



SOPAC

SOUTH PACIFIC
APPLIED GEOSCIENCE COMMISSION

1991 Annual Report Summary

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This report is derived from the
Annual Report to the Governing
Council presented at the 20th
Annual Session of SOPAC.

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FOREWORD



Jioji Kotobalavu, Director

1991 was a year of continued satisfactory progress by the South Pacific Applied Geoscience Commission.

With Papua New Guinea and Tonga adding their signatures to the new SOPAC Constitution, all the necessary formalities for the adoption of the updated legal framework of SOPAC as a regional inter-governmental organisation were completed.

A special feature of the new Constitution is that whilst full membership of SOPAC will be confined to independent and self-governing Pacific island countries, together with Australia, Guam and New Zealand, supporting Governments and agencies may, by invitation, send representatives as full participants in the Technical Advisory Group, which is entrusted under the constitution to provide advice to the Governing Council of SOPAC member countries on the organisation's technical Work Programme.

The new SOPAC Constitution also provides for the admission, on application, of dependent territories in the region as associate members. Under this provision, New Caledonia has joined SOPAC in 1991 as an associate member.

The main focus of the Technical Secretariat has continued to be the implementation of the SOPAC Work Programme, which was greatly assisted during the past year by the fact that the Technical Secretariat had almost a full complement of professional and support staff.

An independent review and evaluation of SOPAC's Training Programme was completed and its report and recommendations accepted by

the Governing Council at its meeting in Port Vila in October. It was very pleasing to note the report's finding that there was widespread satisfaction among the member countries with SOPAC's Training Programme and in particular with its continuing evolution and expansion to meet the training needs of the member countries.

It is hoped that a similar independent review and evaluation of the other components of the SOPAC Work Programme, to be undertaken in the coming year, will also be able to provide clear guidelines on the future directions and emphasis of activities in these other areas, so as to ensure that SOPAC is responding fully and effectively to the development needs of its member countries.

Finally, may I take this opportunity to thank member countries and supporting Governments and agencies for their excellent support and generous assistance to the Technical Secretariat during the years.

As this is my last report as the Director of the Technical Secretariat, I extend my best wishes to SOPAC for a continuing bright and successful future.

Jioji Kotobalavu
DIRECTOR

INTRODUCTION TO SOPAC

OBJECTIVES

The South Pacific Applied Geoscience Commission (SOPAC) is an independent, inter-governmental, regional organisation established by the member countries to:

- provide information on the physical environment of coastal and nearshore areas to assist with resource and environmental management, hazard evaluation and coastal protection works, and with planning and implementation of coastal development projects.
- investigate the resource potential of coastal, nearshore and deepsea minerals including construction materials, phosphates, cobalt-rich crusts, manganese nodules, polymetallic sulphides, precious corals, and detrital minerals such as gold.
- assess and promote the hydrocarbon and wave energy potential of the region.
- coordinate marine geological and geophysical research being carried out in the region and manage the resulting data.
- train nationals in the implementation and management of their work programmes.

MEMBER COUNTRIES

Member countries are currently Australia, Cook Islands, Federated States of Micronesia, Fiji, Guam, Kiribati, Marshall Islands, New Zealand, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa. New Caledonia is an Associate Member.

BACKGROUND

SOPAC was established in 1972 as CCOP/SOPAC (the Committee for Coordination of Joint Prospecting for Mineral resources in South Pacific Offshore Areas) under the sponsorship of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). In 1984, CCOP/SOPAC changed its legal status to become an independent, regional inter-governmental body. At their Annual Session in Tarawa, Kiribati, in October 1990, the member countries adopted an Inter-governmental Agreement, which they agreed to refer to as the Tarawa Agreement, as SOPAC's new Constitution.

In deciding at its meeting in Canberra in October 1989 that a new Constitution should be adopted for SOPAC, the Governing Council also decided to adopt the new name South Pacific Applied Geoscience Commission, whilst retaining the acronym SOPAC.

The Commission comprises the Governing Council, composed of representatives of the member countries, the Technical Secretariat and the Technical Advisory Group (TAG). The Commission meets annually to review work completed, and to discuss and plan future work required by member countries.

The Commission's Work Programme is carried out by its Technical Secretariat (Techsec) in close liaison and consultation with the member countries. Techsec is based in Suva, Fiji and currently has a staff of about 50.

SOPAC ANNUAL SESSION

The SOPAC Annual Session is a meeting of the Commission, and has three components:

- a Plenary Session, which covers the procedural aspects of the meeting, the presentation of reports from member countries, donor Governments and organisations, and the discussion of non-technical matters concerning SOPAC such as cooperation, management and funding.

- a meeting of the Technical Advisory Group (TAG). TAG comprises advisors attending the Annual Session who are nominated by member countries and by supporting Governments and organisations, or are invited by Techsec. The TAG meeting is a technical session to review and make recommendations on the SOPAC technical Work Programme.

- a Budget and Policy Session held by the Council. Attendance is restricted to representatives of member countries and selected observers.

It is at this Session that policy on all SOPAC matters, including the SOPAC Work Programme and Budget, is decided.

Proceedings of the Annual Session are published by SOPAC each year. Annual Sessions over the past five years have been:

16th Annual Session, Lae, PNG, 12-21 October 1987

17th Annual Session, Suva, Fiji, 13-22 October 1988

18th Annual Session, Canberra, Australia, 2-13 October 1989

19th Annual Session, Tarawa, Kiribati, 1-11 October 1990

20th Annual Session, Vila, Vanuatu, 23 September - 3 October 1991

Participants at the SOPAC 20th Annual Session at Vila, Vanuatu.



