

**SCIENCE, TECTONICS, AND  
RESOURCES (STAR)  
1991**

# SCIENCE, TECTONICS, AND RESOURCES (STAR) 20-22 September 1991

## SUMMARY REPORT

### 1. Opening of the Session

(a) The Chairman, Dr Charles Helsley, called the meeting to order at 5.30 pm on Friday, 20 September, 1991 in the conference room of the USP Centre, Vila, Vanuatu. He welcomed delegates and observers from member countries and introduced Dr Cedric Mortimer, Director, Vanuatu Department of Geology, Mines, and Rural Water Supply. Dr Mortimer welcomed delegates and observers to Vanuatu.

(b) Referring to the draft agenda, several changes were noted and the agenda revised accordingly. The following revised agenda was then adopted.

#### AGENDA

(Friday, 1700 - 2000)

1. Opening of the Session
  - a) Opening remarks - welcome
  - b) Adoption of the Agenda
  - c) Election of Chairman, Vice Chairman and Rapporteur
  - d) Announcements

2. Study Groups
  - a) Summary of STAR activities
  - b) Introduction to Review of Progress on Recommendations from 4th International Workshop
  - c) Reports from Study Groups
    - Coastal and Nearshore Processes and Resources
    - Information Exchange
    - Island/Lagoon Drilling
    - Ocean Drilling
    - Remote Sensing
    - Submersibles and ROV's
    - Tectonics
    - Age Dating
    - Ocean Basin Mineral Resources and Technology

3. Future Course of STAR
  - a) Functions of STAR
  - b) Next meeting

(Saturday 0830 - 1800)

4. Scientific Programme
  - a) ODP Drilling:
    - Introduction to ODP Programme - Heinrichs
    - ODP Leg 134: Vanuatu - Greene
    - ODP Leg 135: Lau Basin - Hawkins
    - ODP Leg 130: Ontong Java Plateau - Kroenke
    - Future Plans for ODP - Heinrichs
  - b) Regional Studies
    - "Volcanism in the equatorial Pacific" - Keating
  - c) Deepsea Minerals
    - "Polymetallic massive sulfide deposits from the Western Pacific Arc and backarc" - Rao
    - "Tectonics and Hydrothermal Observations of the Manus Basin from recent US-German-Japanese Investigations" - Taylor

"Seafloor Observations in Manus Basin from the Moana Wave and MIR submersible" - Sinton

- d) Other Ongoing Geological/Geophysical Work in the SOPAC Region

"Acoustic Facies/Structural Map of eastern Manus Basin, PNG and its Interpretation" - Crook

"Results of Seabed Mapping in northern Vanuatu - NW Fiji Basin" - Johnson

"PACRIM Optical Fibre Submarine Cable System Route Survey Data" - Hussong (Abstract only)

5. Plans for future Cruises in SOPAC area
6. Review Status of Recommendations from 4th International Workshop
7. Meeting of Study Groups
8. Closing of the Session
  - a) Adoption of Report
  - b) Date and Venue for next meeting

(c) Nominations were opened for Chairman of the next meeting. Keith Crook was nominated by Don Tiffin, seconded by Gary Greene. No further nominations being made, Brian Taylor moved that nominations be closed. Dr Crook was elected Chairman by acclamation, to take office at the end of this meeting.

The Vice Chairman Mr Ron Richmond indicated that since he had been Vice Chairman since the inception of STAR, it was not his wish to remain in the position, but in view of the election of a new Chairman, he would be willing to provide continuity by remaining in office for one more year. Since no other nominations were made from the floor, Mr Richmond was re-elected.

Don Tiffin volunteered to serve as rapporteur for the meeting.

(d) There were no announcements.

### 2. Study Groups

#### (a) Summary of STAR Activities

The Chairman summarised the activities of STAR since the last formal meeting in Suva in 1988, and

noted the addition of two new members to SOPAC: Federated States of Micronesia and Republic of the Marshall Islands. Both of these states have very large Exclusive Economic Zones and the science of these areas will need to be incorporated into the work of STAR. He also noted the need for representatives of all SOPAC member countries to be present at STAR, as one of the purposes of STAR is to enable scientists to inform the countries of work in progress in the region, and its results. One major programme in the region was now essentially completed and another was nearing completion. These are the Tripartite programme and the Ocean Drilling Program, and considerable new information was now ready to be presented and would be considered in the scientific papers to be presented during the meeting.

