SOPAC

SOUTH PACIFIC
APPLIED GEOSCIENCE COMMISSION

1993
Annual Report Summary

CONTENTS

South Pacific Applied Geoscience Commission
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FOREWORD

Philipp Muller, Director

This year saw a high level of achievement on work program objectives and improvement to several key aspects of SOPAC's services to its member countries.

Integration of the various technical sessions into the one meeting has improved efficiency of the Annual Session, reducing significantly the time and resources spent on it while strengthening Governing Council's involvement. Although prioritisation of the work tasks needs to be further strengthened, changes in the work program and budget format will facilitate these improvements. This format can accommodate an uncertain pattern of funding that seems likely to persist in the future.

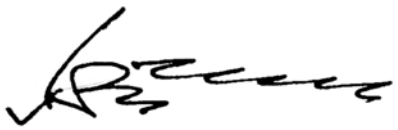
Despite continuing severe losses in scientific personnel in the field programs the Secretariat was able to maintain a very creditable output in surveys, studies and reports. Workshops, seminars and training fellowships were also maintained at the highest level possible. Great advances were achieved in the development of computer systems that serve data base and mapping capabilities as well as field surveys, analysis and report preparation. Such systems have contributed significantly to maintaining the high output of the Secretariat.

Monitoring of the physical coastal environment continued in several member countries. Surveys continued to seek sustainable sources of sand and aggregate. Progress was made on a regional approach to improving coastal protection practices. Data collection continued in the wave energy program. A systematic study of the occurrence of manganese nodules for the region has been completed and reported on in map form. The reprocessing of existing seismic profiles for hydrocarbon evaluation has been completed and a proposal finalised for further surveys. Promotional brochures are now available for those member countries with unrealised hydrocarbon potential. Geographical Information Systems and remote sensing have become essential technologies that the Secretariat is rapidly adopting. Similarly, to provide member country access to SOPAC's Regional Data Centre, development of a regional communication network has become urgent. These development efforts, although showing little immediate return, will have tremendous benefits in the future.

The Secretariat now stands poised with field survey and computer equipment geared to the new tasks and directions it is being asked complete. Although refinements are likely in the future, the systems are in place both at the Secretariat and in many of the member countries to ensure that the delivery of services will be as efficient as is possible.

Of increasing concern to SOPAC is the counter-reaction to marine mineral resources development and its implications for funding in this area. Until some priority is returned to it, possibly years of data collection opportunity will be lost, delaying the economic inputs that marine resources in a resource-poor region could provide. Physical preservation of the coast is utterly fundamental to many of our member countries, and SOPAC's studies of coastal erosion and their causes, the effects of man-made structures and sand mining on the coast, and the interaction of natural and human-induced coastal changes provide the only practical advice these countries receive. Some of our work is to search for alternative resources to prevent environmental degradation, including our ocean energy program and searches for sustainable sources of construction materials. Delays in bringing into production offshore sources of sand and aggregates could set back irrevocably steps to mitigate coastal erosion as beach mining continues uncontrolled.

Competition for aid funds has become severe and created a greater demand for transparency and accountability by donors. The popularity of environment and sustainable development arising from the green vote has actually resulted in less information in geoscience being collected for analysis in the future, yet geoscience plays a key role in those agendas.



D.A.P. Muller CSI, AM
Director

INTRODUCTION TO SOPAC

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

- provide information on the physical environment of coastal areas to assist with resource and environmental management, coastal protection works, and with planning and implementation of coastal development projects

- study geological hazards

- investigate the resource potential for onland, coastal and deep-sea minerals including construction materials, phosphates, cobalt-rich crusts, manganese nodules, polymetallic sulphides, and detrital minerals such as gold

- assess and promote the hydrocarbon, wave and geothermal energy potential of the region

- assess the water resources of the region

- coordinate marine geological and geophysical research being carried out in the region and manage the resulting data on behalf of the member countries

- train member country nationals and improve the institutional capabilities of member countries in the application of geoscience to the management and development of their non-living resources and coastal zones.

The Commission comprises the Governing Council (the member country representatives), the Secretariat, and the Technical Advisory Group (TAG). TAG comprises advisors who are nominated by member countries and by supporting Governments and organisations, or are invited by the Secretariat.

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

The Commission's Work Program is formulated from member country requests, and is carried out by its Secretariat based in Suva, Fiji.

MANAGEMENT PROGRAM

New management systems have been established at the Secretariat following the Review and Evaluation of SOPAC. A new program structure involving more participation by program leaders has been established. Beside providing management inputs to the technical work of the Secretariat, program leaders provide advice to management on the complete range of SOPAC activities. However with reduced staff numbers management is required to spend increasing time on some activities, including wave and ocean energy, technical workshop management, consultancy arrangements, and tendering.

A project monitoring system has been developed and will be progressively implemented to provide ready access to up-to-date information for planning, management, programs and financial control. Medium-Term Plan has been drafted and will be further developed in 1994. The development of proposals for funding of the new SOPAC Headquarters, including a Training Centre and accommodation, is well advanced.

During 1993, management made member country visits to Federated States of Micronesia, French Polynesia, Guam, Marshall Islands, New Caledonia, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa. Contact with donors has been increased and new projects continue to be developed.

FINANCE

The annual budget of SOPAC is reviewed and set by the Governing Council at its Annual Session. At its 21st Annual Session in Nuku'alofa in September-October 1992, the Governing Council approved a total Budget of F$9,976,957 for 1993, including F$3.5M for a one-off swath mapping survey funded by the EC. At its 22nd Annual Session in Fiji in October 1993, the Governing Council approved a total Budget of F$6,468,850 for 1994. These budgets were to be covered as follows:

Contributions		1993 (F$)	1994 (F$)
Cash	General Purpose	919,874	1,170,000
	Special Purpose	8,079,783	4,630,750
*In-kind	- Special Purpose	977,300	668,100
Total		9,976,957	6,468,850

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

STAFFING

The recuitment of the Mapping Geologist and Computer Systems Manager at the end of 1992 and the Senior Electronics Technician at the beginning of 1993 improved the mapping capability, the computer systems and the operation of the workshop at the Secretariat. However, the departure of the Offshore Coordinator, Petroleum Coordinator and Pertoleum Geophysicist towards the end of the year will considerably affect the technical output of the Secretariat in 1994 unless further funding support is secured.

FUNDING

Most of SOPAC's income comes from project-based donor support, making the organisation vulnerable to changes in donor funding. Major changes of donor support in 1992 have continued to affect the implementation of the Work Program in 1993. In addition, there continue to be increased demands for accountability, both to member countries and donors, for resources, results and benefits.

The flexibility that SOPAC has to allocate resources has been limited by the size of the General Purpose Fund. At its 22nd Annual Session, the SOPAC Governing Council adopted a new formula for membership contributions so that a Primary Function and a Basic Program, as approved and representing about 12% of total budget, would be funded out of contributions. The formula adopted for contributions is based on that used by the Forum Secretariat. The principal effect was to transfer grants from Australia and New Zealand to membership contributions for 1994. Contributions by Pacific Island members are set at two levels. Most contributions are little changed except that athough Tuvalu is placed on the lower level, its contribution is increased.

SOPAC will need to increase its efforts to attract donor support for its work in a climate of increasing competition for a decreas-

ing pool of aid funds if it is to avoid a steep decline in its services to member countries.

Australia continues to provide substantial and increasing support for SOPAC. Australia currently supports eight positions with most support going to coastal work, especially mapping and aerial photography, and also to management and training. The ability of Australia to respond rapidly to urgent requests has proved most valuable. Regular contact with AIDAB is maintained through their office at the Australian Embassy in Suva.

Fiji continues to support SOPAC with an annual special grant. It is also plans to contribute towards the cost of the construction of the new SOPAC headquarters to be built in Suva.

New Zealand has continued to maintain its strong support of SOPAC, especially the Information and Training Programs, and special coastal projects and consultancies. New Zealand currently supports three staff positions: Publications Coordinator, Librarian, and Training Coordinator. Regular contact with New Zealand is maintained through the New Zealand Embassy in Suva.

The closure of the Canadian agency ICOD has continued to have negative implications on the SOPAC Work program, especially the Coastal Program. All Canadian-funded projects are affected, including the CIDA-funded C-SPOD programs. While funds under existing signed agreements are secure, no new agreements can be entered into. Extensions have been obtained for projects beyond the stated time limits using savings but remaining within the overall amount of funds approved. As a result it is now expected that are sufficient existing funds for ICOD-funded project 'Nearshore Minerals' and the C-SPOD-funded project 'Coastal Development' to extend well into 1994. However, limited funds allow support for only one full staff position (reduced from six at the beginning of 1992); other activities will continue at a reduced level through the use of consultants. Support for the SOPAC Training program has continued with funds for scholarships and fellowships. A workshop on Computerised Data Management has also been supported. The other two C-SPOD projects, 'Offshore Coordinator' and 'Hydrocarbon Program', conclude in October and December 1993 respectively. The ICOD project 'Strengthening Technical Information Services in Marine Geology and Non-Living Resources for the South Pacific Region' concluded at the end of 1992 after being extended for 12 months. A new management group for C-SPOD I has been selected but the future and timing of C-SPOD II is still uncertain.

