.

Date	Time	Activity
17/08/16	18:00	Depart Princes Wharf for Storm Bay
17/08/16	18:30	Arrive compass calibration site
17/08/16	19:30	Arrive Storm Bay and commence calibration of EK60
18/08/16	07:00	Steam to Cascade Seamount area
19/08/16	17:00	Arrive area of operations. Commence mapping, coring and dredge operations
21/08/16	18:00	Steam for Hobart
22/08/16	08:00	Arrive Princes Wharf, Hobart

Piggy-back projects (if applicable)

N/A

Investigator equipment (MNF)

Equipment:

- Rock Dredge
- Rock saw
- Coring systems
 - Multicorer
 - Kasten corer
 - Piston corer
 - Smith-Mac grab
- Stabilised platform: Test (*no dedicated time allocation required*).
- Sonardyne USBL Beacons
- Gravity meter
- Multi-beam
- Sub bottom profiler
- 24 Bottle CTD
- Test weights
- Clear and PVC liners

Name	Essential	Desirable
Aerosol Sampling Lab		
Air Chemistry Lab		
Preservation Lab		
Constant Temperature Lab	X	
Underway Seawater Analysis Laboratory		
GP Wet Lab (dirty)	X	
GP Wet Lab (Clean)	X	
GP Dry Lab (Clean)		
Sheltered Science Area	X	
Monkey Island		
Walk in Freezer		
Clean Freezer		
Blast Freezer		
Ultra Low Temperature Freezer		
Walk in Cool Room		

User Equipment

None

Special Requests

None

Permits


No permits required for area of operations and activities.

Personnel List

	Surname name	First name	Organisation	Role
1	Buchanan	Pearse	Utas	PhD student geochemistry
2	Ding	Xuesong	Sydney	PhD Student geophysics
3	Duggan	Brian	South Carolina	Geologist
4	Farmer	Michael	Macquarie	Masters student geology
5	Fox	Jody	Utas	PhD student volcanology
6	Johnson	Sean	Utas	PhD student geology
7	Mundana	Rhiannan	Utas	PhD student volcanology
8	Perez-Tribouillier	Habacuc	Utas	Sedimentologist
9	Rhodes	Andrew	Utas	Communications
10	Sauermilch	Isabel	Utas	PhD student geophys
11	Scher	Howie	South Carolina	Geologist
12	Watson	Sally	Utas	PhD student geophys
13	West	Harry	Macquarie	PhD student geology
14	Whittaker	Joanne	Utas	Chief Scientist
15	Wild	Toban	Monash	PhD student Paleontology
16	Williams	Simon	Sydney	Alternative Chief Scientist
17	Wright	Nicky	Sydney	PhD student geophys
18	Thost	Doug	CSIRO MNF	Voyage Manager
19	McKenzie	Don	CSIRO MNF	Voyage Manager 2
20	McGuire	Max	CSIRO MNF	Ops Support
21	Lewis	Mark	CSIRO MNF	SIT
22	Fazey	Jason	CSIRO MNF	SIT
23	Muir	Brett	CSIRO MNF	SIT
24	McRobert	Ian	CSIRO MNF	SIT
25	Filisetti	Andrew	CSIRO	SIT
26	Ponsonby	Will	CSIRO MNF	SIT
27	Nau	Amy	CSIRO MNF	GSM
28	Cooke	Frances	CSIRO MNF	GSM
29	Boyd	Matt	CSIRO MNF	GSM
30	Hawkes	Ian	CSIRO MNF	DAP
31	Barker	Hugh	CSIRO MNF	DAP
32	Chui	Francis	CSIRO MNF	DAP
33	Shanks	Peter	CSIRO MNF	DAP
34	Malakoff	Karl	CSIRO MNF	DAP

	Surname name	First name	Organisation	Role
35	Groneng	Kim-Arne	Rapp Marine	Technician
36	Pedersen	Bard Morten	Nordkontakt	Technician
37	ASP	ASP	ASP	ASP
38	Opdyke	Bradley	Macquarie	Sedimentologist
39	Kimber	Matt	CSIRO MNF	support and familiarisation
40	Scanlon	Mark	CSIRO MNF	Familiarisation

Signature

Your name	Dr. Joanne Whittaker
Title	Senior Lecturer Geophysics
Signature	
Date:	11/08/2016

