

SOPAC Miscellaneous Report 94

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**SOPAC WORKSHOP ON DEEP-SEA RESEARCH
AND MINERAL EXPWRATION ONBOARD RV SONNE
AND IN NUKU'ALOFA, TONGA
18-31 March 1990**

- Workshop Report -

by

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INTRODUCTION

The SOP AC workshop on Deep-sea Research and Mineral Exploration was held onboard the RV *Sonne* from 18-28th March and at the conference room of the Ramanlal Hotel in Nuku'alofa, Tonga from 28-31st March 1990. The workshop, organised as part of SOPAC's human resources development and training programme, was sponsored by the Government of the Federal Republic of West Germany, Kingdom of Tonga, UNDP, EC and the Canadian Government.

Although hampered by very rough sea conditions due to Cyclone Rae, the onboard experience gained by the trainees was greatly appreciated. The objective of the cruise was to enable island member country nationals to become acquainted with techniques and equipment used in deep-sea research and mineral exploration and in particular, equipment used on the RV *Sonne* which included; Seabeam, 3.5 kHz sub-bottom profiler, Elac echo sounder, deep-towed side-scan sonar, TV hydraulic grabs, multisonde, dredges and a piston corer. It gave the trainees hands on experience with the equipment rather than being observers to the operations. This experience is what made the onboard portion of the workshop most successful.

The scientific aspects covered ocean floor geology, geochemistry, ocean floor sedimentation and geophysical properties. Profiling was done to determine the southern extension of the Northern Lau Spreading Ridge (NLSR) and the northern extension of the Eastern Lau Spreading Ridge (ELSR) and to examine the structures of the NLSR and ELSR. Investigations for hydrothermal mineralisation were also carried out.

The RV *Sonne* sailed from Suva at 1630 on Sunday 18 March to the Northern Lau Basin with eight participants and Phillip Woodward, Techsec's Chief Draftsman acting as co-ordinator. The instructors on board the RV *Sonne* were Dr Ulrich von Stackelberg, Dr Helmut Beiersdorf, Dr Herrud Kudrass and Dr Michael Wiedicke. During the workshop Dr Beiersdorf and Dr von Stackelberg presented lectures.

FUNDING

The workshop was funded by the Government of the Federal Republic of West Germany (all vessel and scientists costs), Kingdom of Tonga (in kind support), UNDP (SOPAC Training Coordinator workshop organisation), EC (travel costs for all participants, except for the Cook Islands) and the Canadian Government (travel for Cook Islands participant).

PARTICIPANTS

There were eight participants onboard the RV *Sonne* and nine participants at the Nuku'alofa workshop; they were from eight countries in the region: Fiji (2), Tuvalu, Cook Islands, Tonga, Papua New Guinea, Vanuatu, Western Samoa and Solomon Islands.

The participants were as follows:-

Niko Naibitakele	Fiji	SOPAC, Draftsman Private Mail Bag Suva
Fiu Manueli	Fiji	Institute of Marine Resources USP Suva
Niko Apinelu	Tuvalu	Ministry of Natural Resources Funafuti
Aturangi Hosking	Cook Islands	Survey Department PO Box 114 Rarotonga
Sione Soakai	Tonga	Ministry of Lands, Survey & Natural Resources PO Box 5 Nuku'alofa
Gwaibo Kopi	Papua New Guinea	Department of Mineral Resources Geology & Survey Division PO Box 778 Port Moresby

Stanley Temakon	Vanuatu	Department of Geology, Mines & Rural Water Supply Private Mail Bag 001 Port Vila
Don Tolia	Solomon Islands	Ministry of Natural Resources Geological Survey Division PO Box G24 Honiara
Maselino Mataafa	Western Samoa	Apia Observatory PO Box 3020 Mulinu'u Apia

Unfortunately Maselino Mataafa from Western Samoa was not able to arrive in Suva in time to join the RV *Sonne* but joined us in Nuku'alofa for the workshop then joined the ship for the next leg.