French Government support has continued to be strong. A new position, Computer Mapping Geologist, has been established and was filled in November 1992. Support also continues for the positions of Computer Geologist and Computer Operator. French funds provide valuable support for SOPAC's mapping programs, especially in coastal areas, and in the use of computers, especially GIS software. Remote sensing is also being developed. Support from French institutions IFREMER and ORSTOM remains strong with continuing in-kind support. French support is coordinated by the French Embassy in Suva.

The Government of Japan provides substantial support for the Offshore Program, including the services of an Offshore Geologist. Under a special joint agreement, Japan also provides two months of ship survey time each year on the *Hakurei Maru No 2.* to investigate deepsea mineral resources in the SOPAC region. Substantial new information and detailed reports stem from this work. In 1993, survey work was carried out in Solomon Islands waters.

Support from the Norwegian Government through NORAD continued into 1993, the second year of a two year extension of the existing Wave Energy Program. The wave measurement and wave climate studies are designed to conclude at the end of 1993 with the wave database being transferred to the Secretariat, a wave climate study concluded, and theoretical and practical training associated with all parts of the program completed. SOPAC has approached NORAD for further support for 1994, including some final activities on the wave energy project and investigation of a possible ocean monitoring project.

CFTC have affirmed their continuing interest in supporting professional positions at the Secretariat and in training. During 1993 they supported the position of Petroleum Coordinator and have reaffirmed their willingness to continue their support for this position in 1994. Support for a second position was not possible during the reporting period due to restructuring and budget constraints. CFTC technical experts are provided with a small travel grant to assist with regional travel in connection with official duties. CFTC also continue to provide substantial support for training, especially for the Certificate Course in Earth Science and Marine Geology.

EC-funded projects under Lome III continue to have a major impact on the SOPAC Work Program. EC funding supports 11 staff positions at the Secretariat, including support for the new position of Computer Systems Manager from January 1993. The EC also provides major support to coastal field activities and the Offshore Program, and supports selected activities within the Training and Hydrocarbon Programs. Within the Offshore Program, substantial assistance is being provided to seabed mapping activities. Tenders for dual system multibeam mapping were approved by the EC in Brussels in late 1992. Six tenders were received. Following detailed assessment and approval according to EC rules and procedures, the contract was awarded to IFREMER in mid-1993. A three-leg, 90-day survey by *L'Atalante* concluded in mid-October. Tender documentation for the purchase of equipment including computers was approved in late 1992, and following the implementation of EC tender procedures, was ordered and started arriving at the Secretariat in mid-1993. The computers arrived in time to be used for a Workshop on Minerals Database Use and have subsequently been sent to most SOPAC member countries. Further discussion on possible submissions to the EC for support under Lome IV has been made during the last year. Priority is being given to projects on coastal protection strategies and mineral resource assessment.

Following a decision by SPOCC that SOPAC be the lead agency for water resources assessment and related studies, the Secretariat has had discussions with UNDP on the integration of the UN Water Resources Project into SOPAC. UNDP is approving a second one-year extension of the project to mid-1994, with a strong expression of support beyond that time, to allow a smooth transfer of project administration and management to SOPAC.

COASTAL PROGRAM

SOPAC studies physical aspects of the coastal environment. The work includes investigations of coastal mineral resources; assessment of geological and oceanographic processes; study of problems related to coastal erosion, protection, and development projects; and mapping of the coastal zone. One important application of the work is to assist with coastal management by providing data against which any future coastal changes can be measured. Associated training activities improve in-country expertise. The 1992 reduction of staff numbers continued to constrain progress in the Coastal Program during 1993.

COASTAL MINERALS

SOPAC has an established program to evaluate construction material resources in the coastal zone. Increasing demand due to construction of wharves, jetties, seawalls, buildings, airports and landfill projects has added tremendously to the pressure already placed on traditional sources of sand and aggregate such as beaches, reef flats and storm deposits, resulting in environmental concerns for sustainable development.

In 1993, bathymetric and sediment maps, together with data on aggregate mining, were compiled for Tarawa Lagoon, Kiribati, as part of a study to improve the management of the removal of construction materials from the coastal zone. Data were also collected to assist with assessment of the environmental impact of dredging the Fafa sand deposit, Tonga, as an alternative to beach mining. The Borrow Pit Infilling Pilot Project in Tuvalu was completed in September and a report is being prepared on the feasibility of using lagoon sediment to reclaim the World War II borrow pits and low lying areas on Fongafale, which represent about 30% of the land area.

SOPAC also has an ongoing program to evaluate and encourage exploration for detrital and placer minerals. Regional studies are focused on the volcanic islands, and compilation is in progress of existing information on placer minerals in Fiji, Solomon Islands and Vanuatu. In 1993, work was carried out in Solomon Islands, Fiji, and Vanuatu, mainly on detrital gold.

COASTAL MAPPING

SOPAC conducts geological, bathymetric, and air photo surveys of the coastal zones of member countries to produce maps for coastal management, development planning, coastal hazards protection, mineral exploration and resource assessment. SOPAC's in-house aerial photography capability is used extensively for coastal zone mapping, providing an important historical database for monitoring coastal changes such as erosion and the effects of coastal development projects. Member countries can also use the photographs for coastal management and land use planning. In 1993, work was completed in Cook Islands, Fiji, Federated States of Micronesia, Kiribati, Tuvalu, Tokelau, and Papua New Guinea.

As well as these physical applications, SOPAC maps and data are used for fisheries management, including deep-water FAD deployment and identification of potential deep- water fishing grounds. SOPAC has provided bathymetric data and maps to other regional bodies, primarily FFA and SPC, for fisheries-related projects in Fiji, Papua New Guinea, Solomon, and Tokelau Islands.

A vertical airial photo survey was carried out as part of a study of of erosion sites in the Gilbert Islands Group, Kiribati. SOPAC also assisted in planning a vertical aerial photo survey of NW Aitutaki, Cook Islands, and arranged funding to re-fly coastal Rarotonga to replace photos lost in a recent fire. The Secretariat also provided advice on the potential for surveying reef channels using low-level aerial photography to provide information on passages for tourist vessels in remote areas of Fiji .

Coastal maps of Lelu Island, Federated States of Micronesia, prepared during the 1992 Coastal Mapping Course, were digitised during a training attachment. Base maps were compiled for the 1993 Coastal Mapping Workshop held in Touho, New Caledonia.

Lagoon bathymetry maps were compiled for Tarawa, Kiribati, and Majuro, Marshall Islands. Nearshore bathymetric maps were also compiled for Avatiu and Avarua, and support for sediment sampling and bathymetry was provided for investigations in Penrhyn Lagoon, Cook Islands. Compilation was completed for the last of six sheets in the 1:250 000 bathymetric series maps published by Mineral Resources Department, Fiji. Printing of the bathymetry of SE Viti Levu, important for assessing the proposed offshore tailings outfall for the Namosi

copper mine project, was delayed to allow the inclusion of new swath data from the *R.V. L'Atalante.* A seabed morphology and bathymetric map was also compiled for the waters surrounding Yasawa Island, Fiji.

A computer mapping capability is being expanded within the Regional Data Centre at the Secretariat to increase the productivity and numbers of maps produced by the organisation through the use of computers, and to move toward distribution of digital products replacing the traditional paper products. The Secretariat manages bathymetric and coastline data for the region, and these data have subsequently been copied to other organisations including FFA, SPREP, Fiji MRD, and ORSTOM.

Many maps were created during the year using computer facilities at the Secretariat, some as the result of training exercises in which an in-country task from the SOPAC Work Program served as a base for the training exercise.

A remote sensing capability is being revived at the Secretariat, following a pilot project in the late 1970s. Cooperation is maintained with ORSTOM and the Polynesian Remote Sensing Facility in Tahiti.

COASTAL MANAGEMENT

SOPAC's surveys of geological processes in the coastal zone include historical air photo interpretation, beach profile monitoring, sediment budget studies, and review of the history of foreshore and harbour developments. Natural hazard impacts on the coastal zone from cyclones, storm surges, tsunamis, coastal erosion and sea level rise are also assessed. The results are applied to development projects to optimise the design and operation of coastal structures and to minimise any adverse effects.

