

JOINT CCOP/SOPAC-IOC FOURTH INTERNATIONAL  
WORKSHOP ON GEOLOGY, GEOPHYSICS AND  
MINERAL RESOURCES OF THE  
SOUTH PACIFIC

24 September - 1 October 1989  
Canberra, Australia



SECOND CIRCULAR





**JOINT CCOP/SOPAC-IOC FOURTH INTERNATIONAL WORKSHOP ON  
GEOLOGY, GEOPHYSICS AND MINERAL RESOURCES  
OF THE SOUTH PACIFIC**

**Canberra, 24th September to 1st October, 1989**

**PURPOSE OF THE WORKSHOP**

1. Summarise present knowledge and ongoing research projects on marine geosciences in the South Pacific for the benefit of island member country representatives.
2. Identify major unsolved problems in the field of geology, geophysics, and mineral resources, and further research work needed to solve these problems.
3. Define new scientific research and training programmes for execution in the region.

**WORKSHOP ORGANISING COMMITTEE**

|            |                        |                   |                 |
|------------|------------------------|-------------------|-----------------|
| Chairman:  | Keith Crook, ANU       | Phone: 6162492059 | Fax: 6162495544 |
| Committee: | Neville Exon, BMR      | 6162499347        | 6162488178      |
|            | Russell Howorth, SOPAC | 679381377         | 679321040       |
|            | Kazu Kitazawa, IOC     | 45683972          | 33143061122     |
|            | Michel Larue, ORSTOM   | 687261000         | 687264326       |
|            | Jaques Recy, ORSTOM    | 687261000         | 687264326       |
|            | Don Tiffin, SOPAC      | 679381377         | 679321040       |

## CHAIRMAN'S COMMENTS

Dear Colleagues

There has been a good response to the First Circular for the forthcoming Joint CCOP/SOPAC-IOC Fourth International Workshop on the Geology, Geophysics and Mineral Resources of the South Pacific. The Workshop will be held in the Department of Geology, Australian National University, Canberra, from 24th September to 1st October 1989. An international representation at the Workshop is assured. About 80 participants are expected, including representatives from CCOP/SOPAC member countries (Australia, The Cook Islands, Fiji, Guam, Kiribati, New Zealand, Papua New Guinea, The Solomon Islands, The Kingdom of Tonga, Tuvalu, Vanuatu and Western Samoa); all participants will be involved in the plenary and working sessions.

This Workshop is the fourth in a series. The first was held in Suva in 1975, the second in Noumea in 1980 and the third in Suva in 1983. The overall aim of this series of Workshops is to review and plan on a regular basis the basic geoscientific research being carried out in the region as it assists in the identification and assessment of mineral resources.

The Workshop aims to achieve these objectives by providing a forum where invited participants from the island nations, research institutions and industry can come together.

In the six years since the last Workshop, there have been major mineral and petroleum discoveries in the region and many geoscience research cruises have taken place. This Workshop will provide an important forum for the discussion of individual studies and their comparison with the results of others. These discussions will form the basis of future planning which is a critical element in the activities of the working groups at the Workshop. The presence of island country representatives will ensure that the needs of the island nations are an integral part of the discussion and planning.

The Workshop which is being held immediately prior to the 18th Annual Session of the CCOP/SOPAC, will replace the 1989 STAR Meeting, which is a joint working group of CCOP/SOPAC and IOC on the Structure, Tectonics and Mineral Resources of the South Pacific. STAR has met annually since 1984 in conjunction with and prior to each CCOP/SOPAC Annual Session.

The Workshop is intended to be informal in style, and provision has been made for discussion after each paper and at the end of each major theme. Invited speakers will review general topics of particular interest to the region, or will discuss particular aspects of the geology of the South Pacific. Scientists from the region will have an opportunity to speak about their country's problems and interests. The programme outline and titles of papers offered for the Workshop, which are included in this Circular, shows the wide range of interesting topics which will be covered during the Workshop.