List of additional figures and documents

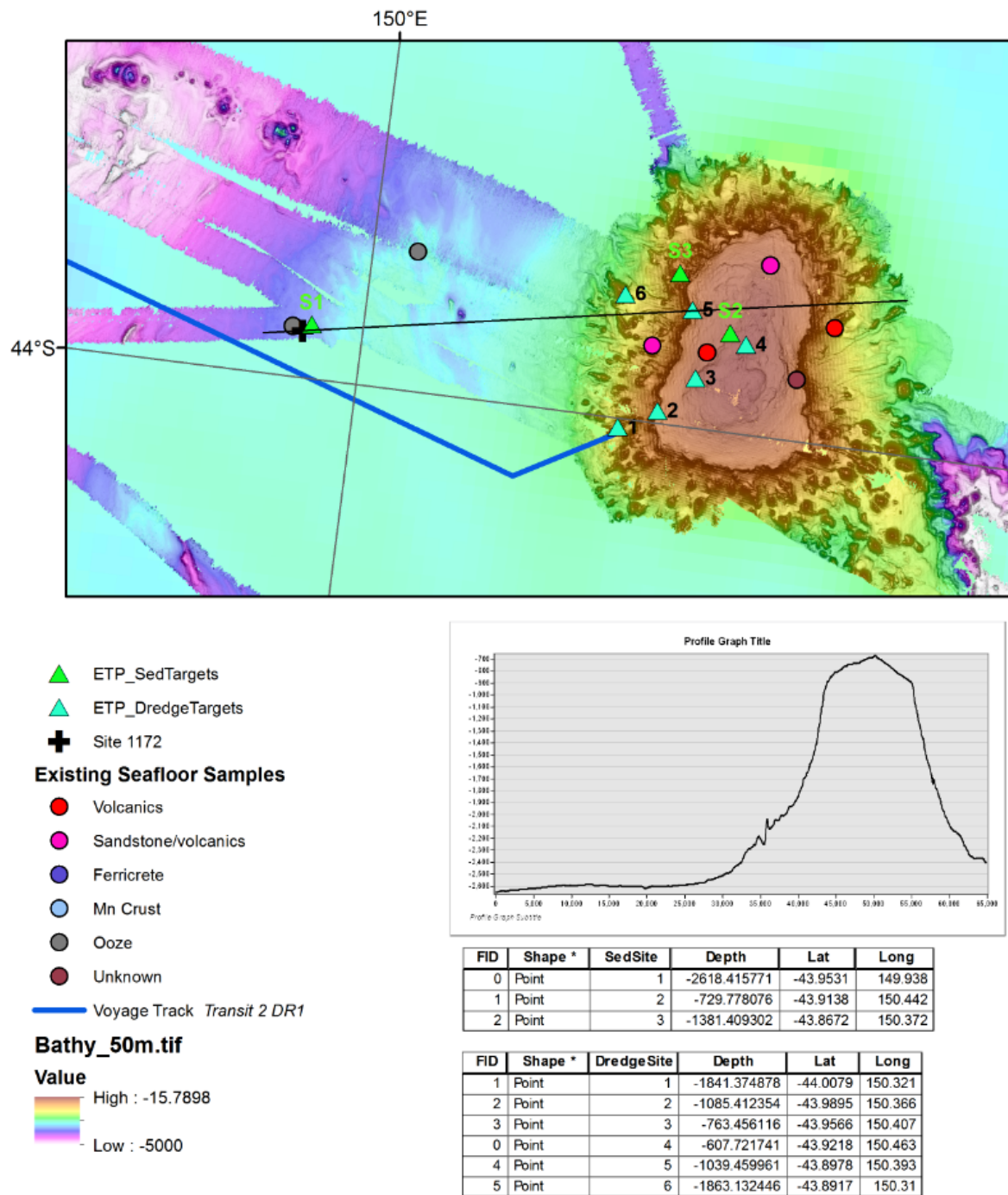


Figure 1: Sediment Coring and Dredge Target Sites

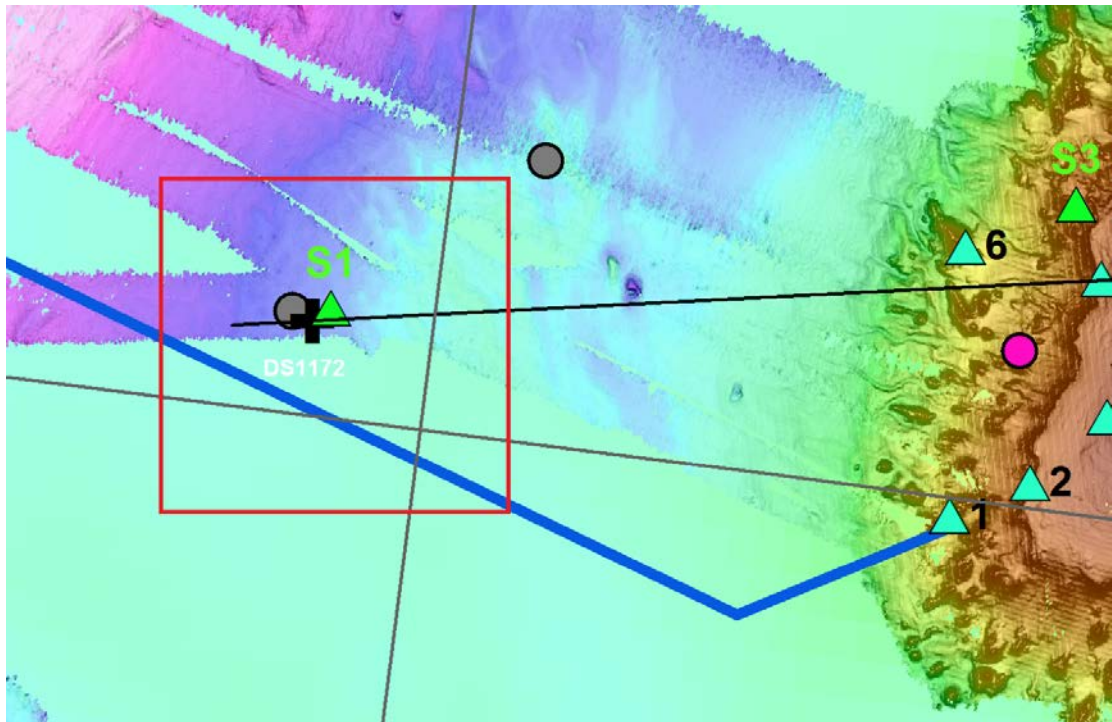


Figure 2: Drill Site 1172