These studies are closely linked to other aspects of the Coastal Program, such as coastal mapping, which all contribute to the process of Coastal Management. The work applies from the village to the national development level. Through these studies, SOPAC is increasing the understanding of natural coastal processes in the Pacific and is providing advice to member country governments to assist with coastal management.

Coastal work is an important area of cooperation between SOPAC and SPREP. SOPAC's Coastal Program compliments SPREP's Integrated Coastal Management and Planning Program through the provision of geoscience data and information. In a recently drafted Memorandum of Understanding between the two organisations, it was agreed that SPREP and SOPAC will co-operate and assist one another in the development, implementation and continuation of Integrated Coastal Zone Management within the region. It was recognised by both parties that SPREP is the lead agency responsible for coordinating and implementing national and regional environmental activities, and that SOPAC is the sole regional agency responsible for the acquisition, assessment, and provision of geoscience data, information, and advice.

In 1993, SOPAC completed a reconnaissance survey of coastal erosion problems in the outer islands of the Gilbert Group of Kiribati. This was a logistically difficult and expensive exercise, but gave new insight into the processes of coastal erosion on atoll islands which has widespread application in the Pacific. A major conclusion was that cycles of coastal erosion were closely linked to short-term weather cycles, especially El Nino events. Also in Kiribati, a study of Betio shoreline positions taken from air photo coverage since 1943 gave an accurate picture of coastal evolution over an unusually long period. Erosion problems associated with the Nippon Causeway channel were investigated, and progress continued on producing public awareness materials on coastal issues for Kiribati, both for radio broadcast and written brochures. The material will have application to other SOPAC member countries. Current meters were deployed for physical oceanographic studies in Kiribati as well as in Solomon Islands, Tonga, and Fiji.

A study of coastal erosion at Ranadi Beach, Solomon Islands, indicated that changes in the natural supply of sediment to the beach were causing long-term erosion to which beach mining was contributing. It was recommended that sand mining from the beach be stopped.

In response to a request from the South Pacific Forum, SOPAC and SPREP prepared a report on coastal protection systems in the region, a significant step forward in combining information on engineering and physical coastal processes in a Pacific context, and the first step towards producing a coastal design manual focused on design conditions, available material

resources and skills in Pacific Island countries. In a technically related area of cooperation, SOPAC participated in an international SPREP meeting to develop a document on integrated coastal zone management.

OCEAN ENERGY

The wave energy program is establishing a detailed database of measured wave parameters for sites in Cook Islands, Fiji, Tonga, Tuvalu, Vanuatu, and Western Samoa as well as establishing a regional wave climate for the central and South Pacific so that wave parameters can be calculated for any site in the region. Pacific Island nationals are being trained to use the information to assist with their country's development of renewable energy.

By September 1993, non-directional wave data sets were completed for Cook Islands, Tonga, Tuvalu, Vanuatu and Western Samoa, and directional wave data measurements completed in Tonga, Vanuatu and Western Samoa. Wave data reports for each country up to the end of 1992 were received from the contractor OCEANOR, and the wave database was transferred from OCEANOR in Trondheim, Norway, to SOPAC with assistance from OCEANOR consultants and the Fiji Energy Department. The wave climate study, begun in 1992, is continuing.

The Secretariat maintains a watching brief on developments with OTEC, and assistance was given to Marshall Islands to help them select a contractor to carry out a detailed feasibility study of establishing an OTEC power and fresh water plant on Majuro.

FIELD SUPPORT AND EQUIPMENT

The wide variety of field activities undertaken by SOPAC requires that a large inventory of geological, geophysical, oceanographic and navigational instruments and associated support equipment be available at the Secretariat for use on the surveys that are conducted throughout the region each year. This inventory of specialised equipment is a regional asset with a value exceeding F$1 million. The Secretariat also has the expertise, developed over two decades, to mobilise this equipment for use anywhere in the region.

In 1993, a total of 15 surveys were mobilised to seven member countries: Fiji, Tuvalu, Tonga, Vanuatu, Kiribati, Solomon Islands, Cook Islands and Western Samoa. New EC-funded field equipment was ordered after a major evaluation of available systems.

HYDROCARBON AND OFFSHORE PROGRAM

SOPAC's offshore work investigates mineral potential in deepsea areas, promotes mineralised areas, advises and assists member countries on management and development of their deep sea areas, maintains mineral databases, advises member countries of research vessels planning to work in the region and publishes their schedules, plans offshore investigations and seeks ship time to carry them out when approved by member countries. SOPAC also carries out seafloor mapping surveys and investigates mineral potential, geological hazards, and geoscience problems in the region, and coordinates the work of foreign research vessels operating in the region. SOPAC has been active in the promotion of regional science and its relationship to economic potential through STAR, the Science, Tectonics and Resources organisation sponsored by SOPAC.

Hydrocarbon studies by SOPAC have enhanced prospects of the region through a better understanding of the geological setting, source rocks, hydrocarbon generation, reservoirs and seals. Much of this is due to reprocessing of seismic data using state-of-the-art technology and the application of new geological concepts. In addition to commercial fields in Papua New Guinea, the island member countries of Fiji, Solomon Islands, Tonga and Vanuatu are considered to have good potential for hydrocarbons.

PROMOTION TO OIL INDUSTRY

The aim of the Secretariat's promotional activities is to attract international oil companies to invest in exploration. It is only through such exploration that the oil and gas prospects can be drilled and commercial discoveries made.

Member countries' petroleum potential was promoted at three international industry conferences: Circum-Pacific Council for Energy and Mineral Resources (CPCEMR) in Kuala Lumpur, APEA in Brisbane and the Second PNG Petroleum Convention in Port Moresby.

A promotional brochure was produced for Fiji summarising the results of the technical evaluations of the petroleum potential of Bligh Water and Bau Waters Basins.The Secretariat published four papers in oil industry and scientific journals. The Secretariat also assisted the Governments of Fiji and Tonga in announcing acreage offers to the oil industry worldwide in the publications of PetroVentures and Petroconsultants.

A Petroleum Data Package was set up for Fiji at the SOPAC Petroleum Data Bank. The Data Package comprises all available seismic and other geophysical data, geological reports and maps, and well reports. Data Packages now exist for Fiji, Solomon Islands and Vanuatu, providing a valuable resource for hydrocarbon resource evaluations and to oil companies interested in assessing oil and gas prospects.

As a direct result of the Secretariat's promotion activities, more than 30 enquiries from oil companies and their representatives were received by member countries and the Secretariat during 1993 and three large international oil companies visited the SOPAC office for technical presentations. It is important to build on this by mounting promotion tours and by continued promotion at international oil conferences.

PETROLEUM EVALUATION

A detailed structural analysis and petroleum evaluation of the Aure Fold Belt (the offshore extension of the oil/gas-producing Papuan Fold Belt) in the Gulf of Papua Basin, PNG, was completed to assist the Department of Mines and Petroleum to establish new prospective areas for hydrocarbons.

An evaluation of the petroleum potential of Fiji for the Mineral Resources Department showed that there are source rocks, reefal reservoirs and seals that may combine to trap hydrocarbons. Over twenty possible traps were identified in Bligh Water and Bau Waters Basins. The Secretariat assisted MRD in the sampling and analysis of an offshore oil seep in Bligh Water Basin which confirmed the presence of hydrocarbons.

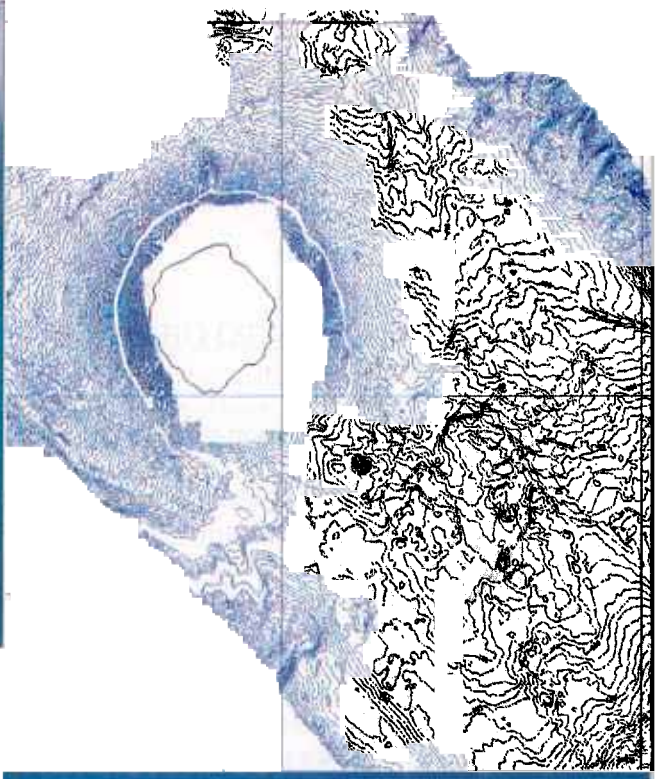
SOPAC employed BGS consultants to carry out comprehensive surveys of hydrocarbon source rocks in Solomon Islands and Vanuatu based on sampling and geochemical analysis of outcrop samples. Reprocessing of selected shallow water seismic lines considerably enhanced the resolution and display of the seismic data from both countries. Evaluation of the processed seismic data from Solomon Islands identified five areas have been with promising petroleum potential, with improved definition of seismic features including reefs, and turbidite bodies and large anticlines.