MANAGEMENT OVERVIEW

GENERAL

The overall aim of Techsec management, within the constraints of available resources, is to implement the tasks in the agreed SOPAC Work List as presented in order of priority by member countries and expressed in the SOPAC Work Plan. The efficient and effective implementation of the SOPAC Work Programme will continue to be Techsec's primary function, with the emphasis and direction changing as needed to meet member countries' requirements. Close contact is maintained with other organisations in the region to improve the effectiveness of work being carried out.

SOPAC CONSTITUTION

With signing by Tonga at the 20th Session in Vila in September 1991, and by Papua New Guinea at the Special Session in Suva in December 1991, new SOPAC Constitution has now been signed by all member countries. The constitution firmly establishes SOPAC as a juridically separate and independent, inter-governmental, regional organisation.

STAFF

Staffing of the Technical Secretariat has been kept within the total staff establishment in the approved 1991 Budget.

Most of the professional staff positions were filled throughout the past year and this greatly assisted with the implementation of the Work Programme. A list of staff as at December 1991 is given in Appendix 1.

New recruitments in 1991 included Umar Farook from Fiji as Finance and Administration Controller, Teuea Toatu from Kiribati as Programme Coordinator (EC-funded Programme), Fuka Kiteikei'aho from Tonga as Assistant Training Coordinator and Bill Barclay from Canada as Petroleum Geophysicist. During the year, the Norwegian Wave Engineer completed his attachment to Techsec. Other staff matters are noted under relevant sections.

Several short-term consultancies were used for specific assignments. These included assessment of sand resources in Tonga, interpretation of offshore GLORIA data, compilation of a sediment distribution map of the Southwest Pacific, and an evaluation of Techsec's computing requirements.



Semu Taafaki, Secretary of Natural Resources and Home Affairs, Tuvalu, and Robert Cotton, the Australian Ambassador to Fiji, signing the SOPAC Constitution.

It was with shock and great sadness that the Commission learned of the sudden death in September of Doug Rearic, a coastal geologist on assignment to SOPAC from US Geological Survey.

STAFF TERMS AND CONDITIONS OF EMPLOYMENT

As approved at the 19th Annual Session, a new remuneration structure and an updated set of terms and conditions of employment were applied to all staff from 1 January 1991 on a trial basis.

At the 20th Annual Session in Port Vila, the Governing Council deferred consideration of these to a Special Session in Suva in December at which it was agreed that SOPAC would instead adopt the terms and conditions of the Forum Secretariat.



Coastal development on Uplolu, Western Samoa. SOPAC's coastal studies provide information for coastal management, including cyclone risk, project design and protection structures.

OFFICE COMPLEX

With a special grant of close to F\$103,000 from Australia, a new addition to the current Techsec office complex was completed, and now houses the SOPAC Library and the Drafting and Publications Sections.

In the meantime, the Government of Fiji has earmarked a 6-acre block near the University of the South Pacific to be made available to SOPAC on a special long lease tenure as its permanent headquarters site. Funds will be sought from the EEC under Lome Convention IV to cover all construction and related costs.

CONSULTATION WITH MEMBER COUNTRIES

During the year, the Technical Secretariat has maintained close contact with the member countries and with the SOPAC Chairman by a combination of direct communications, by visits to the member countries, by attachment of member country representatives to the Technical Secretariat, and by attendance at regional meetings where member countries are represented at Head of Government or Ministerial level.

Several senior management officials from member countries were attached to the Technical Secretariat under the SOPAC Fellowship Scheme at different times during the past year for programme consultations. These included officials from the Federated States of Micronesia, Tuvalu, Solomon Islands, Kiribati, Vanuatu and the Marshall Islands.

COORDINATION WITH OTHER REGIONAL ORGANISATIONS

In addition to direct consultation with the Forum Secretariat, SPREP, FFA, USP, East-West Center and ESCAP in the various programme areas of mutual interest, SOPAC is a member of the South Pacific Coordinating Committee of Regional Organisations.

CONSULTATION WITH SUPPORTING GOVERNMENT AND DONOR AGENCIES

Close liaison and contact with donor Governments and agencies have been maintained through their locally-resident representatives, and through overseas visits.

REVIEW AND EVALUATION OF THE SOPAC WORK PROGRAMME

At the 19th Annual Session, the Governing Council agreed that an independent review and evaluation of the SOPAC Training Programme should be carried out prior to the 20th Annual Session.

This review took place in April 1991. Australia and NZ provided financial assistance to cover costs. The resulting report highlights member country satisfaction with past and present training activities and also with the way the Training Programme has evolved, reflecting changes in the overall SOPAC Work Programme.

Recommendations for the future included additional new advance modules for the Certificate in Earth Science and Marine Geology course, careful monitoring of the SOPAC scholarship scheme including mandatory involvement of national scholarship committees in the selection process, increased cooperation with USP leading to an effective degree in Earth Science, expansion of the SOPAC fellowship scheme and a switch to national seminars rather than regional workshops.

At the 20th Annual Session, the Governing Council agreed to carry out a complete review of the SOPAC Work Programme during 1992 using UNDP, Canadian and other funds.

Mulinu'u Point, Apia, Western Samoa, where there is extensive coastal development and a shoreline erosion problem. SOPAC have studied the natural movement of sand around the peninsula and the effects of man's activities, and made recommendations on coastal protection design and siting of the sand dredging operation.