*(b) Review of Progress on 4th International Workshop Recommendations*

Keith Crook was called upon to lead the discussion and to explain the Review of Progress form passed out at the meeting. He stated that nearshore work was increasing to such an extent in the member countries that there was a possibility that it was overshadowing other work of importance. Thus there was a need to bring the recommendations to the forefront again lest they be forgotten. He asked those present to complete the form as best they could and to return it to him the next day so that he could compile the results for general discussion later in the session.

*(c) Reports of Study Groups*

The chairman noted that the study groups had not formally met for several years and that the group leaders of several of the groups were no longer active in the region. He therefore asked all present to consider suggesting names of appropriate individuals who could serve as leaders.

He stressed that in order to maintain continuity of interest and retain experience in the region, study group leaders with long-term interest in the region, who regularly attend STAR meetings, and who act as focal points for discussion should be selected. He then asked for reports from the study groups via either the leader or a knowledgeable member at the meeting.

*(i) Coastal/Nearshore Processes and Resources* - In the absence of its leader, Alf Simpson reported that considerable emphasis and need

was placed on this topic by the member countries and that additional information was needed particularly in the area of marine sand and gravel resources. He also reported that a workshop on aggregates for concrete would take place later this year.

*(ii) Information Exchange* - Yann Morel reported substantial progress had been made in obtaining data soon after completion of cruises but that there was still an urgent need for a better response from some cruises. He reported that assembly of old data sets as well as unprocessed new data required more resources than were now available at SOPAC, and noted that the substantial volume of data being provided to Techsec from various sources required considerable effort to put into compatible formats. He urged scientists to submit their data in a clean and near final form using NGDC format whenever possible. He also indicated the need for well documented cruise reports that listed where and when various types of data were obtained during cruises. This information would be keyed into the database for selective retrieval of data.

Jacques Daniel tabled three volumes of the final report of the *Jean Charcot* world cruises which include Seabeam data and a summary of scientific results. Keith Crook noted that extensive reports of recent MIR dives were available in the Russian language from principal investigators in the USSR, Australia, Hawaii and Canada. Copies have been provided to PNG and Tonga. An English version should be available in one or two years as a special issue of "Marine Geology". Gary Greene pointed out that the SOPAC regional bibliography last printed in 1985 needs to be updated with the considerable new citations now in the grey literature. It was noted that a summary of cruises within the SOPAC region would be useful to scientists planning future cruises in the area.

*(iii) Island/Lagoon Drilling* - The Chairman noted that the group leader was not present nor were any members of the working group. Brian Taylor reported that an upcoming ODP drilling leg would attempt to drill in a shallow lagoon environment in Eniwetok, Marshall Islands, and that this may be a stimulus to future activity in the region.

*(iv) Ocean Drilling* - The meeting noted that the Ocean Drilling study group had been disbanded but this may have been premature as the drillship will be in the Atlantic for 1993 to 1995, but plans for the later 1990s are still open. These plans include a global agenda of topics of high priority for research that requires a long lead time. SOPAC

regional needs will probably be best met by continual encouragement of programmes of high scientific merit within the region.

(v) *Remote Sensing* - No report made

(vi) *Submersibles and ROVs* - Although the leader was absent, the meeting noted that considerable submersible activity had taken place in the region as a result of the Submersible Workshop held in Suva in 1985 and the efforts of scientists interested in marine resources in the Southwest Pacific. This activity includes dives of the *Nautilus* in Lau and North Fiji Basins, the Soviet MIR submersibles in Lau, Woodlark and Manus Basins, and the Japanese Shinkai 6500 dives currently underway in North Fiji Basin.