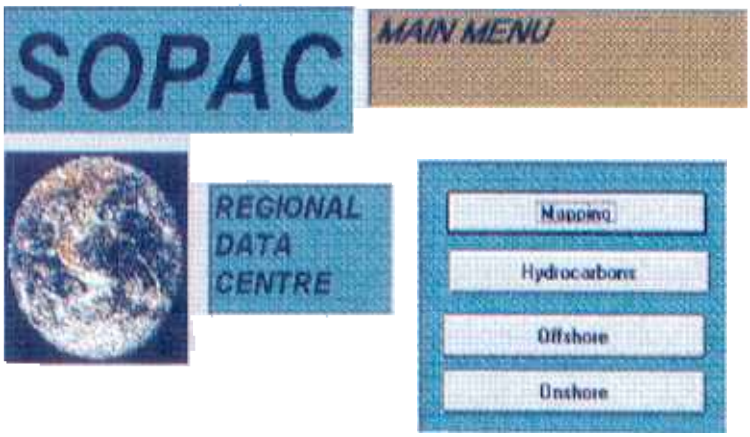
Evaluations of seismic data collected by the Tripartite cruises of 1982 and 1984 and other commercial data, have identified several areas in Fiji, Solomon Islands, Tonga and Vanuatu with fair to good petroleum potential. However, there are still large areas with either no, or insufficient, data coverage to make a proper assessment, and the Secretariat has prepared project proposals for a regional seismic survey program to gather new data in selected areas of Fiji, Solomon Islands, Tonga and Vanuatu. The proposals have been sent to SOPAC's advisory agencies and organisations for review and support for attracting funding from donors.

TRAINING IN HYDROCARBON EVALUATION

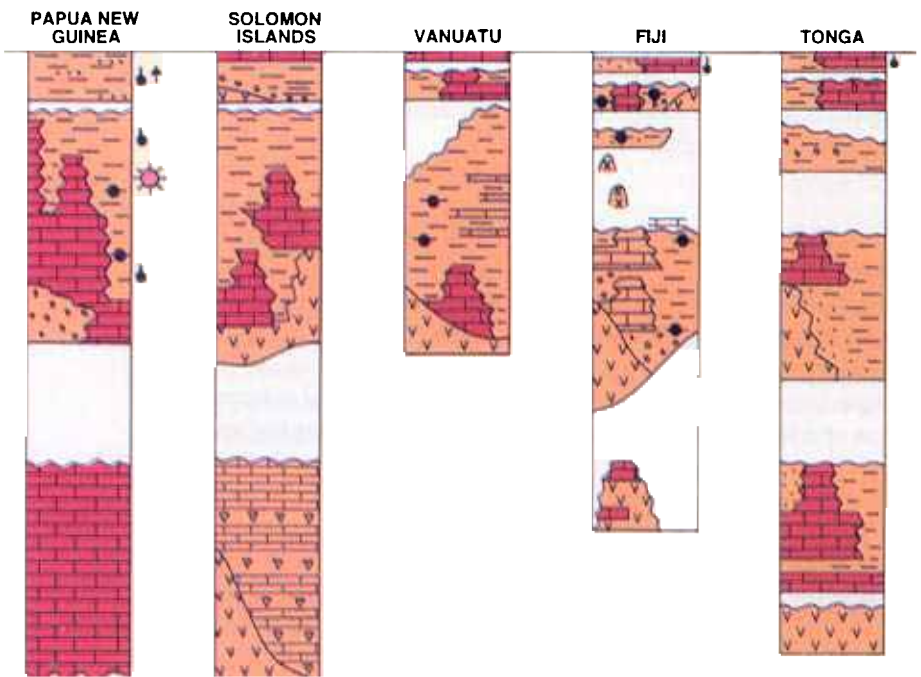
The Secretariat provided training for a government geologist from Solomon Islands Geology Division in geological basin evaluation and mapping, and for a geophysicist from PNG Department of Mining and Petroleum in structural interpretation and modelling of seismic data, structural mapping and

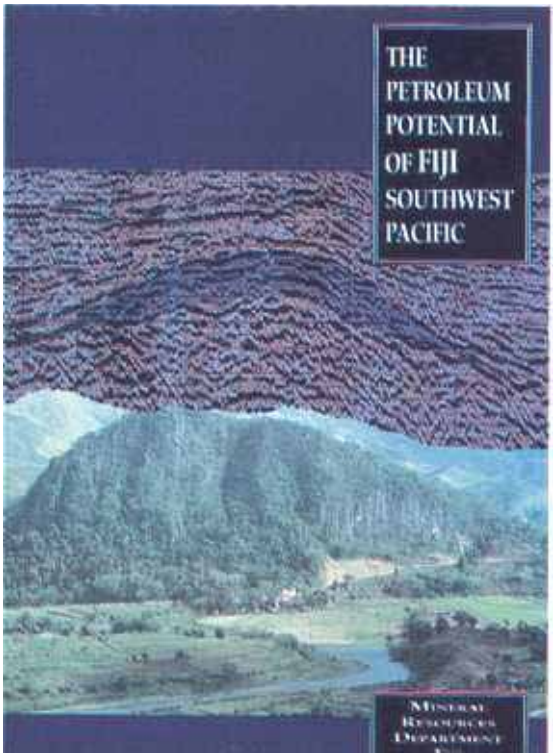
Cyclones can cause catastrophic short term damage to the coast, but the same process is vital for long term construction of coastal plains and of atolls. This photograph of almost total destruction by Cyclone Val of villages on Savai'i, Western Samoa, shows the real width of the active coastal zone.

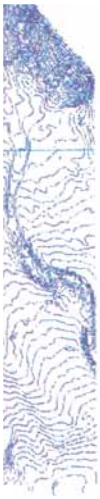




SOPAC's Regional Data Centre provides enhanced data management for member countries and the Secretariat.







Under contract to SOPAC and funded by the EU, IFREMER's R/V *L'Atalante* carried out a seabed survey of Fiji, Solomon Islands, Tuvalu and Vanuatu waters to assess resources and geological hazards, and to obtain bathymetric data for EEZ management, including assessment of fishing potential.

Training of SOPAC member country personnel in various aspects of geoscience improves in-country skills, including the capacity to utilise the results of SOPAC's work program.

Remote sensing can be a valuable tool for mapping remote parts of the Pacific.

Beach erosion is of great concern in the Pacific, and SOPAC carries out studies to determine the causes and solutions. Some erosion is a natural process; some is human-induced by removal of sand or poor coastal protection design. This maneaba in Kiribati has been built too close to a fluctuating shoreline.

'AC evaluates the hydrocarbon ntial of its member countries and ishes promotional brochures to attract

source rock burial and maturation modelling. Representatives of the Fiji, Tonga, Vanuatu and Solomon Islands governments attended petroleum conferences on fellowships arranged by the Secretariat.

PETROLEUM DATA MANAGEMENT

The SOPAC Petroleum Data Bank at AGSO in Canberra provides storage and data management facilities for all data relevant to hydrocarbon exploration on behalf of Fiji, Solomon Islands, Tonga and Vanuatu.

Since the early 1970s, over 70 000 line-km of seismic data have been acquired in SOPAC member country EEZs during 27 surveys by oil companies and a further 22 by scientific institutions. These data are a valuable resource and provide the basis for petroleum resource evaluations. Although the Secretariat holds seismic sections for many of these surveys on behalf of member countries, copies of the original field tapes are not all available. These tapes are now being retrieved and stored on behalf of member countries by the Secretariat.

The Secretariat has set up Petroleum Data Packages for Fiji, Solomon Islands and Vanuatu comprising all data required for evaluation of petroleum resource potential. Catalogues of the data have been prepared and distributed to oil companies worldwide.

PETROLEUM LEGISLATION AND POLICY

Legislation is essential to safeguard national interests and attract oil company investment. The substantial progress made by the Secretariat this year on legislation for Fiji, Solomon Islands and Vanuatu was largely based on the successful 1992 SOPAC-OIC Workshop on Hydrocarbon Legislation and Policy, held in Vanuatu. Following an in-country seminar for senior government officers, the Petroleum Act 1993 was passed by the Vanuatu Parliament.