FINANCE

BUDGET

The annual budget of SOPAC is reviewed and set by the Governing Council at its Annual Session. At its Nineteenth Annual Session in Tarawa, Kiribati in October 1990, the Governing Council had approved a total Budget of F\$8,707,588 for 1991. At its Twentieth Annual Session in Port Vila in October 1991, the Governing Council approved a total Budget of F\$9,724,211 for 1992. These budgets were to be covered as follows:

Contributions	1991	1992
Cash	F\$3,909,210	F\$6,684,935
In-kind	F\$4,798,378	F\$3,039,276
Total	F\$8,707,588	F\$9,724,211

In-kind assistance is the assessed value of indirect, non-monetary support provided by donors.

MEMBERSHIP CONTRIBUTION

At its 20th Annual Session, Council approved an increase in member country contributions for 1992 from F\$11,000 to F\$13,500 per member country with Kiribati and Tuvalu continuing to contribute at 75% and 25% of the agreed rate respectively.

The Technical Secretariat is grateful to the member countries for making every endeavour to ensure early payment of their assessed membership contribution.

DONOR SUPPORT

SOPAC continues to be heavily dependent on voluntary assistance, both in-cash and in-kind, from member Governments, supporting countries and international agencies.

The member countries and the Technical Secretariat are deeply grateful to the various supporting Governments and donor agencies for their continued generous assistance to SOPAC.

Development assistance now accounts for more than 95% of total resources needed for the implementation of its Work Programme and for the general operation of the Technical Secretariat.

The following is a summary of support received from the major donors to SOPAC. The generous annual grant assistance by Australia, New Zealand and Fiji, over and above their membership contributions, has been especially helpful in filling budget gaps arising from the tying of other donor contributions to specified programme activities, and from delays in the payment of pledged contributions.

Australia : Inclusive of its membership contribution, Australia's annual grant to the SOPAC Budget was F\$418,339 (A\$371,000) in 1991. This included funding of the positions of Deputy Director and Chief Draftsman. In addition, the Australian Government also gave special contributions totalling F\$312,557 for 1991. This included funds for the Hydrocarbon Programme, construction of an addition to the Techsec office complex, and biological monitoring for the Tuvalu Borrow Pits Pilot Project.

New Zealand : NZ's annual grant to SOPAC, including its membership contribution, was F\$334,568 (NZ\$410,000) in 1991, mainly for training, nearshore minerals and other coastal work, and technical information services including the position of Technical Editor.

Fiji : In addition to its membership contribution, Fiji also makes a regular grant to SOPAC. Its grant contribution was F\$152,892 for 1991.

Canada : Canadian assistance to SOPAC comes from two sources; the International Centre for Ocean Development (ICOD) and from the CIDA-sponsored Canada South Pacific Ocean Development Project (CSPODP), administered through ICOD. These agencies support the positions of Coastal Geologist, Marine Geologist, Coastal Engineer, Petroleum Geophysicist, Offshore Coordinator, Librarian and Assistant Librarian. The current phase of Canadian assistance is for the period 1989/90 to 1992/93.

For 1991, Canada provided a total of F\$995,000 for nearshore and offshore minerals, coastal studies, hydrocarbon assessment, and training workshops and scholarships.

European Economic Communities : Annual support to SOPAC from the EC continues to be through the ECU 5 million (about F\$8.6 million) allocated to SOPAC under Lome Convention III (1986-1991). Of this amount, about ECU 2.5 million has been cleared for expenditure. However, actual expenditure to date is about ECU 500,000, about half of which relates to the seabed mapping survey carried out in 1989. The EC supports the positions of Programme Coordinator, Assistant Training Coordinator, Assistant Editor, and several support staff.

France : In-kind technical assistance by France to SOPAC includes the provision of a Data Manager and a Computer Geologist. France has also continued to make a direct cash grant to the SOPAC Budget for programme support: a grant of F\$147,000 was received for the 1991 Budget. IFREMER has also been providing an annual cash grant, which was F\$27,600 for 1991.

Norway : Norway's current support for the SOPAC Wave measurement programme is within an overall commitment of Nok 5.5 million (about F\$1,200,000) for 1989-1991. In response to a request from SOPAC for an extension of this programme beyond 1991, Norway has approved in principle a 2-year extension of the programme, within an overall commitment of Nok 4.76 million. Norway funds the position of Wave Engineer. Norway has also been assisting with a wave modelling project with funding support of Nok 1.5 million to 1991.

Japan : Japan is continuing to provide an Offshore Geologist. In addition, within the framework of a five year (1990-1994) programme of support for the SOPAC Offshore Programme, Japan is carrying out

deep sea mineral surveys for several SOPAC member countries. This included the provision of 65 days of ship time. This included surveys for manganese nodules/cobalt crusts in the EEZ of Kiribati in 1991.

United States : Through the United States Geology Survey, the US has provided a Coastal Geologist and financial assistance towards the cost of the annual coastal mapping workshop.

CFTC : The Commonwealth Fund for Technical Co-operation is providing a Petroleum Coordinator for a 2 year period from December 1991. Its current support for a Marine Geologist is scheduled to terminate at the end of 1992. However, thereafter it is willing to provide a Computer Services Manager for a 2-year period. CFTC also provided a Dredging Engineer on a 6 month consultancy assignment.

CFTC's support for SOPAC's annual Earth Science and Marine Geology Course has continued with a contribution of F\$63,569 in 1991.

United Nations : United Nations assistance to SOPAC is provided largely by UNDP through ESCAP who fund the positions of Training Coordinator, Draftsman, Electronics Engineer and other technical support staff.

The support for SOPAC in the current UNDP programming cycle, 1987 to 1991, is within an overall commitment of US\$2,849,500. This cycle is currently under consideration for a 6-month extension to 30 June 1992 within its approved commitment. In the new UNDP Cycle, 1992-1996, UNDP will no longer be able to provide institutional and direct programme support to SOPAC. However, UNDP assistance will be available to SOPAC within a regional programme of assistance to Pacific island countries in coastal management and development studies and planning.

