





RV Southern Surveyor

### Itinerary

Depart Darwin 1600hrs, Sunday 15 July, 2007 Arrive Madang 0800hrs, Tuesday 24 July, 2007

### Principal Investigator(s)

Dr Chris Yeats - CSIRO Exploration and Mining, PO Box 1130, Bentley, WA 6102

Richard Arculus – Department of Earth and Marine Sciences, Australian National University.

### **Scientific Objectives**

Cheshire Seamount lies close to the western tip of the Woodlark oceanic spreading ridge where it is actively propagating into continental crust, a globally unusual geological setting. Previous investigations of the site recovered low to medium-K calcalkaline lavas, ranging in composition from basalt to andesite, from the lower flanks of the volcano, implying that the crestal portion may be more strongly fractionated. However an attempt to dredge it in 1988 was unsuccessful. This project aims to sample the crest of Cheshire Seamount and test the feature for hydrothermal activity. Although a stand alone proposal, the work is closely related to SS06/2007, which immediately follows the transit and is an extension of previous MNF voyages led by CSIRO-ANU, which have led to formation of an Australian-based seafloor mineral exploration industry in the southwest Pacific, improved knowledge of oreforming systems, and contributed significantly to understanding of the complex tectonic evolution and interrelationships of the southwest Pacific margin.

## **Voyage Objectives**

Utilising high resolution multibeam bathymetry and sidescan images recently collected and provided to us by Nautilus Minerals, our primary objectives in this project are:

- 1. To dredge sample the crest of Cheshire Seamount and other volcanic features of interest, with the aim of recovering fractionated volcanic rocks.
- 2. To test the volcano and these other features for hydrothermal activity, using CTD-hydrocasts, deep tow video, dredge and grab sampling.

# Voyage Track



### **Time Estimates**

The area of operations lies directly on the transit route from Darwin to Madang, so no additional time for steaming is required. There are two potential target areas for this cruise, which will be investigated sequentially by the following methods in the time available.

Target 1 – Main Cheshire Seamount Crest (~9°47'S, 151°49'E)3nM Tow-yo CTD-hydrocast operation to test for hydrothermal activity6 hoursDredge sampling of crest of volcano (~1600mbsl)2 hoursIf no evidence of hydrothermal activity is recorded in the hydrocast, notfurther operations at this Target. If evidence of hydrothermal activityis found, the following additional operations are anticipated:7 hours

Deep tow video traverse of potential hydrothermal field4 hours2x dredge operations - sampling of hydrothermal field4 hours

8 to 23 hours

#### **Total time at Target 1**

In the event that results at Target 1 are positive, it is likely that the full time available will be spent at this site.

Target 2 – Eastern Pinnacles (~9°48'S, 152°09'E)

Transit Target 1 to Target 2 (~20 Nm)	2 hours
3x single dip CTD-hydrocasts to test for hydrothermal activity	7 hours
Dredge sampling of volcanic features and hydrothermal material	available time

Note that there are up to 8 potential dredge targets (up to 16 hours of operations) in this area.

# **Piggy-back projects**

This project has similar goals and is closely tied to SS06/2007, which immediately follows this transit. However, the results of this cruise will not impact on operations during the following expedition.

# **Southern Surveyor Equipment**

Please see Attachment 4 to the Cruise Application (enclosed)

# **User Equipment**

- Plume water sampling equipment requires lab space only
- Deep tow camera system and cage deployed using stern A-frame, requires acoustic pinger and EA-500 (or equivalent setup) to allow flying 3-5m off bottom
- 2 Lister dredges (as back ups for ship's dredges) deployed using stern A-frame
- Microscope

# **Personnel List**

Role	Name, Affiliation	
MNF Electronics Support	ТВА	CMAR
MNF Computing Support	ТВА	CMAR
Swath Processing Support	Camilla Stark	CEM
Chief Scientist	Chris Yeats	CEM
Science Watch Leader	Shannon Johns	CEM
Technical Support (Student)	Katerina Dodds	UWA

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

### **Chris Yeats**

Chief Scientist