In collaboration with the UNDESD (formerly UNCTC), the Secretariat provided draft Petroleum Regulations for the Solomon Islands and supplied Solomon Islands and Vanuatu with a suggested Petroleum Licencing Area and Block Numberiing System. Also in collaboration with the UNDESD, the Secretariat produced an economic analysis of oil prospects for SOPAC member countries showing the revenues that could be generated from typical prospects in the region, should oil be present. In the light of this analysis, modified fiscal terms were proposed which would be more attractive to potential investors.

DEEP-SEA MINERALS

Deep-sea minerals include manganese nodules, cobalt crusts, hydrothermal minerals, metalliferous sediments, and seamount phosphates.

The 1993 cruise of the *Hakurei Maru No* 2 under the Japan/SOPAC Joint Study Program investigated hydrothermal mineral deposits in the eastern Woodlark Basin and sampled for mineralisation volcanic centres south of the New Georgia Group in Solomon Islands. A small unmapped region of the Woodlark Basin west of the main survey area, partly in Solomon Islands and partly in Papua New Guinea waters, was mapped during the latter part of the survey to complete the mapping of the whole of the Woodlark spreading centre. Work began in late 1993 on setting up a SOPAC hydrothermal minerals database.

The SOPAC manganese nodule database was used to prepare 1:7 000 000 coloured maps showing sample locations, abundances, grades of copper, nickel or cobalt, bathymetry from the GEBCO digital database, and EEZs of the mapped region which covers Kiribati, Tuvalu, Cook Islands, Western Samoa and contiguous areas. The database was also used to complete a report for Kiribati on nodule potential in the Gilbert, Phoenix, and Line Islands groups. A draft report on Cook Islands nodules, using data from the SOPAC nodule database, was received from the East-West Center.

SEA-BED MAPPING

An important part of SOPAC's work is to compile bathymetric maps of the EEZs of its member countries and the contiguous areas of international waters between them. Close working contacts have been established with the IHO/IOG GEBCO project, and the GEBCO difital atlas was used to update base

maps of the EEZs of member countries, particularly Federated States of Micronesia and Marshall Islands.

In 1993, hydrosweep multibeam bathymetry was collected in southern areas of Solomon Islands by the *Hakurei Maru No.2* under the Japan/SOPAC Study Program. Plans are being with MMAJ made for a third Five-year Joint Japan/SOPAC Study Program.

In May of this year, IFREMER was awarded the contract for the EC-funded swath mapping survey in Fiji, Solomon Islands, Tuvalu and Vanuatu waters. A three-leg, 90-day survey by RV *L'Atalante* began in July and ended in October 1993. Preliminary data sets were presented to Solomon Islands and Vanuatu in Port Vila in October and to Fiji and Tuvalu in Suva in November. Final maps and reports will be delivered to SOPAC before mid-1994.

Interpretations of the 1989 GLORIA swath mapping survey in waters of Vanuatu, Western Samoa, Fiji, Tonga and Solomon Islands were published in GeoMarine Letters in 1993.

OFFSHORE RESEARCH COORDINATION

Foreign marine scientific research is at a high level in the region, totalling more than one year of ship time during 1993. The Secretariat coordinates these activities to ensure that member countries can make maximum use of high technology ships at minimum cost, participate in the cruises, and obtain the data and information collected in their EEZs. Member country nationals are encouraged and assisted to participate in the cruises, and copies of the reports, data, and information collected by the research vessels in the EEZs of member countries are obtained for use by the member countries and for archiving in the region.

TRAINING PROGRAM

Human resources development is an important aspect of SOPAC's Work Program, and includes 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 resources assessment. Training activities are grouped into Certificate Courses, Scholarships, Fellowships, and Workshops and Seminars, and Development Advice.

CERTIFICATE COURSES

The Certificate in Earth Science and Marine Geology is an ongoing activity run for three months each year over a three year period . It comprises a Basic Course in year one followed by four six-week Advanced Courses in years two and three. The objective of this regional training program is to provide continuing development of skills required by technicians in their positions within mineral resource departments throughout the South Pacific. The course is also attended by participants sponsored by mining companies.

The Certificate commenced a new three-year cycle with the three-month Basic Course held during the period 1 March to 21 May. Thirty participants representing seven member countries attended, fifty percent more than in any previous year since the courses began in 1978. There are now 40 Certificate Graduates, of which ten have gone on to degree studies.

SCHOLARSHIPS

The SOPAC Scholarship Scheme provides first degree training in geology and engineering for member country nationals. A total of twelve scholarships were held during 1992 at the Universities of Hawaii, Canterbury, British Columbia, the University of the South Pacific, and Queensland University of Technology. Three graduates completed their degrees during the year.

FELLOWSHIPS

The SOPAC Fellowship Scheme enables individuals to gain technical and scientific on-the-job training for periods of up to three months, either with Secretariat staff or with other appropriate organisations. In 1993, 24 Fellowships were awarded. The attachments were for periods of up to six weeks. The Fellow-

ship Scheme was also utilised to offer SOPAC Scholars the opportunity to gain work experience during vacation time.

Each year, several senior and junior island member country individuals have the opportunity to gain management experience by attending the Annual Sessions and spending time at the Secretariat. Nine individuals from three member countries attended conferences during the past year, including participation in the STAR meeting. Of particular note was participation by senior member country government officials in petroleum conferences, assisting with the promotion of the petroleum potential in the region. In addition, there were five research vessels in the region during the past twelve months which had member country participants on board.

Organisations other than the Secretariat continued to support the Training Program, and the number of attachments during the past year grew accordingly and included individuals from six member countries as follows: NZ Dept of Survey and Land Information, Oceanor (Norway), AGSO (Australia), ORSTOM (New Caledonia) and MRD (Fiji).

WORKSHOPS AND SEMINARS

Since 1975, Regional Workshops have provided training opportunities on a specific aspects of the SOPAC Work Program, giving island nationals the opportunity to meet together with experts acknowledged as leaders in their field, to receive theoretical and practical training, to discuss problems of mutual interest, and to obtain expert advice on the development and management of the work program for their country.

The Annual Coastal Mapping Workshop was held at Touho in the Northern Province of New Caledonia, attended by 14 participants from 11 island member countries. A coastal map at a scale of 1:5000 was produced for the Touho area from field mapping and by interpretation of aerial photos and a SPOT satellite image.

A regional Computerised Geological Data Management Workshop was held at the Secretariat attended by 15 participants from 11 member countries. The objectives of the workshop were to enhance the basic computing skills of the participants and to focus on the use of computers in handling data relating to the economic analysis of mineral deposits.

Two regional wave energy workshops were held at Secretariat during the year, attended by participants from Cook Islands, Fiji, Kiribati, Tonga, Tuvalu, Vanuatu and Western Samoa. The first was on the wave data base and its operation and the second, on wave climate and wind data, was to sum up the series of workshops held since 1989.

DEVELOPMENT ADVICE

The Training Coordinator visited four member countries to assist with their manpower development. Assistance was given to the University of the South Pacific in the Marine Studies, Ocean Resources Management, Marine Public Education and Earth Sciences Programs. Assistance was also given to school teachers by participating in a UNESCO workshop on Marine Sciences for Secondary School Teachers, and a USP Public Marine Education Workshop.

ONSHORE PROGRAM

The two components of the Onshore Program are water resources and onshore geology, including geo-hazards. In 1993, a bathymetric survey of Monasavu lake, Fiji, was carried out to develop a volumetric model for hydroelectric management. Following Cyclone Kina in Fiji in January, SOPAC supported sidescan sonar hazard mapping in the Ba and Sigatoka Rivers after the bridges collapsed, a pipeline survey in the Ba River and investigation of the numerous landslides, coastal changes and river flooding that occurred during the cyclone.

The decision by SPOCC in 1993 to assign the Water Resources and Sanitation Program from UNDP to SOPAC gave regional water studies an established geoscience organisational base. Much of the role of the program is coordination together with resources assessment, the development of master plans in member countries, and training activities. While this greatly increases the scope of SOPAC activities, funding is not secured at an appropriate level to deal with the geological diversity of the region. Planning for a change-over in mid-1994 commenced in late 1993.

At the 22nd Annual Session, SOPAC was also asked to secure funding for a regional geothermal investigation program, to develop a regional onshore minerals program, and to assist with building up the regional capacity to study geological hazards on a long term basis.

INFORMATION PROGRAM

One of SOPAC's roles as a regional organisation is the effective dissemination of geoscience data and information to its member countries. The Information Program includes the development and maintainance of library services, both at the Secretariat and in member countries; publication of technical and promotional reports; publication of bathymetric and coastal maps; and management of data.