Invaluable assistance has also been provided by ESCAP, the UN Centre for Transnational Corporation, and the UN Law of the Sea Office.

WORK PROGRAMME FOR 1991

INTRODUCTION

The SOPAC Work Programme reflects work required of the organisation by its member governments, and consists of three main areas of technical work: the Coastal and Nearshore, Hydrocarbon, and Offshore Programmes. These are supported by strong Training and Technical Support Programmes.

Within the programmes are some 100 projects. Country Projects define areas of applied work requested by individual members to assist with their countries' development. Regional Projects have more general objectives, either to provide the background information needed for applied work or to synthesise results for widespread use. Progress towards project objectives is by way of particular tasks, formulated on an annual basis.

Each year's Work Programme is driven by member government needs expressed as requests for assistance with particular tasks. At the Annual Session, the member countries, with the assistance of the Technical Advisory Group, review the Work Programme and formulate Work Lists of tasks for each country for the coming year. Based on resources available to it, the Technical Secretariat then develops a Work Plan for the coming year in close consultation with the member countries.

The emphasis of the Work Programme changes as member country needs change. During the past year, the biggest changes continue to take place in the Coastal and Nearshore Programme with Training also being maintained at a high level. During this period, field work has been carried out in nine of the twelve island member countries. Assistance provided to the two new members, Federated States of Micronesia and Marshall Islands, should lead to programme activities in those countries starting in 1992 (except Training which commenced late in 1990 immediately following their joining SOPAC).

Management assistance with programme review and development was provided by Techsec to Federated States of Micronesia, Fiji, Guam, Kiribati, Marshall Islands, Papua New Guinea, Solomon Islands, Tuvalu, and Vanuatu with both country visits and meetings at Techsec.

COASTAL AND NEARSHORE PROGRAMME

The majority of SOPAC's field studies are in this programme, which provides information on the physical aspects of coastal and nearshore areas to assist member countries with resource and environmental management so that their coastlines can be conserved, utilised or developed wisely. Member country personnel are trained in mapping coastal environments so that island countries will be less dependent on outside expertise in the future.

The programme includes:

- evaluation of the causes of and solutions for coastal erosion
- nearshore mineral resource assessments
- investigation of problems associated with engineering projects in the coastal zone
- mapping the coastline to provide information for planning and development purposes
- provision of data against which any future changes can be measured.

The programme is divided into four sub-programmes: Nearshore Minerals; Coastal Development; Coastal and Nearshore Mapping; and Ocean Energy. Each has a defined set of objectives, but the study methods, information gained, and applications are closely interwoven.



*Bathymetric mapping of
Port Havannah, Vanuatu.*

TONGA SAND RESOURCES

A major review of the availability and potential of sand resources off Nuku'alofa, Tonga has been completed by Techsec. Many of beaches on the island of Tongatapu have suffered severe erosion as a result of sand mining, reducing the shore's ability to withstand storm damage and spoiling recreational and tourism potential. Remaining beach resources are very limited, yet sand is one of the most vital commodities for island development. The report recommends that beach mining be phased out urgently, and offshore sand deposits located by SOPAC surveys be mined instead.



NEARSHORE MINERALS

The greatest requirements for member country assistance with nearshore mineral resources are for assessment of sand and gravel aggregates, reflecting the importance of construction resources to island member countries and the potential impact that their extraction has on coastal environments. Work on the identification, assessment, and management of sand and gravel aggregates has continued in Cook Islands, Kiribati, Solomon Islands, Tonga (see box), Tuvalu, and Vanuatu. Field studies have been completed to identify and assess new deposits, monitor the effects of mining activity, and provide information to assist in the development of management plans in areas where mining may take place.

The pilot project on Funafuti, Tuvalu, to test the feasibility of mining lagoon sand to infill the borrow pits on Fongafale, is continuing. The dredging equipment was constructed in Suva in 1991 and will be shipped to Tuvalu to start dredging and infill operations in early 1992.

Recognising the interest from the private sector in gold in the region, Techsec has begun a detailed review of the potential for placer minerals in coastal and nearshore areas. The aim of this study is to identify areas where existing information is insufficient to make an evaluation capable of enticing industry to explore and exploit. When completed, the review will provide information to member governments recommending areas where detailed field surveys are warranted.



The barge for the Tuvalu Borrow Pits Infilling Pilot Project, under construction in Suva.

COASTAL EROSION AT ABAIANG ATOLL, KIRIBATI

On Abaiang Atoll, Kiribati, coastal erosion is threatening villages along the lagoon shoreline. Wave-cut banks and fallen coconut trees along the beach are evidence of active erosion. Only remnants are left of several coastal protection structures.

These are problems common to many atoll nations in the Pacific. The conclusions of a SOPAC study have widespread application in the Pacific, particularly for remote atolls.

- Improperly designed or placed coastal structures are often useless for protection and may actually cause erosion damage.
- Westerly wind wave erosion associated with recent, severe El Nino events is believed to be the major cause of coastal erosion at Tebunginako. The very strong El Nino event of 1982-83 could have caused erosion which natural processes did not have time to restore before the 1987 El Nino.
- El Ninos and the resulting westerly wind and waves are natural events which can be expected from time to time and the beach should readjust naturally as it has in the past without any coastal protection works. Abaiang has probably existed in its present form for some millenia and is as dynamically stable as it ever was.
- A stepped sandbag seawall is recommended, but only to protect property which is valuable to the community and cannot be moved back from the shore.
- The best way to avoid damage to the coastline and coastal buildings is to leave the beach alone and let it fluctuate naturally. By siting permanent buildings at a safe setback distance, the beach is left in its natural state without a need for expensive structures to protect either the beach or the land.

