

RV Investigator Scientific Highlights

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: 0800 Monday 22 August, 2016		
Demobilisation:	Monday 22 August, 2016		
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The East Tasman Plateau: Key to unravelling the onset of the Antarctic Circumpolar Current

Introduction

The opening of the Tasman Seaway 35 million years ago was critical component in the onset of the Antarctic Circumpolar Current. Today, this current helps keep Antarctica cool, but how and when it began and its role in stabilising ice sheets on Antarctica remains controversial. During this voyage we collected geological samples that will enable us to resolve how rapidly the Tasman Seaway deepened, and help to constrain the onset of the Antarctic Circumpolar Current and answer these outstanding questions around the evolution of key changes in past climatic and oceanographic conditions.

Contribution to the nation

Understanding how the Earth transitioned from a warm climate to a cool climate 35 million years ago is important for understanding how increasing CO₂ levels may effect climatic and oceanographic conditions into the future. Unravelling the role of tectonic versus CO₂ in driving change will help improve models predicting changes into the future.

As a result of this voyage

1. We have a better understanding of the evolution of the Cascade Guyot, a now submerged feature located southwest of Tasmania.
2. We have found volcanic rocks that will reveal the age of the guyot, and sedimentary rocks indicative of ancient beaches and shallow marine environments. Together these will reveal the evolution of the Cascade Guyot, which we will be able to apply to the evolution of the Tasman Seaway.
3. We have mapped the Cascade Guyot in unprecedented detail, revealing a series of likely paleo-shorelines that formed as the guyot descended beneath the waves.
4. We have commenced a program of describing, analysing and dating the geological samples to obtain our final goal of being able to describe a detailed evolution of the Cascade Guyot and then using this to understand the evolution of the Tasman Seaway via other available geological datasets.



Photo 1: Dredged rocks from the southwest flank of the Cascade Guyot. Photo credit: IMAS.



Photo 2: Sorting dredged rocks in the dirty wet lab. Photo credit: IMAS.



Photo 3: Successful deep-sea sediment sampling, with the Kasten corer. Photo credit: IMAS.

CSR/ROSCOP Parameter Codes

	METEOROLOGY
M01	Upper air observations
M02	Incident radiation
M05	Occasional standard measurements
M06	Routine standard measurements
M71	Atmospheric chemistry
M90	Other meteorological measurements

	PHYSICAL OCEANOGRAPHY
H71	Surface measurements underway (T,S)
H13	Bathythermograph
H09	Water bottle stations
H10	CTD stations
H11	Subsurface measurements underway (T,S)
H72	Thermistor chain
H16	Transparency (e.g. transmissometer)
H17	Optics (e.g. underwater light levels)
H73	Geochemical tracers (e.g. freons)
D01	Current meters
D71	Current profiler (e.g. ADCP)
D03	Currents measured from ship drift
D04	GEK
D05	Surface drifters/drifting buoys
D06	Neutrally buoyant floats

	MARINE BIOLOGY/FISHERIES
B01	Primary productivity
B02	Phytoplankton pigments (e.g. chlorophyll, fluorescence)
B71	Particulate organic matter (inc. POC, PON)
B06	Dissolved organic matter (inc. DOC)
B72	Biochemical measurements (e.g. lipids, amino acids)
B73	Sediment traps
B08	Phytoplankton
B09	Zooplankton
B03	Seston
B10	Neuston
B11	Nekton
B13	Eggs & larvae
B07	Pelagic bacteria/micro-organisms
B16	Benthic bacteria/micro-organisms
B17	Phytobenthos
B18	Zoobenthos
B25	Birds
B26	Mammals & reptiles
B14	Pelagic fish
B19	Demersal fish
B20	Molluscs
B21	Crustaceans
B28	Acoustic reflection on marine organisms

D09	Sea level (incl. Bottom pressure & inverted echosounder)
D72	Instrumented wave measurements
D90	Other physical oceanographic measurements

	CHEMICAL OCEANOGRAPHY
H21	Oxygen
H74	Carbon dioxide
H33	Other dissolved gases
H22	Phosphate
H23	Total - P
H24	Nitrate
H25	Nitrite
H75	Total - N
H76	Ammonia
H26	Silicate
H27	Alkalinity
H28	PH
H30	Trace elements
H31	Radioactivity
H32	Isotopes
H90	Other chemical oceanographic measurements

	MARINE CONTAMINANTS/POLLUTION
P01	Suspended matter
P02	Trace metals

B37	Taggings
B64	Gear research
B65	Exploratory fishing
B90	Other biological/fisheries measurements

	MARINE GEOLOGY/GEOPHYSICS
G01	Dredge
G02	Grab
G03	Core - rock
G04	Core - soft bottom
G08	Bottom photography
G71	In-situ seafloor measurement/sampling
G72	Geophysical measurements made at depth
G73	Single-beam echosounding
G74	Multi-beam echosounding
G24	Long/short range side scan sonar
G75	Single channel seismic reflection
G76	Multichannel seismic reflection
G26	Seismic refraction
G27	Gravity measurements
G28	Magnetic measurements
G90	Other geological/geophysical measurements

P03	Petroleum residues
P04	Chlorinated hydrocarbons
P05	Other dissolved substances
P12	Bottom deposits
P13	Contaminants in organisms
P90	Other contaminant measurements