PUBLICATIONS

The main activity of the Secretariat's publication services is the scientific review, editing, publication and distribution of reports on the results of the Work Program. These reports are primarily for individual SOPAC member countries and are therefore effectively of restricted circulation, although all are listed in SOPAC News and are generally available on request. Technical Bulletins are generally compilations of studies of a particular type, and make the results of SOPAC's work more widely available than the report series. In 1993, about 65 reports of various categories were produced, and two Bulletins were edited to an advanced stage for publication in 1994.

Public awareness materials include the Annual Report Summary, SOPAC News, SOPAC Projects and promotional brochures. SOPAC News circulates topical information about the organisation and its activities. SOPAC Projects provides concise, non-technical summaries of the results of the Work Program to ensure that the information and its benefits are available to as wide an audience as possible. In 1993, a promotional brochure was published on the petroleum potential of Fiji and a bulletin-sized Memoir was published for Mineral Resources Department, Fiji .

Publications staff also compile the report on the Work Program for the previous year, the draft Work program for the year ahead, organise the Annual Session in conjunction with the host country, rapporteur for the Annual Session and publish the Session Proceedings.

CARTOGRAPHY

SOPAC compiles and publishes a range of maps for member countries, including bathymetric maps of EEZs, lagoons and coastlines, coastal resource maps, coastal morphology maps, and sediment maps. Achievements for 1993 are described under Coastal Mapping.

Drafting staff also produce maps and diagrams for SOPAC technical reports, train member country nationals in drafting and map preparation (both at the Secretariat and by instruction at coastal mapping workshops), and prepare promotional and display material.

LIBRARY

The SOPAC library is the principal resource in the region for marine geoscience information, providing access to marine geological information for the Secretariat staff, staff of geology departments in member countries, and researchers and other users of geoscience information. Services provided include reference services, acquisitions of new books and journals, including material obtained through an expanded gift and exchange program, and inter-library loans with the assistance of the Pacific Island Marine Resources Information System (PIMRIS) at the USP Library, and the School of Ocean and Earth Science and Technology (SOEST) Library, University of Hawaii.

Six library databases are maintained; one each for aerial photographs, journals, maps/charts, monographs/reports/reprints, newspaper clippings, and photographs/slides, with regular current awareness lists generated from each database for in-house circulation.

When requested, assistance is provided to the member countries with the organisation of their geology collections or libraries.

REGIONAL DATA CENTRE

Governments need access to accurate, timely and relevant information and analysis to assist with policy making on the responsible exploitation of their non-living offshore, coastal and onshore resources. These resources are or have the potential to be a critical factor in the economies of many SOPAC member countries. The Regional Data Centre at the Secretariat was created in late 1992 to provide enhanced data management for both member countries and SOPAC Secretariat through the development of a regional information system. Outputs include navigation, bathymetric, and geophysical maps, interpreted satellite images and aerial photographs, and summary reports of data held. The Centre provides appropriate software and hardware to member countries to enable them to carry out independent analysis of their own data, together with that from the Secretariat, for management of their resources. The Centre also provides support to other Work Program activities at the Secretariat.

During 1993, a computer-based information system was developed within the Secretariat to provide users with a common set of software applications at the desktop level connected to a central data service. The Regional Data Centre also assists the Computer Mapping Geologist with the maintenance and development of databases and the development of GIS use at the Secretariat, and has taken over the handling of the wave database and the related climate data.

Personal computers and a standard set of applications were provided to the eight ACP member countries of SOPAC under the EC-funded Pacific Marine Resources Program. Visits of approximately one week duration were subsequently made by Regional Data Centre staff to all Pacific Island member countries to provide training, development of in-house systems and assistance with future development.

APPENDIX 1

SOPAC PUBLICATIONS FOR 1993

COASTAL

Barstow, S.F.; Olsen, E. 1992: Wave Data Collection, Kadavu, Fiji, June 1991-December 1991. *SOPAC Technical Report 153*: 44 pages + 1 appendix.

Barstow, S.F.; Olsen, E. 1992: Wave Data Collection, Tongatapu, Kingdom of Tonga, May 1987 - December 1991. *SOPAC Technical Report 154*: 44 pages + 2 appendices.

Barstow, S.F.; Olsen, E. 1992: Wave Data Collection, Funafuti, Tuvalu, May 1990 -December 1991. *SOPAC Technical Report 155*: 47 pages + 2 appendices.

Barstow, S.F.; Olsen, E. 1992: Wave Data Collection, Efate, Vanuatu, November 1990 - December 1991. *SOPAC Technical Report 156*: 47 pages + 2 appendices.

Barstow, S.F.; Olsen, E. 1992: Wave Data Collection, Western Samoa (Outer), May 1990 - December 1991. *SOPAC Technical Report 157*: 53 pages + 2 appendices.

Gillie, R.D. 1992: Ranadi Beach coastal erosion study, Honiara, Guadalcanal, Solomon Islands. *SOPAC Technical Report 152*: 42 pages + 8 appendices.

Gillie, R. 1992: Final report for the position of Coastal Geologist, ICOD Nearshore Minerals Project, 29 May 1990 - 28 November 1992. *SOPAC Miscellaneous Report 135*: 19 pages.

Gillie, R. 1992: Air photo survey of South Tarawa, Kiribati, May 1992. *SOPAC Miscellaneous Report 136*: 33 pages.

Gillie, R.D. 1992: Reconnaissance survey of coastal erosion sites in the Gilbert Islands group, Republic of Kiribati, 10-19 August 1992. *SOPAC Preliminary Report 52*: 18 pages.

Gillie, R.D. 1993: Reconnaissance survey of coastal erosion, Gilbert Islands, Kiribati (Phase II). *SOPAC Preliminary Report 55*: 22 pages.

Gillie, R.D. 1993: Coastal erosion problems in the Gilbert Islands Group, Republic of Kiribati. *SOPAC Technical Report 167*: 77 pages + 5 appendices.

Lum, J. 1993: Field visits to Kele River and Matepono River in the Solomon Islands and Big Bay in Vanuatu. *SOPAC Preliminary Report 57*:

Smith, R. 1992: Geophysical investigations, Forari Bay, Efate, Vanuatu. *SOPAC Preliminary Report 51*: 14 pages, 8 appendices. CONFIDENTIAL.

Smith, R.; Saphore, E. & others 1992: Marine geophysics/geology survey, Port Moresby, Papua New Guinea. *SOPAC Miscellaneous Report 134*: 20 pages + 6 appendices.

SOPAC and SPREP 1993: Coastal Protection in the South Pacific. Report to South Pacific Forum. *SOPAC Technical Report 190.*

Taylor, G.K. 1993: Interpretation of marine magnetic surveys, Yasawa Island, northwest Fiji. *SOPAC Technical Report 165*: 29 pages.

Torsethaugen, K. 1993: Climatic study for Tonga - comparison of different wind and wave data. *SOPAC Preliminary Report 56*: 23 pages.

Woodward, P. 1992: Air photo survey of coastal areas, Northern Guadalcanal, Solomon Islands, August 1992. *SOPAC Preliminary Report 53*: 16 pages.

HYDROCARBONS

Barclay, W. 1993: A petroleum licensing area and quadrant and block numbering system for the Solomon Islands. *SOPAC Miscellaneous Report 152*: DRAFT

Barclay, W. 1993: A petroleum licensing area and quadrant and block numbering system for Vanuatu. *SOPAC Miscellaneous Report* : DRAFT

Barclay, W.; Havard, K. 1993: A summary of hydrocarbon exploration and production licensing terms in SOPAC member countries. *SOPAC Miscellaneous Report 151*: 17 pages.

British Geological Survey, 1993: Source rock survey plan for Solomon Islands and Vanuatu, SW Pacific. Contractor's report.

Digital Exploration Ltd. 1993: Processing Report Solomon Islands and Vanuatu area. Contractor's report.

Johnson, H. 1993: Consultancy on hydrocarbon prospectivity in the South Pacific. *SOPAC Miscellaneous Report 141*: 33 pages.

Rodd, J.A. 1993: Draft Petroleum Act for the Republic of Vanuatu - briefing document. *SOPAC Miscellaneous Report 147*: 10 pages.

Rodd, J.A. 1993: New petroleum potential in Fiji and initiatives to attract oil companies to invest in exploration. *SOPAC Miscellaneous Report 145*: 16 pages.

Rodd, J.A. 1993: Proposal for a multichannel seismic survey in offshore Solomon Islands and Vanuatu. *SOPAC Miscellaneous Report 148*: 12 pages.

Rodd, J.A. 1993: The hydrocarbon potential of Fiji. *SOPAC Technical Report 169*: DRAFT.

Rodd, J.A. 1993: The petroleum potential of Fiji, Southwest Pacific. SOPAC. 20 pages

Rodd, J.A., Barclay, W. 1993: South Pacific Petroleum Survey. Project Proposal for funding. SOPAC Miscellaneous Report 158.