Coastal erosion on Abaiang Atoll, Kiribati.



COASTAL DEVELOPMENT

The interaction of natural coastal processes with the effects of coastal development are of great importance to island member countries. The objectives of SOPAC's coastal development studies are to assess geological and oceanographic hazards to the coastal and nearshore environment and to evaluate the extent and severity of coastal erosion taking place at particular sites in member countries. The results are combined with those of coastal mapping and applied to engineering projects so that they may be designed to minimise any adverse effects on the coastal zone.

Coastal erosion is an on-going problem most member states have to deal with, and work has been carried out in Cook Islands, Kiribati, Solomon Islands, Tuvalu, and Vanuatu. Work has included study of areas where erosion is a natural on-going process as well as where human activities appear to be the cause. Information is being collected to monitor coastal changes associated with beach mining, causeway construction, and other coastal developments.

As well as erosion studies, other coastal studies have been made in Cook Islands, Fiji, Kiribati, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa to assist member governments with development planning and coastal management. Coastal developments benefiting from these studies include harbour and small wharf development, land reclamation, tourist development, coastal protection, and waste disposal.

COASTAL AND NEARSHORE MAPPING

The objectives of coastal and nearshore mapping are to conduct geological, bathymetric, and morphological surveys of the member countries and to use the data from the surveys to produce maps of the coastal and nearshore zones for planning coastal development, hazards protection, and mineral exploration.

Coastal morphology maps of Cook Islands and Western Samoa were published in 1991. A set of preliminary bathymetric maps has been completed for Western Samoa to assist in the assessment and development of deepsea fisheries. Bathymetric information supplied to Fiji and Tuvalu fisheries has assisted in the identification of new deepsea fishing grounds. Other preliminary bathymetric maps have been completed for Cook Islands and Tuvalu.

WAVE ENERGY

There is considerable interest in the Pacific in the potential for substituting renewable resources for imported fuels used for power generation. The evaluation of the potential for deriving electrical power from wave energy requires the collection of extensive oceanographic data.



Deployment of a Waverider buoy, Kadavu, Fiji.

Data on the wave climate of several sites are collected by waverider buoys and relayed by satellite for analysis. To cover seasonal and yearly variations, 3-5 years of measurements are needed at each site. The training of member country nationals is an important part of the programme.

The collection of wave data to assess wave energy potential has been completed in Cook Islands and is continuing in Fiji, Tonga, Tuvalu, Vanuatu, and Western Samoa. Preparations are being made to set up a wave database at Techsec.

Staffing: During the last year, Coastal and Nearshore Programme professional staff consisted of two Marine Geologists, two Coastal Geologists, a Coastal Engineer, and a Wave Engineer.

OFFSHORE PROGRAMME

Seabed mapping of deep-water areas by research vessels provides information on the large, geologically complex and relatively unexplored EEZs of member countries and the South Pacific region as a whole. These investigations are closely linked to assessment of deepsea mineral potential.

The main function of SOPAC's Offshore Programme is to coordinate the activities of foreign research vessels and ensure that member countries are kept fully informed on the activities and results of cruises in their waters, a few of which are carried out directly under SOPAC funding. SOPAC also collects, compiles and interprets seabed and bathymetric data, produces reconnaissance-scale maps of selected areas, evaluates areas with mineral potential and maintains databases on deepsea minerals.

Major activities of the Offshore Programme in the last year were a review of manganese nodule deposits in the region, the management and development of SOPAC swath mapping, and coordination of research cruises in member governments' EEZs.

DEEPSEA MINERALS

Deepsea minerals include cobalt-rich crusts, manganese nodules, polymetallic sulphides, metalliferous sediments, and seamount phosphates. In 1991, the SOPAC database on manganese nodules and cobalt-rich crusts was been updated and regional maps showing manganese nodule distribution, abundance and mineral content have been prepared. These will be published in 1992 when data from the 1991 *Hakurei Maru No.2* cruise in Kiribati waters have been received. A detailed review of Cook Island nodule deposits and comparison with North Pacific nodule fields has started and funding is being sought to complete this work.

SEABED MAPPING

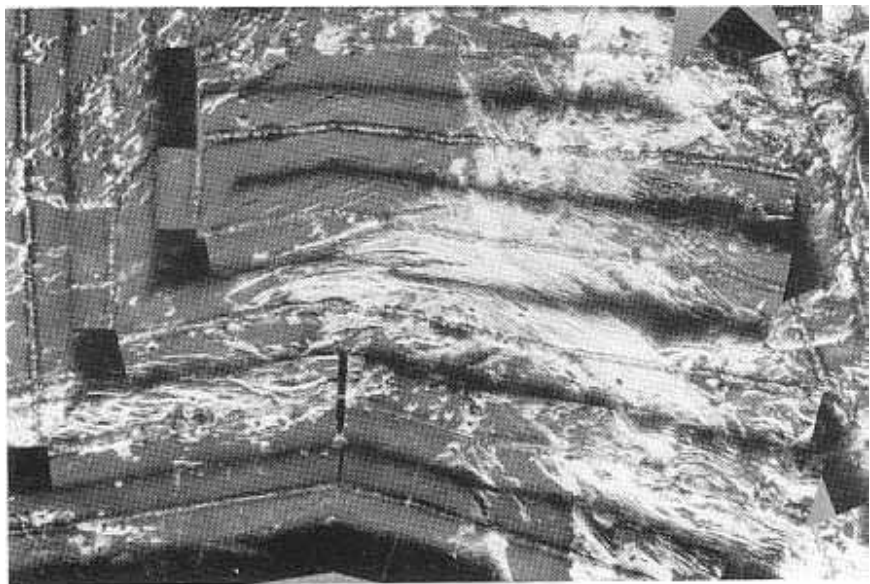
A GLORIA survey was carried out in 1989 by SOPAC from *HMAS Cook* in offshore areas of Vanuatu, Western Samoa, Fiji, Tonga and Solomon Islands. These data were interpreted during 1990-91 and the results are initially being made available to member countries in a series of SOPAC Technical Reports. When completed in early 1992, these will be published in a SOPAC Technical Bulletin and extracted scientific manuscripts will be published in *Geomarine Letters*.