CONTENT OF THE WORKSHOP

The ship board daily schedule is given in Appendix 1. The trainees were divided into three watches, 2000-0400, Dr Michael Weidicke (Manueli, Naibitakele) 0400-1200, Dr Herrud Kudrass (Soakai, Hosking, Apinelu) and 1200-2000, Dr Helmut Beiersdorf (Tolia, Temakon, Kopi).

The workshop in Nuku'alofa was opened by Mr Sione Tongilava, see Appendix 2 for his opening remarks, and the workshop timetable is given in Appendix 3. The timing for the normal daily programme between breaks was 0830-1000, 1030-1200, 1330-1500 and 1530-1700.

ACKNOWLEDGEMENTS

Special thanks must be extended to Dr Ulrich von Stackelberg, Dr Helmut Beiersdorf, Dr Herrud Kudrass, Dr Michael Wiedicke, Captain Martin Kull and all the crew for their efforts onboard.

Many people provided invaluable assistance which contributed to the success of the workshop

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held in Nuku'alofa, especially Saimone HeIu, Robert Gatliff, Lindsay Furness and Soane Ramanlal and the staff of that Hotel.

Thanks are also extended to Mr Sione Tongilava and the Tongan Government for hosting the cocktail party at the Dateline Hotel on Wednesday evening.

[MR94 - Woodward]

APPENDIX 1

Ship board

Schedule Sunday 18/3/90

Meet Ulrich, Helmut and Herrud at RV *Sonne*, Suva Wharf at 0930 for a pre embarkment meeting. Trainees arrive at 1030. Maselino Mataafa from Western Samoa had not arrived in Fiji.

RV *Sonne* sailed at 1630. The ship sailed into rough seas and strong winds.

The first team meeting was held at 1900 in the mess with Captain Kull. He explained some general do's and do not's, general ship safety and ship operation.

Monday 19/3/90. Seas rough. 6 knots maximum speed. Rain squalls.

At 0845 we met again in the geological laboratory where the Chief Mate, Juergen Reimenschneider, talked on ship procedure in emergencies, demonstrated the life jackets and assembly points. A video was then shown on abandoning ship and life raft use.

The trainees then split into their shifts (see Shifts, Appendix 1) and proceeded on a tour of the ship with the appropriate shift leaders.

At 1530 the first scientific meeting was held in the Chief scientists cabin where Ulrich talked on the objectives of this cruise and previous work in the Lau Basin. It was hoped that Seabeam would begin at 2000 but we were fooled by the calmer seas as we had passed through the Lau Group. Participants advised it would be another 12+ hours before reaching the first sample sight. The bad weather continued.

Tuesday 20/3/90. Seas a little calmer early morning.

The first station was a piston core, 15 m of core was retrieved, capped and moved into the geology lab. The procedure for annotation, cutting and visual analysis was demonstrated. The trainees will do one each. The chain bag dredge was lowered into 2,200 m of water. Retrieved with numerous samples of recent volcanic activity. The third station was a multiprobe, mainly to check parameters for Seabeam. The ship then sailed to the next piston core position, arriving around 2200. Watches began at 2000 that evening. The seas were still quite rough.

The piston core was not successful as the liner had cracked. The ship continued with profiles, Seabeam and the 3.5 kHz sub-bottom profiler and Elac echo sounder. Watches were performed.

Wednesday 21/3/90. Seas still rough. Overcast. Speed 6 knots.

Continued profiles throughout the day watches. At 1900 Ulrich talked and showed a video of the May 1989 NAUTILE survey in the Lau Basin. Profiling continued.

Thursday 22/3/90. Morning rain, overcast, seas the same.

Continued profiles, finished the last line in the evening. Side-scan sonar over the NLSR to follow. The trainees were doing simulated exercises of contouring, determining sediment thickness from records etc. between and on watches whilst it was quiet.