Jacques Daniel informed the meeting of future dives planned in December, 1991 - January, 1992 using the French submersible *Cyana* in the Jean Charcot Troughs of northern Vanuatu and the Hazel Holme Fracture Zone. Keith Crook indicated that the Soviets hoped to bring their MIR submersibles to the region again and Brian Taylor noted that there were other plans by Japanese scientists to dive again in the region. The Chairman suggested that a summary of short and long term plans for submersible activities be prepared by the study group for the next meeting.

(vii) *Tectonics* - The leader of the group, Loren Kroenke, noted that there had been considerable activity in the region since the last meeting, noting in particular the PACRIM swath mapping surveys conducted by SSI for OTC cable routes (the data for which was to be presented to SOPAC), the ODP legs and their site surveys. The value of swath mapping in determining structural fabric of the ocean floor was highlighted and the group suggested that additional swath mapping surveys should be encouraged by agencies interested in the region. Many small areas have now been mapped in detail by swath mapping technology, but additional work is needed in order to completely elucidate the tectonic and structural relationships in some areas. These areas should receive a high priority for future work.

(viii) *Age Dating* - The Chairman noted the group had been disbanded but there was now a substantial new body of age dating information in the region. He asked the meeting to consider if there was a need for the group to be reactivated. The consensus was that there is a need to update the data base but that this primarily requires identify-

ing an individual to take on the task of compiling the new data, rather than reactivating the study group.

(ix) *Ocean Basin Mineral Resources & Technology* - No report given.

### 3. Future Course of STAR

The initial suggestion to form the STAR group was at the meeting of CCOP/SOPAC in Vila ten years ago and since then the focus of STAR and its parent organisations has continued to evolve. The meeting reaffirmed the desirability of retaining STAR in essentially its present form. Considerable thought was given to the usefulness of the standing study groups, as well as to possible content, venue and format of future meetings. The alternatives of having an alternate year format or a yearly format were considered. The general consensus was that the STAR meeting should be a full two day meeting immediately preceding the SOPAC Annual Session. This consensus is formally expressed in recommendations given at the end of this report.

The meeting noted that focusing part of the scientific programme on ODP had been successful and requested the Chairman to look into inclusion of similar special topics at future meetings, with the invitation of two or three experts. Possible topics are volcanic hazards, or reaction of atolls to sea level changes and changing storm patterns.

The meeting noted that there are now a number of young trained geoscientists from, and working in, the Pacific Island countries, who would benefit from attending STAR. The meeting requested the Chairman to seek funds to support between 3 and 10 young scientists for subsequent meetings.

The meeting looked forward to the continued involvement of the Intergovernmental Oceanographic Commission in the group and suggested that they, and UNESCO, be approached for funding required to carry out the two previous paragraphs.

The meeting took the view that as its sessions were held in conjunction with SOPAC Annual Sessions, SOPAC Techsec should continue to provide logistic support for STAR (meeting room, refreshments, secretarial services, etc).

#### 4. Scientific Programme

The scientific programme for the STAR meeting was held on Saturday, 21 September. The focus of the morning session was on results of the three recent Ocean Drilling Program (ODP) legs in the region. Don Heinrichs of the US National Science Foundation opened the session with a brief summary of the ODP and its global objectives. This was followed by detailed presentations of drilling results in Vanuatu, the Lau Basin and the Ontong Java Plateau. Dr Heinrichs closed this portion of the session with a summary of future plans for the ODP which includes drilling in the Marshall Islands region in 1992.

The afternoon session included talks on volcanism in the equatorial Pacific and a series of presentation on tectonics and mineral deposits in the back-arc basins of the SOPAC region.

Abstracts for each of these scientific presentations were distributed at the meeting.

#### 5. Plans for Future Cruises in the SOPAC Area

Plans for future scientific research cruises in the SOPAC region were communicated to the assembly. Since these cruises may present an opportunity for collaborative or ancillary research they are listed below.