Specifications and targets have been chosen for another SOPAC swath-mapping survey in 1992 using EC funds.

A swath mapping atlas of SeaMARC II data from the South Pacific was compiled and published by HIG in 1991, mainly from results of the SOPAC Tripartite programme.

Over 250 charts from seafloor surveys for two cable routes were generously made conditionally available to SOPAC by the Overseas Telecommunication Commission (Australia). This donation of commercial data will considerably assist future offshore projects.

GLORIA imagery of the deep seafloor of the northern Lau Basin.



CRUISE COORDINATION

In 1991, Techsec coordinated the planning and implementation of ten cruises in the EEZs of Fiji, Kiribati, Marshall Islands, Papua New Guinea, Solomon Islands, Tonga, and Vanuatu. The second phase of joint SOPAC-Japan deepsea mineral investigations by *Hakurei Maru No.2* included a cruise in Kiribati waters, completing the work on nodules and crusts begun during the first phase of this programme (1985-89). Three further cruises are planned to focus on back-arc deepsea mineralisation. The international Ocean Drilling Program conducted two cruises on the *D/V Joides Resolution* in island members' waters, drilling in Vanuatu in late 1990 and moving to Fiji and Tonga waters in 1991.

Staffing: The work of the Offshore Programme is carried out by two professionals: the Offshore Coordinator and the Offshore Geologist.

SPECIAL ISSUE OF MARINE GEOLOGY

A special issue (Volume 98 No 2/4) of the international journal *Marine Geology* was devoted to papers given at the Fourth International Workshop on Geology, Geophysics and Mineral Resources of the South Pacific, held under the auspices of SOPAC and IOC at the Department of Geology, Australian National University, Canberra from 25 to 29 August 1989.

The 17 papers in the volume cover recent developments in knowledge of petroleum and mineral geology and potential in the region.

The introductory paper to the volume, by Australian scientists Keith Crook, Neville Exon and Patrick Coleman, describes the development of scientific investigations in the region including SOPAC's role and the initiation of the Australia - New Zealand - United States Tripartite Programme. The paper notes that "SOPAC's strategy has been to forge links between the potential of the region as a vast natural laboratory for fundamental geoscience research, and concerns about mineral resources and hazards, so as to promote a research-driven programme of resources and hazard assessment....SOPAC's strategy has been outstandingly successful, for it has mobilised into the region technical and scientific resources far exceeding those otherwise available to SOPAC member nations."

HYDROCARBON PROGRAMME

The overall objective of this programme is to assess and promote oil and gas exploration and development in its member countries. The first step in evaluating their hydrocarbon potential is to identify those sedimentary basins having favourable petroleum prospects. These are so far known in Papua New Guinea, the Solomon Islands, Vanuatu, Fiji and Tonga. Investigations include source- and reservoir-rock analyses, stratigraphic studies, and interpretation of seismic data from marine cruises and oil company surveys. New surveys are carried out where possible.

The next stage is to attract industry interest in further exploration by promoting the hydrocarbon prospects of individual member countries by publishing technical papers and promotional brochures, and displaying highlights of results at international oil industry conferences.

Following publication by SOPAC in 1990 of a glossy brochure promoting the hydrocarbon prospects of Tonga, two oil companies have entered into separate exploration agreements with the Government of Tonga. Promotional publications in 1991 included technical papers on the petroleum potential of Fiji and the Solomon Islands in a special South Pacific issue of *Marine Geology* (see box).

Current work has included interpretation of marine magnetic data from Tonga and investigation of a reported oil seep in Vanuatu. Assistance with on-going work has been provided to Fiji. Preparations have been made for a variety of future activities including reprocessing of selected data, re-interpretation and re-evaluation of existing data, and courses and workshops. Hydrocarbon data management for SOPAC is continuing at the Bureau of Mineral Resources, Australia.

The Hydrocarbon Programme also gives assistance to member country governments with legislative aspects of the petroleum industry and provides training to member country nationals in hydrocarbon exploration.

Staffing: Following a twelve month period with no professional staff, a new Petroleum Geophysicist began work in March and a Petroleum Coordinator in November 1991.

HYDROCARBON DISPLAY

A portable SOPAC display illustrating and explaining the hydrocarbon potential of Papua New Guinea, Solomon Islands, Vanuatu, Fiji and Tonga was prepared by SOPAC and BMR for regional industry conferences. It was displayed at the 1991 Australian Petroleum Exploration Association annual conference in Melbourne, attended by the SOPAC petroleum geophysicist and the government geologist from Tonga. A duplicate of the display is kept at Techsec for exhibition at various venues.



Tom Muller and Peter Butler of BMR, Bill Barclay of Techsec and Saimone Helu of Tonga at the SOPAC stand, Australian Petroleum Exploration Association Conference, Melbourne.

TRAINING PROGRAMME

Training is an important part of the SOPAC Work Programme and continues to be maintained at a level where expenditure on training activities is ten percent of the total SOPAC budget.