Rodd, J.A., Biliki, N., Butler, P.J. 1993: Catalogue of Solomon Islands Petroleum Data Package. SOPAC. 20 pages.

Rodd, J.A.; Elaisi, A. (eds) 1993: Papers and Materials presented at the SOPAC-OIC Hydrocarbon Legislation and Policy Workshop, Port Vila, Vanuatu, 13-17 July 1992. *SOPAC Miscellaneous Report 143*: 215 pages.

Rodd, J.A.; Prasad, S. 1993: International oil companies targeted for promotion of hydrocarbon potential in SOPAC member countries. *SOPAC Miscellaneous Report 146*: 9 pages + 2 appendices.

Rodd, J.A., Temakon, S.J., Butler, P.J. 1993: Catalogue of Vanuatu Petroleum Data Package. SOPAC. 11 pages.

Rodd, J.A.; van Meurs, A.P. 1993: Proposed petroleum policy for the Government of Fiji: amendments to petroleum legislation and new initiatives to promote oil exploration. *SOPAC Miscellaneous Report 144*: 10 pages.

Rodd, J.A.; van Meurs, P. 1993: Economic analysis of offshore petroleum prospects for SOPAC member countries. *SOPAC Technical Report 162*: [28 pages + 4 tables].

SOPAC Secretariat, 1993: SOPAC-OIC Hydrocarbon Legislation and Policy Workshop, Port Vila, Vanuatu, 13-17 July 1992. *SOPAC Miscellaneous Report 140*: 21 pages.

UNCTC; Rodd, J.A.; Barclay, W. 1993: Proposed petroleum regulations for the Solomon Islands. *SOPAC Technical Report 170*: 60 pages.

van Meurs, A.P. 1993: Proposed changes to the petroleum legislation of the Republic of Fiji. *SOPAC Technical Report 166*: 59 pages. CONFIDENTIAL.

OFFSHORE

Clarke, J.E.H.; Jarvis, P.; Tiffin, D.; Price, R.; Kroenke, L. 1993: Tectonic Activity and Plate Boundaries Along the Northern Flank of the Fiji Platform. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Hill, P.J.; Tiffin, D.L. 1993: Geology, Sediment Patterns, and Widespread Deformation on the Seafloor off Western Samoa Revealed by Wide-swath Imagery. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Jarvis, P.; Kroenke, L,; Price, R.; Maillet, P, 1993: GLORIA Imagery of Seafloor Structures in the Northern North Fiji Basin. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Johnson, D.P.; Maillet, P.C.; Price, R. 1993: Regional Setting of a Complex Backarc: New Hebrides Arc, northern Vanuatu-eastern Solomon Islands. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Larue, B.M.; Tiffin, D.L. 1993: A report on research vessel activity in Fiji's Exclusive Economic Zone in 1991 and 1992. *SOPAC Technical Report 168*: 12 pages.

Parson, L.M.; Tiffin, D.L. 1993: Northern Lau Basin: Backarc Extension at the Leading Edge of the Indo-Australian Plate. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Price, R.C.; Maillet, P.; Johnson, D.P. 1993: Interpretation of GLORIA Sidescan Sonar Imagery for the Coriolis Troughs of the New Hebrides Backarc. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Report on a survey for hydrothermal minerals, south of the Admiralty Islands, Papua New Guinea. Preliminary Cruise Report of the Hakurei Maru No.2, 15 August - 18 October 1992 under the Joint Japan-SOPAC Program for Ocean Resources Investigation in the Sea Area of SOPAC. *SOPAC Cruise Report 141*: 17 pages.

Tiffin, D.L. 1993: Acoustic imaging, seismic and coring study of the Western Solomon Sea collision zone, Huon Gulf, Papua New Guinea. *SOPAC Cruise Report 142*: 8 pages + 1 appendix.

Tiffin, D.L. 1993: GLORIA Surveys in Frontier Areas of the Southwest Pacific Ocean. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

Tiffin, D.L. 1993: Tectonic and Structural Features of the Pacific-Indo-Australian Plate Boundary in the North Fiji-Lau Basin Regions, Southwest Pacific. *GeoMarine Letters Volume 13 Number 2. Special Issue: Southwest Pacific.*

DATA MANAGEMENT

Allinson, L. 1993: Recommendations for upgrade of the information system. Geology Division, Ministry of Natural Resources, Honiara, Solomon Islands. *SOPAC Miscellaneous Report 150*: 10 pages + 2 attachments.

Allinson, L 1993: SOPAC Information Systems User's Manual. *SOPAC Miscellaneous Report 155.*

Allinson, L. 1993: Recommendations for upgrade of the information system. Department of Geology, Mines and Water Resources. *SOPAC Miscellaneous Report 156.*

Morel, Y.; Bakoso, B. 1993: Catalogue of magnetic tapes TK50, cartridges and floppies.

Morel, Y.; Medina, B. 1993: A database on multichannel seismic shot points in the sea area of Vanuatu. *SOPAC Technical Report 158*: 17 pages + 4 annexes.

Morel, Y.; Medina, B. 1993: A database on multichannel seismic shot points in the SOPAC region. *SOPAC Technical Report 159*: 34 pages + 4 annexes.

Morel, Y.; Medina, B. 1993: A database on multichannel seismic shot points in the sea area of the Solomon Islands. *SOPAC Technical Report 160*: 22 pages + 4 annexes.

Morel, Y.; Medina, B. 1993: A database on multichannel seismic shot points in the sea area of Tonga. *SOPAC Technical Report 161*: 21 pages + 4 annexes.

ONSHORE

Smith, R. 1993: Ba River sediments and bathymetry, Vaqia Crossing. *SOPAC Technical Report 171*:

Howorth, R.; Baleivanualala, V.; Prasad, S. 1993: Initial reconnaissance of the effects of Cyclone Kina in Central and Eastern Viti Levu. *SOPAC Miscellaneous Report 149*: 27 pages + 1 appendix.

Smith, R.; Young, S.; Saphore, E. 1993: Bathymetric survey of Monasavu Lake, Fiji. *SOPAC Preliminary Report 54*: 12 pages.

TRAINING

Biribo, N. 1993: Training attachment at SOPAC, April 1993. *SOPAC Training Report 51*: 25 pages + 5 appendices.

Clark, A.; Callicutt, W.; Jay, A.; Lum, J. 1993: Proceedings of the regional workshop on computerised Data Management. *SOPAC Training Report 52*:

Howorth, R. 1992: 2nd Phase ICOD Fellowship Scheme. *SOPAC Training Report*

Howorth, R. 1993: Coastal Processes and Coastal Planning towards the Twenty-first Century in Pacific Island Nations (Keynote paper presented to the SOPAC Coastal Planning Workshop, Nuku'alofa, Tonga, 21-24 September 1992). *SOPAC Miscellaneous Report 142*: 17 pages.

Howorth, R.; Kitekei'aho, T. 1993: Earth Science & Marine Geology Course, Course Instructor's Report, 9 March - 29 May 1992. *SOPAC Training Report 50*: 20 pages.

Howorth, R.; Woodward, P. 1992: SOPAC 1992 Coastal Mapping Workshop, Federated States of Micronesia, 4-12 August 1992. *SOPAC Training Report 47.*

Kitekei'aho, T.; Falnes, Prof. J. 1992: Ocean Wave Measurement Workshop II, 17-28 February 1992. *SOPAC Training Report 46.*

Rodd, J.A.; Elaise, A. (eds) 1993: Papers and Materials presented at the SOPAC-OIC Hydrocarbon Legislation and Policy Workshop, Port Vila, Vanuatu, 13-17 July 1992. *SOPAC Miscellaneous Report 143*: 215 pages.

Shorten, G.; Howorth, R. 1992: Report on the Second SOPAC Workshop on Coastal Processes in Island Nations in the South and Central Pacific. *SOPAC Training Report 49*: 18 pages.

SOPAC Secretariat, 1993: SOPAC-OIC Hydrocarbon Legislation and Policy Workshop, Port Vila, Vanuatu, 13-17 July 1992. *SOPAC Miscellaneous Report 140*: 21 pages.

Talia, L. 1992: A review of SOPAC activities in Western Samoa. *SOPAC Miscellaneous Report 137*: 29 pages DRAFT.

Tolia, D.H. 1993: A review of SOPAC activities in Solomon Islands from 1972-1993. *SOPAC Miscellaneous Report 153*: 34 pages + 4 appendices.

INFORMATION

SOPAC Secretariat, 1992: South Pacific Applied Geoscience Commission Work Program. October 1992-December 1993. *SOPAC Miscellaneous Report 133.*

SOPAC Secretariat 1992: Report on Work Program Activities of the SOPAC Secretariat for 1991/1992. *SOPAC Miscellaneous Report 138.*

Annual Report Summary 1992

Proceedings of the Twenty-first SOPAC Annual Session, Nuku'alofa, Tonga, 1992.