##### RESEARCH SHIP SCHEDULE FOR SOPAC AREA

YOKOSUKA/SHINKAI 6500 (Japan), 24 August - 7 November 1991. Diving for the STARMER programme in N. Fiji Basin. Arrive Suva 24 August from Japan; Leg 1 - Leave Suva 29 August: 15 dives on sites on NFB rift axis and hydrothermal areas. Arrive Noumea 25 September, Co-Chief Scientist Tetsuro Urabe (GSJ), Etienne Ruellan, (University of Nice). Leg 2 - Leave Noumea 9 October: 15 dives on sites on NFB rift axis and hydrothermal areas. Arrive Suva 4 November. Leave Suva 7 November. Co-Chief Scientists: Manabu Tanahashi (GSJ), J-M Auzende (IFREMER).

HAKUREI MARU No. 2 (Japan) 26 August - 27 October 1991 in Gilbert Islands for manganese nodules and cobalt crusts. From Majuro 26 August, to Honolulu 27 October. Japan/SOPAC programme, cruise leader Jiro Date, DORD.

FRANKLIN (Australia), 24 September - 14 October 1991 from Cairns to Townsville: PACKLARKV programme, sampling and photography in Western Woodlark Basin in hydrothermal areas and in eastern Manus Basin to define submersible dive targets there. Chief Scientists: Ray Binns, CSIRO; Steve Scott, University of Tasmania.

NOROIT (France), Noumea to Noumea, 1 November - 13 December 1991 by ORSTOM for SANTA CRUZ programme in northwestern North Fiji Basin, eastern Solomon Islands. Bathymetry, magnetic and structural data to determine nature of northern backarc troughs and history and tectonics of northern basin in relation to Vitiiaz paleo-subduction. Port stop in Honiara. Chief Scientist: Bernard Pelletier.

NOROIT/CYANA (France), 15 December - 15 January 1992 for SAVANES programme of ORSTOM. Noumea to Port Vila. Diving at up to 18 sites in the Jean Charcot Troughs and 4 sites on western Hazel Holme Fracture Zone - to date volcanism, analyse hydrothermal fluids and deposits, study stratigraphy, structure, tectonics and

evolution. Part of STARMER Programme. Chief Scientists: Leg 1: Noumea - Port Vila, 15 December - 31 December 1991 - Patrick Maillet, Tetsuro Urabe. Leg 2: Port Vila - Noumea, 1-15 January 1992. Chief Scientists: Ruellan and Tanahashi.

JOIDES RESOLUTION (USA) 24 March - 20 July 1992: ODP Drilling for Atolls and Guyots programme to assess plate tectonic history, determine sea level history and assess causes and timing of mid-Cretaceous carbonate platform drowning and extent and magnitude of regional uplift. Some sites in Marshall Islands. Leg 143: 24 March - 20 May, from Honolulu to Majuro. Drilling at 3 sites. Leg 144: 25 May - 20 July, from Majuro to Yokohama. Drilling at 5 sites.

MAURICE EWING (ex Berbuier) (USA), March - April 1992: Deep seismic studies of extensional processes in Western Woodlark Basin and Trobriand Islands area, in collaboration with Monash University. The ship has a Hydrosweep and 240 channel MCS system. Chief Scientist: John Mutter, Lamont-Doherty Geophysical Observatory.

RAPUHIA (NZ), 1992. CHOC OBS experiment. Division of Marine and Freshwater Science.

MOANA WAVE (USA), 6 April - 14 May 1992, for University of California programme in Huon Gulf. Study of arc-continent collision using SeaMARC II. Chief Scientist: Eli Silver (UCSC).

MOANA WAVE (USA) September/October 1992, for Woods Hole. Two heatflow profiles across the forearc of the Tonga-Kermadec Trench system. Chief Scientist: Richard von Herzer.

THOMAS WASHINGTON (USA), November 1991. Dredging and geophysical surveys around 9 seamounts in Magellan, Marshall and Wake seamount provinces samples are for geophysical study of isotopic character of mantle rocks. Chief Scientist: Hubert Standigel.

THOMAS WASHINGTON (USA) January, 1992. Magnetic study of Jurassic Quiet Zone in area between Marshall Islands and Japan. Chief Scientist: Paul Johnson, University of Washington.

CHARLES DARWIN (UK), proposed for late 1992 for joint IOSDL/BRIDGE programme in Lau Basin. Plan to use GLORIA/TObi swath mapping equipment and do bottom sampling.