Friday 23/3/90. Still a large swell. RIA.

The deep-towed side-scan sonar continued over the NLSR. There was 5,280 metres of cable out and the ships speed was down to 2 knots. As the trainees had copious exercises their time on watch was not wasted. This was a real training cruise. Sea conditions now a sea state 2, the side-scan sonar has been raised and the ship headed NE away from the bad weather associated with Cyclone Rae.

Saturday 24/3/90. Huge seas and strong winds. RIA.

After a rough night, no watches as nothing was working due to the sea conditions the ship headed in a westerly direction into the wind at 1 knot away from the cyclone heading east. The slowness was only to keep tension on the winch which was attached to the side-scan sonar that was still deployed (it could not be retrieved due to rough seas). At 0900 we met in the geological laboratory and Helmut, Ulrich and Michael talked about Seabeam maps, water analysis results from the multiprobe, the *Sonne's* present equipment compared to when it was a fishing boat, the side-scan sonar records collected the day before and the navigation equipment now used.

The crew think the Training cruise is more related to seamanship (hanging on) than Science! As this weather continues I had to agree.

Sunday 25/3/90. Still huge swells. No rain. Less wind.

Disaster! With less wind the deep-towed side-scan sonar was retrieved at 0600 this morning, all that arrived on deck was the depressor (with a smashed fibreglass nose) and a tangle of ropes. The sidescan sonar and float had disappeared. 200,000 marks value. As the seas were still too rough for work we were divided into one hour lookout watches stationed on the deck above the bridge. The object of the lookout was the bright yellow side-scan sonar and float. The scientists were hopeful but not optimistic of spotting the equipment.

The sun went down with no sight of the equipment.

The first piston core was retrieved at 2330, two more plus two chain bag dredges followed.

Monday 26/3/90. Sun Rolling seas.

The first dredge along the southern part of the NLSR brought back very few samples. The second piston core was lowered into 2,200 metres, a one and a half hours trip, down and back. During the afternoon, piston core number 3 was deployed. It was also successful. The Captain had ruled out the deployment of the ocean floor observation sledge due to the sea state, instead the TV grab was used. TV from 2,500 metres was displayed on three monitors in the geological laboratory. A sample was collected. The next station was a chain bag dredge.

Tuesday 27/3/90. Sunny. Rolling seas.

The Captain advised us we were headed for Tonga at 4 knots as the ship was down to 2 engines. Seabeam and other recorders were still operating so some watches were continuing. That evening we all joined the Captain for a few drinks and a brief discussion on the cruise.

Wednesday 28/3/90. Sunny. Rolling seas.

A 0900 meeting in the Chief Scientist's room for a scientific discussion. New ETA Tonga 1400. *Sonne* arrived in Nuku'alofa at 1430 where we all disembarked and moved into the Ramanlal Hotel.

Shifts

2000-0400	0400-1200	1200-2000
MICHAEL WIEDICKE Niko Naibitakele Fiu Manueli	HERRUD KUDRASS Niko Apinelu Atu Hosking Sione Soakai	HELMUT BEIRSDORF Stanley Temakon Don Tolia Gwaibo Kopi

APPENDIX 2

Opening remarks by the Tongan National Representative to SOPAC Mr Sione Tongilava

On behalf of the Tongan Government welcome to the participants from Cook Islands, Solomon Islands, Vanuatu, Fiji, Papua New Guinea, Tuvalu, the Australian from SOPAC and not forgetting Western Samoa. Welcome to Dr Beiersdorf and Dr von Stackelberg.

I have had a long association with SOPAC, eighteen years, and seen new faces at workshops. I hope you people stay and use the knowledge you have gained.

SOPAC is associated with the highest technology in the world as seen by the presence of these gentlemen from BGR here today.

