National Facility Research Vessel

RV FRANKLIN

VOYAGE DOCUMENTS

RV SOUTHERN SURVEYOR

CSIRO AUSTRALIA

CSIRO MARINE AND ATMOSPHERIC RESEARCH

Voyage Plans and Summaries

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Franklin Voyage Plan No. FR04/00

Title

Investigation of Hydrothermally Active Submarine Island Arc Volcanoes in the Tabar-Lihir-Tanga-Feni Island and Solomon Island Chains

Itinerary

Depart Rabaul 0800 hrs, Friday 5 May, 2000
Arrive Darwin 1600 hrs, Wednesday 24 May, 2000

Principal Investigator(s)

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Scientific Objectives

The Franklin 04/00 research team will conduct a multi-disciplinary investigation of submarine volcanic-hydrothermal systems in island arc regions of Papua New Guinea and the Solomon Islands. The team will carry out 3 primary scientific activities:

1. Volcanology/Petrology (Team Leader: Arculus)
2. Hydrothermal Deposits/Geochemistry (Team Leader: McInnes)
3. Marine Chemistry/Hydrothermal Fluids (Team Leader: Massoth)

Although volcanism and associated hydrothermal activity on mid-ocean ridges (MOR) and some back-arc basins have been the focus of many detailed studies over the past decade, only a few submarine arcs and fore-arc regions have received much attention. Our investigations of the New Ireland-Solomon Islands convergent margin will strive to generate a better understanding of the styles and processes of hydrothermal mineralization at submarine arc volcanoes, and compare and contrast these with hydrothermal activity occurring at divergent plate boundary volcanism.

Cruise Objectives

The research team will attempt to satisfy the scientific objectives during the Franklin 04/00 cruise by conducting water-column sampling and dredging programs at submarine island arc volcanos in the Tabar-Lihir-Tanga-Feni and the Solomon Island chains. Camera tow surveys will be conducted on an opportunity basis using equipment provided by the Dekker/Binns cruise 03/00.

Specific sampling targets include active hydrothermal vent sites on submarine cinder cones off the southern coast of Lihir Island, mineral deposits and associated rocks shed off caldera-collapse structures on eastern Lihir Island, several fore-arc submarine volcanoes adjacent to the Kilinailau trench, and four fore-arc and triple-junction related submarine volcanoes located in the New Georgia Group of the Solomon Islands.

We plan a total of about 40 stations to be equitably distributed between the 3 key science activities: 16 in the Solomons region, and 24 in the New Ireland-TLTF region.

We will rely on the accurate SONNE HYDROSWEEP maps for the TLTF portion of the cruise and bathymetric maps of the Solomon fore-arc that are available from the University of Hawaii and MMAJ/SOPAC.