ATALANTE (FRANCE), proposed for 1993, possibly also 1994, for dual EM12 swath mapping and geophysical surveys in New Caledonia and South Pacific region. Also for New Zealand GEODYNZ programme, 1993-1994.

#### 6. Review of Status on Recommendations from the 4th International Workshop

Dr Keith Crook, convener of the 4th International Workshop in Canberra, summarised progress made on the recommendations from that Workshop. Although much progress has been made on implementing some recommendations, STAR encourages additional emphasis be placed on some topics as noted in the recommendations.

#### 8. Closing of the Session

The STAR membership approved the adoption of the Report in principle, reserving the right to make changes in the draft to be circulated during the TAG session of SOPAC.

Mr Ron Richmond thanked the outgoing Chairman, Dr Charles Helsley for his many years of service as STAR Chairman and expressed the

appreciation of the membership of his commitment to the region.

The Chairman adjourned the session at 10.00 am Sunday, 22 September 1991.

### **Recommendations of the 1991 STAR Meeting**

#### *Recommendations of the committee as a whole:*

STAR, in committee as a whole,

*Reaffirms* the desirability of meeting in conjunction with the SOPAC Annual Session,

*Reaffirms* that scientific sessions should be held every year in conjunction with formal discussion and planning sessions,

*Further reaffirms* that standing adhoc study groups should meet at its annual meetings as and when necessary, and

*Strongly recommends* that a full two day venue, not to include Sundays by request of member countries of SOPAC, be formally established and approved by SOPAC.

*Noting* the need for timely reporting of research results to countries of the region,

*Recommends* that approvals given by SOPAC member countries for work in their EEZs include a statement of expectation that the results of that work will be reported as soon as practicable at a scientific meeting in the region,

*Further noting* that no progress has been made on establishing the Multinational Petroleum Assessment Programme recommended at the 1989 SOPAC Annual Session, and

*Emphasising* the importance of this programme,

*Recommends* that SOPAC seek ways of implementing it in an expeditious manner.

### **Recommendations of the Study Groups**

#### *Information Exchange Study Group*

*Recommends* that Techsec develop in consultation with island states and research institutions guidelines for data submission and reporting of cruise results.

#### *The Tectonic Study Group*

*Aware* that the SOPAC region has been considerably expanded by the addition of new member countries; and

*Recognising* that vast amounts of new geophysical/geological data have been acquired in recent years within the SOPAC region and also

*Perceiving* a continuing need to provide basic data to facilitate location, mapping and reporting on potential mineral resources within the region,

*Recommends* to SOPAC that:

1)The current SOPAC regional chart series (1:6,000,000 scale) be expanded to cover all of the present SOPAC region,

2)The series be revised and updated to incorporate new data, particularly high resolution swath-mapping and bathymetric data,

3)All data sets in the revised charts be digitised to allow further revision and updating on a timely basis, and

4)A new chart to delineate seafloor fabric and structural trends be added to the series (based on high resolution swath-map data, where available, and extended by remote sensing techniques where swath-mapping data are not available).

*Recognising* the value to resource assessment, of the newly published HIG Pacific Seafloor Atlas (1:250,000 scale)

*Recommends* that action be taken by SOPAC and other parties to secure publication of similar data so as to ensure rapid distribution of new swath-mapping data.

*Noting* that areas exist where only small amounts of additional work are required to completely elucidate tectonic relationships and thus improve the knowledge of the areas potential resources, e.g., the NW Lau Basin, the NW corner of the North Fiji Basin (including the Hazel Holme Fracture Zone-South Pandora Ridge area), and in the western Woodlark and Manus Basins,

*Recommends* to SOPAC and TAG that these areas receive a high priority for future swath-mapping cruises in the region.

Also noting that there are other areas where existing data are too sparse to permit more than a rudimentary understanding of tectonic and structural relationships, e.g., the western Central Pacific Basin, the Ellis Basin, parts of the D'Entrecasteaux Basin, and the Norfolk Basin, and the Melanesian borderland among others,

*Recommends* that SOPAC target these areas for reconnaissance swath-mapping transects as soon as possible.