Activities are many and varied, and include general education of island member country nationals in the earth sciences as well as technical, scientific, and management training in marine and coastal geology, environmental geology, and non-living resource assessment.

As a result of a decision made by the Governing Council at the 19th Annual Session in 1990, a comprehensive, independent review of the Training Programme was made during 1991. The review team found widespread satisfaction among member countries with the past and

present training programme showing that training is needed, is effective, and that demand is likely to continue to increase over the next five years.

COURSES

The focus of training courses offered continues to be the Certificate in Earth Science and Marine Geology, a three year course held for three months each year aimed at improving the skills of technicians and field assistants in the region. To date, twenty nine students have graduated, and fourteen participants in a course that began in 1990 are expected to graduate in 1992.

During the last year, seven students have benefited from SOPAC Scholarships for first degree training in earth sciences.

ON-THE-JOB ASSIGNMENTS

During 1991, 48 SOPAC Fellowships were awarded for island nationals to travel within the region for practical training in the field and at Techsec. Management training was held in conjunction with the SOPAC Annual Session and the Deputy Director of the Department of Geology Mines and Rural Water Supply, Vanuatu, was attached to Techsec for seven months. Six island nationals have participated in

cruises on foreign research vessels in their country's waters. Support was provided for 15 island nationals to attend five international conferences.

WORKSHOPS

The 1991 SOPAC Coastal Mapping Workshop was held in Fiji. Fourteen participants from ten member countries attended and gained experience in the techniques of mapping the coastal and nearshore zone.

SOPAC WORKSHOP ON CONCRETE IN TROPICAL MARINE ENVIRONMENTS

A four-day workshop on Concrete in Tropical Marine Environments of the South Pacific was held in Fiji in October, organised by SOPAC in conjunction with the South Pacific Ports Association and assisted by KRTA. Participants included engineers and other technical people from ports authorities, government departments and consultant firms in the region.

While SOPAC is normally more concerned with understanding coastal pro-

cesses than with civil engineering, but no other organisation was in a position to organise the workshop, which had long been identified as an outstanding need in the region.

The objectives of the workshop were:

- to review the availability and use of concrete aggregates in steel reinforced concrete;
- to examine projects in the field;
- to discuss the application of various type of concrete mix additives;
- to determine data requirements for aggregate selection;
- to identify training requirements

A number of recommendations emerged from discussion, including the development of an aggregate quality data base for the region, a study of coral material in concrete, the use of environmental management systems for all developments and projects, the development of a maintenance manual for concrete structures, and the need for continued training.

Participants of the Concrete Workshop at Levuka, Fiji.



In conjunction with the Annual Session, a Workshop on Minerals Policy was held in Luganville on Santo, Vanuatu, attended by twenty three participants from eleven island member countries.

In October, a regional workshop on Concrete in Tropical Marine Environments was held in Fiji in conjunction with the South Pacific Ports Association (see box) and was attended by eighteen participants from nine member countries.

In May, a national workshop on coastal mapping was held for 25 physical planning students at the College of Higher Education in the Solomon Islands. In November, a national workshop on petroleum geology was held in Papua New Guinea for seven geologists and engineers from the Department of Minerals and Energy and from oil companies. These two workshops were follow-on activities to similar workshops held in 1990. Also in Papua New Guinea, a three day geophysics course was held at the University in Port Moresby for twenty four students.

National workshops were also held in Kiribati for 13 students (Introduction to Geology), and in Solomon Islands for 25 students (Coastal Mapping).

TRAINING ASSISTANCE

Techsec continues to assist the University of the South Pacific with the Ocean Resources Management Programme and development of a Marine Studies Programme. Continuing discussions have been held with the UNDP Regional Water Resources Project with regard to incorporating the regional training needs in hydrogeology with those of existing SOPAC training activities.

Staffing: The Training Coordinator was joined by an Assistant Training Coordinator in November 1991 bringing the number of full-time professional staff to two.



Coastal protection structures at Fongafale, Tuvalu. Without good information on coastal processes, the considerable investment in these structures may be offset by inappropriate siting or high maintenance costs.

TECHNICAL SUPPORT PROGRAMME

Technical support is provided by data management, drafting, publishing, library services, computing services and field operations. A major review of Techsec computing requirements has been completed in an attempt to rationalise the use of computers in the implementation of the SOPAC Work Programme. As a result, a Computer Services Manager is being recruited and other recommendations concerning hardware and software purchasing and use are being followed up.

DATA MANAGEMENT

The management of a large amount of scientific data and the provision of ready access to it is fundamental to SOPAC's work.

During 1991, the offshore cruise database has been expanded northward from 5° to 18°N to include data from new SOPAC member countries Federated States of Micronesia and Marshall Islands. Databases holding navigation, bathymetry, magnetic, gravity, and deepsea mineral data from offshore cruises have been maintained, and indexes prepared to offshore cruises and data stored at Techsec. A new SUN sytem was installed, multi-channel seismic tracklines were digitised, and several reports were prepared for member countries on data held at Techsec.

was published, providing an overview of the organisation, Work Programme activities and finances. A new-look Proceedings was published, solely as a report on the Annual Session. Three issues of SOPAC News were produced, providing information on the Technical Secretariat, progress on the Work Programme, and lists of recent SOPAC publications. The newsletter is distributed to about 600 contacts world-wide. The second issue of SOPAC Projects was published, providing easily-read summaries of key SOPAC technical reports to ensure that their content is accessible to as wide an audience as possible. A video promoting SOPAC was also produced and distributed.