The government of the Federal Republic of West Germany has funded a number of RV *Sonne* cruises in Tongan waters which is greatly appreciated. And now we see the end of a ten-day cruise.

What are the benefits of this workshop? We have none of the sophisticated scientific equipment in the Pacific as is on the R V *Sonne*.

In the early days of SOPAC, under Cruz Matos, investigation of mineral potential was two tiered, deep-sea and nearshore. Nearshore is easy, we can carry out investigation and make inventories of our own islands. Deep-sea is much more difficult, keep learning, don't rest on your laurels, we must all still learn the basics. Our small countries need the support like we are receiving from the Federal Republic of Germany and the RV *Sonne* cruises.

We are very grateful to supporting governments, especially the FRG. The two professors are recognised world wide and highly regarded. Thanks must go to the Federal Institute for Geosciences and Natural Resources.

I think the Lau Basin should be renamed the Tongan Lau Basin on geological rather than political boundaries.

I will be in Tarawa at the SOPAC annual session but not as the Tongan representative but as an advisor to SOPAC.

Without further ado, I declare this workshop open and hope it is successful.

Reply by Phillip Woodward

On behalf of the Director, Mr Jioji Kotobalavu, the Training Co-ordinator, Dr Russell Howorth of the South Pacific Applied Geoscience Commission (SOP AC) Technical Secretariat, the participants, Dr Helmut Beiersdorf and Dr Ulrich von Stackelberg, I would like to thank you for your words and for opening this portion of the Deep-sea research and Mineral Exploration workshop.

We thank the Tongan Government for hosting this two and one half day workshop in Nuku'alofa.

We are also looking forward to Dr Beiersdorf and Dr von Stackelberg's presentation during this workshop to complete the very successful cruise on the RV *Sonne*.

Closing of the workshop remarks by Phillip Woodward.

Dr Beiersdorf, speaking for all the participants we would like to thank you, firstly for the shipboard experience on the R V *Sonne* and for this short workshop.

Although we were inexperienced sailors and had Cyclone Rae to contend with we feel we have all gained vast knowledge of how deep-sea research and mineral exploration is carried out.

The RV *Sonne* is a very sophisticated ship, equipment wise as well as being a marvellous research vessel, and the opportunity for us to be on board with yourself, Ulrich, Herrod, Michael and all the crew was greatly appreciated. To our sponsors the Government of the Federal Republic of West Germany and Bundesanstalt fur Geowissenschaften und Rohstoffe please express our sincere thank yous.

To the workshop that we are now closing, thank you for your guidance producing the reports and for your time with us here. We hope you now have some time to relax in Tonga before returning to Germany.

Again, thank you sincerely from Tonga, Fiji, Western Samoa, Vanuatu, Papua New Guinea, Solomon Islands, Tuvalu and the Cook Islands and we hope we will all meet again in the future.

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APPENDIX 3

Workshop Timetable

Wednesday 28/3/90

1700 Cocktail Party hosted by Mr Sione Tongilava and the Tongan Government at the Dateline Hotel.

Thursday 29/3/90

0900 An address by Mr Sione Tongilava to open the workshop. 1000
Morning tea
1030 Dr Beiersdorf reassessed the cruise and gave an outline for the report to be written.
1200 Lunch
1330 Students begin report
1500 Afternoon tea.
1530 Dr Ulrich von Stackelberg presented a talk on Hydrothermal deposits worldwide, with slides and OHP.
1715 Close.

Friday 30/3/90

0830 Dr Beiersdorf reassessed the ship board functions and talked on geology. 1000
Morning tea.
1030 Students continue report writing.
1200 Lunch.
1330 Report writing and assessment by Dr Beiersdorf.
1500 Afternoon tea.
1530 Report assessment, mineral exploration.
1615 Close

Saturday 31/3/90

0830 The mineral resources of the sea.
1000 Morning tea.
1030 Finalising reports to be handed to Dr Beiersdorf.
1200 Closure of workshop.