

VOYAGE PLAN SS01/2003

Title

Subduction east of Australia from 120-45 Ma: search for the missing evidence in the eastern Lord Howe Rise, New Caledonia Basin, Norfolk and Three Kings Ridge Region.

Itinerary

Depart Hobart 1000 hours, Friday, 21 Feb 2003
Arrive Auckland 1000 hours, Thursday 13 March 2003

Principal Investigator

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Scientific Objectives

Although most plate kinematic models for the W Pacific region suggest that the plate boundary between the Pacific and Australian plates was a subduction zone, probably with Pacific plate oceanic crust subducting towards the west, there is no evidence known for the volcanic arc magmatic products such subduction demands.

To attempt to solve this problem, comprising

- the nature of the plate boundary east of Australia during the Cretaceous-Palaeocene, and
- the existence, location, longevity and composition of the missing arc,

We propose dredging of the scarps (rather than the Eocene volcanic peaks) of the Norfolk and Loyalty Ridges and Three Kings Rise. The dredge sites will hopefully yield Cretaceous-Palaeocene subduction-related volcanic rocks, and perhaps even fragments of the hypothesised most easterly continental crust of Australia rifted from the eastern Lord Howe Rise in the Cretaceous.

The area in focus has been recently multibeam-surveyed during the Australia-France FAUST 2 program. The bathymetric imagery of the eastern Lord Howe Rise, Norfolk, New Caledonia Ridge and Three Kings Ridge region has allowed selection of 50 dredge sites to address the problems outlined above.

Cruise Objectives

We will address the scientific objectives by:

1. An intensive dredging program using chain bag dredges and well-identified targets based on multibeam and seismic data. We presently have 50 dredge targets defined, although it is likely that only 35-40 of these will be able to be undertaken given the time constraints.

2. Using on-board diamond saws and lapping equipment for preliminary characterisation of dredged samples, to evaluate the success of the dredging operations and guide further dredging efforts towards achieving the scientific goals.
3. To collect a small number (~5) of gravity cores to detail the subsurface character of the sediment deposits in the area, the internal character of the bed-forms and to locate materials suitable for dating.

Voyage Track

The general voyage track is indicated on Figure 1. We anticipate a 3-day transit from Hobart to the start of operations on the southern Norfolk Ridge. The voyage will focus almost entirely on dredging operations, working in a broadly clockwise sweep of dredge targets as shown on Figure 1. A more detailed map with all dredged sites shown and numbered is available. We plan to be ~ 1 days steaming from Auckland on March 11, arriving Auckland March 12.

Time Estimates

Transits

Hobart - Norfolk Ridge	3 days
Southern Three Kings Ridge to Auckland	1 day
Transits between 35 dredge sites (estimated)	6-8 days
Time on station dredging	~11 days

Dredge site depths range from 500m to 3500m, averaging ~ 2000m. A dredge at 2000m depth is estimated to take about 4 hours.

Southern Surveyor Equipment

The equipment required on this voyage is simple:

- 3-5 chain bag dredges and depressor weights to be supplied by Geoscience Australia to complement those on the Southern Surveyor as part of the National Facility.
- At least 1 diamond saw for slabbing rocks, and perhaps a smaller saw and diamond lap to enable thin sections to be prepared aboard the vessel
- A small gravity corer
- A large number (perhaps ~ 100) plastic drums for sample storage and transport post-cruise, plus ~2000 plastic bags for individual samples.

Personnel List

Professor Tony Crawford, University of Tasmania, Chief Scientist

Dr Neville Exon, Geoscience Australia, Research Scientist

Dr Sebastien Meffre, University of Tasmania, Research Scientist

Dr Rick Herzer, IGNS (NZ), Research Scientist

Dr Patrick Quilty, University of Tasmania, Research Scientist

Maria Sdrolia, University of Sydney, Research Student

Michel Allenbach, UFP Noumea, Research Scientist

TBA, Research Student

John Stratton, Geoscience Australia, Technician

Lyndon O'Grady, Geoscience Australia, Technician

Jeff Cordell, CSIRO Marine and Atmospheric Research, Voyage Manager, Electronics

Bob Beattie, CSIRO Marine and Atmospheric Research, Computing

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

Tony Crawford
Chief Scientist

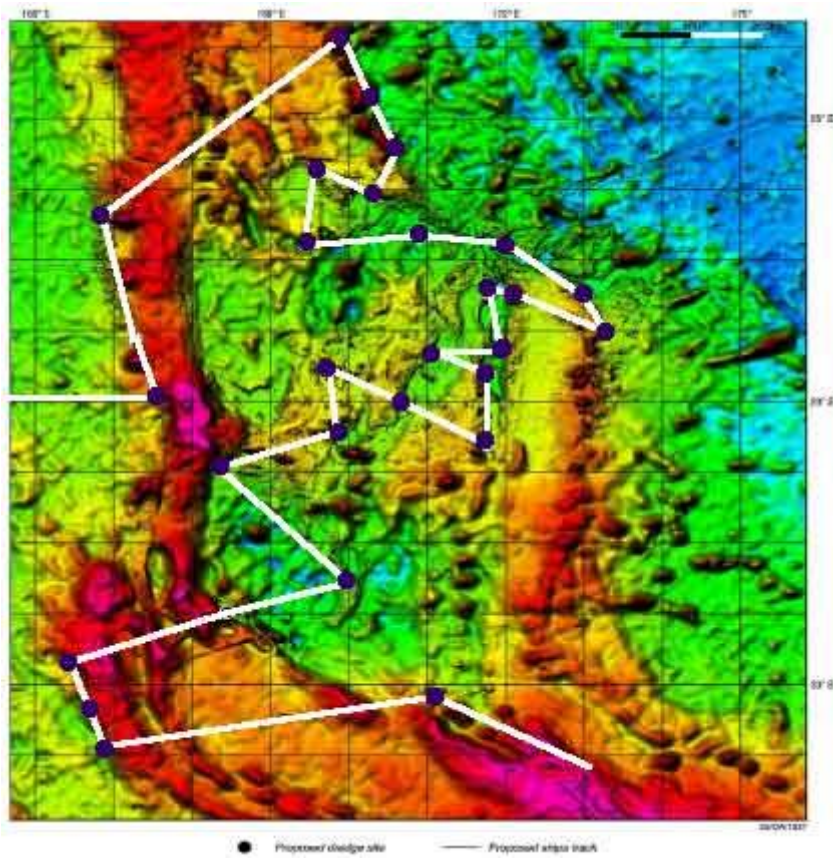


Figure 1. Proposed Voyage Track and Sampling Sites SS01/2003