Cruise Track

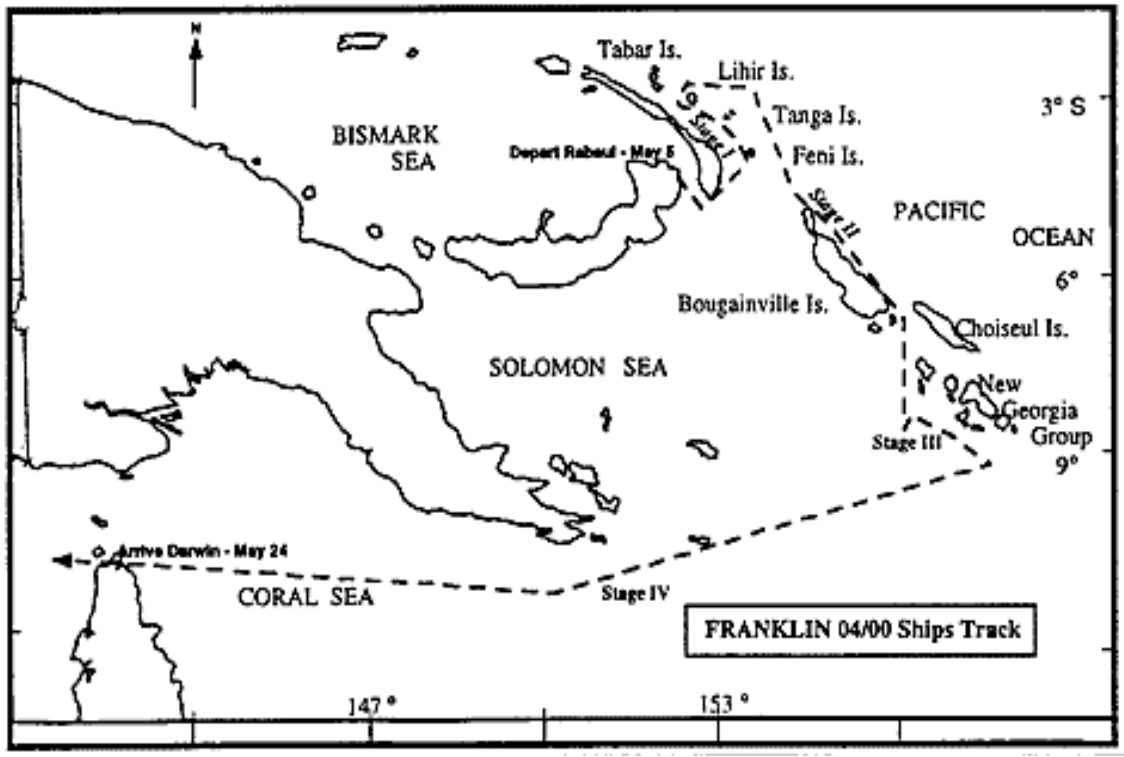

Figure 1

The cruise track begins in the port of Rabaul and ends at the port of Darwin. The cruise will have 4 stages, with two stages dedicated to research and two stages dominated by transit. We plan to start our research in the Tabar-Lihir-Tanga-Feni island arc, a 0.5 day transit from the port of Rabaul. Stage I will involve 24 sampling stations in the TLTF arc region spanning a time period of 7 days. Stage II will involve a 1.5-2 day transit to the Solomon Islands research sites. Stage III will involve 16 sampling stations spanning a time period of 4.5 days. Stage IV is the final transit to port of Darwin. It will take 2 days to transit from the final station at Kavachi volcano in the Solomon Islands across the Solomon Sea to the Louisiade Archipelago, and an additional 4 days to transit from the Louisiade Archipelago (eastern tip of PNG) across the top of Australia to the port of egress in Darwin.

Time Estimates

Stage I: TLTF region (Total of 7 days and 24 stations)

Transit: Rabaul port to Feni Island?(12 hours)

Stations 1-2: Feni Island Volcano flank (9 hours)

Transit: Feni Island to Tanga Island (4 hours)

Stations 3-4: Tanga Island Volcano flank (9 hours)

Transit: Tanga Island to Lihir Island (4 hours)

Stations 5-8: Conical Seamount (18 hours)

Stations 9-14: Edison Seamount (27 hours)

Stations 15-18: Tubaf Seamount (18 hours)

Stations 19-20: New World Seamount (9 hours)

Transit: Lihir Island to Kilinailau Seamounts (6 hours)

Stations 21-24: Unnamed Kilinailau Seamounts (18 hours)

Assumptions: station transect time = 36 hours; average station time = 4.5 hours

Stage II: TLTF region to Solomon Islands Transit (Total of 1.5-2 days)

Stage III: Solomon Islands region (Total of 4.5 days and 16 stations)

Stations 25-28: Simbo Ridge/Ghizo (18 hours)

Stations 29-32: Coleman Seamount (18 hours)

Stations 33-34: Rendova Island S. Scarp (9 hours)

Stations 35-37: Kana Keoki Seamount (13.5 hours)

Stations 38-40: Kavachi Volcano flank (13.5 hours)

Assumptions: station transect time = 36 hours; average station time = 4.5 hours

Stage IV: Solomon Islands to Darwin Transit (6 days)

TOTAL DAYS (STAGES I, II, III and IV) = 20

Franklin Equipment

- All winches
- deck crane
- laboratories
- deck machinery
- differential GPS
- echosounder
- CTD-profiler with altimeter and light transmissometer

- Niskins
- computers
- pinger and broad beam receiver
- rosette samplers and water bottles (12 or 24 pos.)
- Milli-Q water purification system
- submersible data logger
- Smith-McIntyre grab
- clean air cabinet (class 100 vertical flow).

User Equipment

Dr. Ray Binns (CEM) has offered the use of dredges, small sediment corer and camera equipment on a replace-if-lost basis. This equipment will be left on board Franklin following the Dekker/Binns cruise 03/00.

Other sundry equipment to be brought on board by CEM and ANU include:

- electrical rock saw
- chemicals and preservative agents
- binocular microscope
- Macintosh laptop computers (2-4)
- sample sealing/packaging equipment
- sample storage/shipping containers

Equipment to be brought on board by GNS includes:

- Plume-water sub-sample reservoirs (<400 0.25L plastic bottles in 4 plastic chests)
- Misc. sample processing items (pipettes, filtration manifold, filters, etc.) in small trunk
- Cold-weld system for helium sub-sampling (hydraulic crimper, 100 psi. air req'd, 37 kg)
- Cu tubing, ca. 10 rolls, 50-ft. each
- Glass-stoppered bottles for methane plus preservative (~200, 500-mL)
- Bench-top pH meter/electrode plus 50-mL sample bottles
- Bench-top flow-injection-analysis system (for determination of H_2S, one large trunk)
- Carboy for Milli-Q water
- MAPR (temp./press./optical profiler from NOAA)
- Lap-top computers (Macintosh, 3)
- Chemicals (hazardous chemicals to be pre-shipped directly to Rabaul or Port Townsend)
- Ultra-clean 6N HCl, 1 L)
- Reagents for H_2S determinations (12N HCl, 1L, + colorimetric reagents)
- pH buffers

Personnel List

Ron Plaschke, CMR, Cruise Manager, General Support
Brent McInnes, CEM, Chief Scientist, HDG Leader
Richard Arculus, ANU, VP Leader
Gary Massoth, GNS, MC-HF Leader
Cornel de Ronde, GNS, MC-HF team
Des Patterson, CEM, HDG team
Perfit graduate student, U. Florida, VP team
CEM, HDG team
A. Qopoto (SI citizen), ANU, VP team
Ed Baker, NOAA, MC-HF team
Daniel Conwell, CMR, Electronics
Pamela Brodie, CMR, Computing

This cruise plan is in accordance with the directions of the National Facility Steering Committee for the Research Vessel Franklin.

John Wallace
Ships Manager

Updated: 31/01/03