*Aware* of the importance of understanding the tectonic development of the region, particularly the style and timing of tectonism as an aid to indicating the presence of possible mineralisation and/or hydrocarbon formation,

*Recommends* that SOPAC revise and update Technical Bulletin 5 to incorporate results of recent studies.

*The Ocean Basin Mineral Resources & Technology Study Group*

*Noting* that a substantial body of data on mineralisation and metallogenesis for both onland and seafloor mineral deposits has been acquired in the past few years,

*Recommends* that SOPAC prepare a series of metallogenic maps on a tectonic/seafloor fabric base showing the composition, size, style and context of mineral deposits in the region; each map to be accompanied by supporting data, and

*Recommends* that TAG encourages comparative studies on on-land and offshore volcanic massive sulfide deposits with the aims of (a) establishing a comprehensive data-base; and (b) assisting in developing exploration methods for genetically-similar on-land deposits.

*Encourages* TAG to promote surveys and other studies of Pacific Ocean seamounts, guyots and atolls that will contribute to greater understand-

ing and assessment of their resource potential, particularly in relation to cobalt-rich crusts, phosphate deposits, endo-upwelling in seamounts; and to ensure that surveys of seamounts include as much as possible the documentation of fish distribution patterns for communication to the relevant SOPAC member states fisheries authority.

**PARTICIPANTS TO THE STAR 1991 MEETING**

<b>Name</b>	<b>Organisation</b>
AUENGA, Siniala	Ministry of Natural Resources, Tuvalu
BARCLAY, Bill	SOPAC Technical Secretariat
COLLINS, Bill	SOPAC Technical Secretariat
CROOK, Keith	Bureau of Mineral Resources, Canberra
DANIEL, Jacques	ORSTOM, Noumea
ERB, Bill	US Department of State
FISK, Mary	United Nations CALOS
GAUTHIER, Michel	IFREMER (New Caledonia)
GREENE, Gary	USGS, Menlo Park, CA
HAWKINS, James	Scripps Institution of Oceanography
HEINRICH, Donald	National Science Foundation, US
HELSLEY, Charles	HIG, University of Hawaii
HELU, Saimone	Ministry of Lands, Survey & Natural Resources, Tonga
JOHNSON, David	James Cook University, Australia
KAMU, Sitivi	Agriculture Department, Western Samoa
KEATING, Barbara	HIG, University of Hawaii
KINCAID, Ramona	Marine Minerals Technology Center, SOEST, University of Hawaii
KINGAN, Stuart	Scientific Research, Cook Islands
KINOSHITA, Yasumasa	SOPAC Technical Secretariat
KROENKE, Loren	HIG/SOPAC Technac
LUM, Jackson	East-West Center, University of Hawaii
MALOLO, Tevita	Ministry of Lands, Survey and Natural Resources, Tonga
MOREL, Yann	SOPAC Technical Secretariat
MULLER, Philipp	Forum Fisheries Agency, Honiara
NIKORA, Erene	Lands & Survey Division, Kiribati
PAUTOT, Guy	IFREMER - Centre de Brest (France)
PRATT, Cristelle	Mineral Resources Department, Fiji
RAO, Bhaskar	East-West Center (MRD)
RICHMOND, Ron	Australian Petroleum Exploration Authority, Sydney
SANKEY, Trevor	UNESCO, Apia
SHORTEN, Graham	Queensland University of Technology
SIMPSON, Alf	Mineral Resources Department, Fiji
SINTON, John	University of Hawaii
TAYLOR, Brian	University of Hawaii
TEMAKON, Stanley	Department of Geology, & Mines, Vanuatu
THOULAG, Bernard	Micronesian Maritime Authority, Federated States of Micronesia
TIOTI, Teboranga	Ministry of Environmental & Natural Resources Development
TIFFIN, Don	SOPAC Technical Secretariat
TONGILAVA, Sione	Ministry of Lands, Survey & Natural Resources, Tonga
WALKER, Peter	Mineral Resources Department, Fiji