SOPAC News (3 issues)

SOPAC Projects (1 issue)

APPENDIX 2

SECRETARIAT STAFF LIST

MANAGEMENT PROGRAM		*(Contract end)*
Director	Philipp Muller	January 1995
Deputy Director	Jim Eade	February 1995
Special Fund Coordinator	Teuea Toatu	June 1994
Finance & Administration Controller	Umar Farook	April 1994
Accountant	Angela Pal	February 1995
Administrative Assistant	Nazmeen Whippy	Permanent
Senior Technical Secretary	Laisa Baravilala	Permanent
Technical Secretary	Lavenia Kamali	December 1994
Assistant Accountant	Marica Salusalu	Permanent
Senior Accounts Clerk	Atesh Narayan	Permanent
Secretary/Clerk	Annette Olssen	Permanent
Registry Clerk	Aseri Tokalaulevu	Permanent
Receptionist/Clerk	Unaisi Bainiloga	Permanent
Office Assistant/Cleaner	Salestino Niu Daurewa	Permanent
Driver/Clerk	Enele Gaunavou	Permanent
Watchman/Security	Cama Temo	Permanent
Watchman/Security	Inoke Soqo	Permanent
Watchman/Security	Watisoni Tuberi	Permanent
COASTAL PROGRAM		
Marine Geologist	Robert Smith	June 1995
Marine Geologist	Jackson Lum	November 1995
Coastal Geologist	vacant	
Coastal Geologist	vacant	
Coastal Engineer	vacant	
Mapping Geologist	Michel Larue	October 1994
Senior Electronics Technician	Simon Young	January 1996
Electronics Technician	Peni Musunamasi	Permanent
Marine Mechanic	Joe Mausio	November 1994
Workshop Assistant	Setareki Ratu	Permanent
Technical Support Assistant	Graeme Frost	March 1995
Senior Geology Technician	Sekove Motuiwaca	Permanent
Technical Secretary	Litia Waradi	December 1994
HYDROCARBON &OFFSHORE PROGRAM		
Petroleum Coordinator	Jon Rodd	November 1993
Petroleum Geophysicist	Bill Barclay	December 1993
Offshore Geologist	Yoshitaka Hosoi	August 1995
Offshore Coordinator	Don Tiffin	September 1993
TRAINING PROGRAM		
Training Coordinator	Russell Howorth	July 1995
Assistant Training Coordinator	Fuka Kitekei'aho	November 1994
Technical Secretary	Anna Elaise	December 1994
INFORMATION PROGRAM		
Publications Coordinator	Alan Sherwood	April 1995
Assistant Editor	Mereseini Lala Bukarau	September 1994
Librarian	Dillie George	January 1995
Chief Draftsman	Phil Woodward	July 1994
Draftsman	Niko Naibitakele	Permanent
Technical Secretary	Sunita Prasad	December 1994
Computer Systems Manager	Les Allinson	October 1995
Computer Geologist	Franck Louis	December 1994
Computer Operator	Bougainville Bakoso	Permanent

APPENDIX 3

1993 REVISED BUDGET & 1994 APPROVED BUDGET

SUMMARY OF ANTICIPATED INCOME (INCLUDING IN-KIND SUPPORT CONTRIBUTION) AND EXPENDITURE BY PROGRAMS – REVISED 1993 & APPROVED 1994 BUDGETS

	1993 REVISED BUDGET F$	1994 APPROVED BUDGET F$
Coastal Program	2,000,855	1,721,600
Hydrocarbon & Offshore Program	4,587,094*	1,592,450
Onshore Program	0	315,000
Training Program	972,945	1,128,700
Information	438,287	468,600
Management Program	1,013,773	1,160,500
TOTAL	**9,012,954**	**6,386,850**

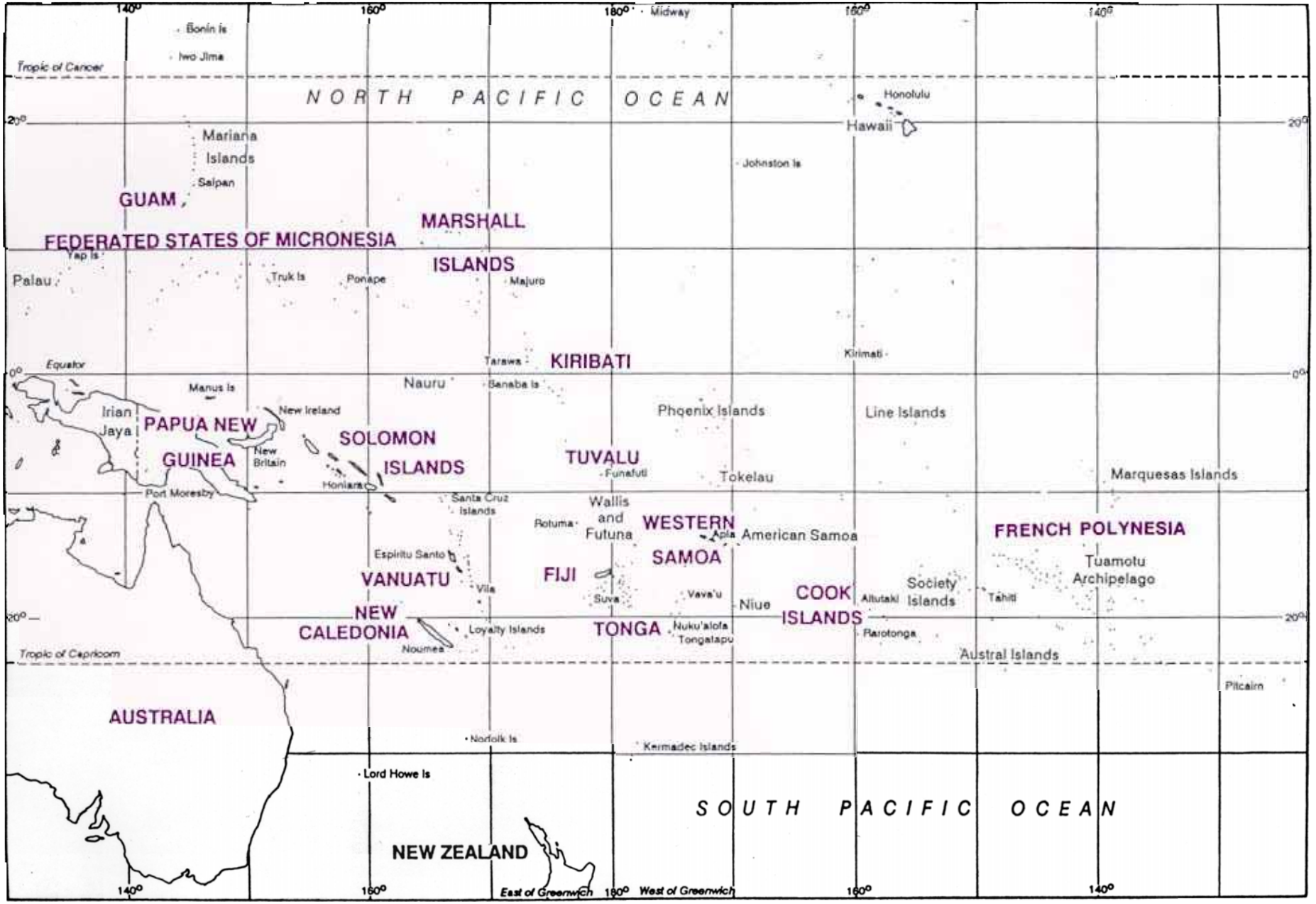
* includes an amount of F$3,500,000 for the EC–Seabed Swath Mapping Contract

APPENDIX 4

MEETINGS

Management attended the following meetings in 1993:

Governing Council Working Group meetings	various	Suva	Director & Dep.Director
Small Island States meeting	January 1993	Tuvalu	Director
PIDP meeting	January	Honolulu	Director
Sealevel & Climate Monitoring Project - PCC	March	Suva	Dep.Director
SOPAC/SPREP consultations	March	Suva	Director & Dep.Director
UNDP CTA's Quarterly meeting	March	Suva	Dep.Director
PIC/Development Partners meeting	April	Suva	Dep.Director
GEBCO Sub-Comm. on Digital Bathymetry	April	Boulder	Dep.Director
Forum Fisheries Agency annual meeting	May	Palau	Dep.Director
SPOCC annual meeting	May	Noumea	Director
PIDP Leaders meeting	June	Tahiti	Director
SPREP Asia-Pacific meeting of SIDS	June	Vila	Dep.Director
ICLARM annual meeting	July	Manila	Director
South Pacific Forum meeting	July/August	Nauru	Director



SOPAC MEMBER COUNTRIES