TECHNICAL INFORMATION

Publications

About 50 Technical, Cruise, Preliminary and Miscellaneous reports were edited and distributed during the year. A Technical Bulletin was published (see box) on the Coastal Processes Workshop in Lae, PNG. SOPAC's first Annual Report (for 1990)

Drafting

A major part of the work by drafting services is the compilation and production of bathymetric and coastal morphology maps, both in conjunction with work of the Coastal and Nearshore Programme and in response to direct requests from member governments. During 1991, four Western Samoa (Upolu) and two Cook Islands (Rarotonga) coastal morphology maps were published and work continued on several other

TECHNICAL BULLETINS

SOPAC Technical Bulletins now have a new format. The A4 page size is easier to read and less costly to produce and the glossy colour cover is a more attractive presentation than the old style. The first in the new format is Technical Bulletin 7, Workshop on Coastal Processes in the South Pacific Island Nations. It is planned to publish a new bulletin each year on average. The next will publish the results of SOPAC's recent offshore GLORIA survey; others may include compilations of related field studies, or papers given at training workshops and seminars.

maps; 17 bathymetric and six coastal morphology maps are now available in draft form. Work on the SOPAC Geophysical Atlas continues with the tectonic map almost completed and with major progress being made on the sediment map. Training in bathymetric drafting and coastal morphology mapping has continued.

Library

A specialist library at the Technical Secretariat includes the provision of information services to improve the effectiveness of marine geological researchers and other users of geological information in the South Pacific region. The library is now fully operational and the bibliographic database established. As well as the book and serials collection, the Techsec library also maintains collections of maps and charts, aerial photographs, and news articles. Current awareness and reference services, and inter-library loans are provided to Techsec staff and member governments direct, and to others through PIMRIS. During the year, assistance was provided to member government libraries in Solomon Islands, Tonga, Fiji and Vanuatu.

TECHNICAL SERVICES

The successful implementation of much of the SOPAC Work Programme, especially in the Coastal and Nearshore Programme, is dependent on the services provided by Technical Services. Electronic and mechanical equipment and operational support was provided to more than 12 major field surveys during the last year. Equipment maintenance, including Techsec computers, and arrangements for the shipping of equipment around the region are a major con-



Part of the Electronics Workshop at Techsec.

sumer of workshop staff time. Technical Services have also developed a digital nearshore mapping system for coastal and nearshore work. Training in the implementation of field work, including the operation and maintenance of equipment, has been carried out on all surveys.

Staffing: Professional Technical Support staff consist of Data Manager and Computer Mapping Geologist (Data Management); Chief Draftsman (Drafting); Technical Editor and Assistant Editor (Publications); Librarian and Assistant Librarian (Library); and Electronics Engineer (Technical Services). With training of the Assistant Librarian nearing completion, the present Assistant Librarian will be promoted to Librarian early in 1992 when funding for the present Librarian ceases.

Appendix 1

TECHNICAL SECRETARIAT STAFF LIST

MANAGEMENT

Director	J. Kotobalavu
Deputy Director	J. Eade
Finance & Admin. Controller	U. Farook
Programme Co-ordinator	T. Toatu
Executive Secretary	J. Brown
Senior Technical Secretary	L. Baravilala

FINANCE AND ADMINISTRATION

Accountant	A. Pal
Administrative Assistant	N. Whippy
Assistant Accountant	M. Salusalu
Secretary/Registry Clerk	A. Olssen
Receptionist/Clerk	U. Bainiloga
Driver/Clerk	E. Gaunavou
Cleaner/Office Assistant	N. Daurewa
Watchman/Security (on roster basis)	T. Cama
	W. Tuberi
	I. Sogo

TECHNICAL PROGRAMMES

Coastal and Nearshore Programme

Coastal Geologist	vacant
Coastal Geologist	R. Gillie
Coastal Engineer	B. Holden
Marine Geologist	R. Smith
Marine Geologist	W. Collins
Computer Mapping Geologist	recruiting
Wave Engineer	E. Olsen
Dredging Engineer	S. Pow

Hydrocarbon Programme

Petroleum Coordinator	J. Rodd
Petroleum Geophysicist	W. Barclay

Offshore Programme

Offshore Coordinator	D. Tiffin
Marine Geologist	Y. Kinoshita

Training Programme

Training Coordinator	R. Howorth
Asst. Training Coordinator	T. Kitekei'aho

Technical Secretaries

Technical Secretary	L. Waradi
Technical Secretary	L. Kamali
Technical Secretary	A. Nata
Technical Secretary	S. Prasad

Technical Support Programme

Data Management

Data Manager	Y. Morel
Computer Geologist	B. Medina
Computer Operator	B. Bakoso

Technical Information

Technical Editor	A. Sherwood
Assistant Editor	L. Bukarau
Librarian	H. Creech
Assistant Librarian	D. George
Chief Draftsman	P. Woodward
Draftsman	N. Naibitakele

Technical Services

Electronics Engineer	E. Saphore
Computer Systems Manager	recruiting
Snr Electronics Technician	recruiting
Electronics Technician	P. Naqau
Marine Mechanic	J. Mausio
Snr Geology Technician	S. Motuiwaca
Technl Support Assistant	recruiting
Workshops Assistant	S. Ratu

Appendix 2

1991 BUDGET

SUMMARY OF ANTICIPATED INCOME INCLUDING IN-KIND SUPPORT CONTRIBUTION

Executive Management	538,605
Coastal and Nearshore Programme	1,446,798
Hydrocarbon Programme	337,300
Offshore Programme	3,270,142 *
Training Programme	929,220
Technical Support Programme	1,382,242
Finance, Administration and Special Support Services	648,382
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TOTAL	8,707,588
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* includes \$3.1M of nominally assessed in-kind ship time