Participants should note that apart from listening to scientific papers and enjoying the field trip, they will be expected to contribute to the intensive working group discussions, the aim of which is to draw up a programme for future geoscience research in the South Pacific.

**INTENDING PARTICIPANTS SHOULD ALSO NOTE THAT THE PRE-REGISTRATION FORM INCLUDED AT THE BACK OF THIS CIRCULAR SHOULD BE SENT TO ME BEFORE SEPTEMBER 1ST. NUMBERS ATTENDING ARE RESTRICTED TO 80 AND ACCEPTANCE OF LATE REGISTRATION CANNOT BE GUARANTEED.**

I look forward to your attendance at what I hope will be a very innovative and productive Workshop in Canberra.

**Keith A. W. Crook**  
**CHAIRMAN ORGANISING COMMITTEE**



## CCOP/SOPAC

The island nations of the South Pacific have very much larger Exclusive Economic Zones (EEZ's), and very much longer coastlines, in relation to either land area or population, than almost any other group of nations in the world.

For sensible economic planning, these South Pacific nations need to know the potential for minerals in their EEZ's. For the sensible and safe development of their coastal areas, where most people live, and where most development has taken place, they need to know all about their present coastal areas, and all about the possible consequences of each new major development.

Surveys of ocean minerals and of coastal areas are most effective, and their results and recommendations are most reliable, if the most modern high technology is used. It includes the use of marine research vessels with complex geophysical and electronic equipment aboard, submersibles, satellite images of coastal areas, drilling and sampling equipment, and a wide range of analytical and electronic equipment. In addition, a team of specialists is needed to assess the survey results.

Collectively, through their own "CCOP/SOPAC", the "Committee for Co-ordination of Joint Prospecting for Mineral Resources in South Pacific Offshore Areas" established in 1971-2, the South Pacific island nations can determine the nature and extent of their marine mineral resources, and ensure sound and safe coastal developments, and can use the latest technologies and world-ranking specialists. Individually they could never consider such programmes.

CCOP/SOPAC is an inter-governmental body established:

- \* to investigate mineral and other non-living resources potential in coastal, inshore, nearshore, and offshore areas of its Member Countries;
- \* to gather baseline data to determine criteria for engineering works or other developments in the coastal zone;
- \* to co-ordinate marine geological and geophysical studies being made in the region; and
- \* to train nationals in the implementation and management of their country's work programmes.

The MEMBER COUNTRIES are: Australia, The Cook Islands, Fiji, Guam, Kiribati, New Zealand, Papua New Guinea, The Solomon Islands, The Kingdom of Tonga, Tuvalu, Vanuatu, Western Samoa

The Programme is funded by the Member Countries, with additional grants from Australia, Fiji and New Zealand. Assistance is also provided by supporting countries and international organisations including, Canada, France, Japan, Netherlands, Norway, People's Republic of China, United Kingdom, West Germany,

the European Community, UNDP/ESCAP and CFTC.

At its Annual Sessions, the Committee of Member Countries receives advice from experts of world standing on the latest appropriate technological developments, and on what they might usefully achieve in the South Pacific. They are then able to allocate their own funds, and to select the most appropriate aid packages from many donors to the best advantage. Decisions on priorities, between both technologies and country areas, are made by the Countries' Representatives, according to time-honoured Pacific traditions.

Thus an annual Work Programme is developed. To manage and implement it, CCOP/SOPAC has established a Technical Secretariat (Techsec) - based in Suva since the earliest days of the Committee.

Techsec comprises professional, technical and support staff from many countries of the South Pacific and the World. Several supporting countries place appropriate highly trained specialist staff at CCOP/SOPAC's disposal, swelling staff numbers to some 20 professionals. They work in the following defined areas, which change with time as the emphasis of the overall programme changes; but the expertise of all is available to all Projects within the Work Programme, as required.

**NEARSHORE MINERALS:** conducting surveys for: sand and gravel resources; problems of natural hazards and human developments such as sand mining, causeway construction and hotel building; possible occurrences of phosphates, detrital minerals (especially gold); possible occurrences of precious corals.

**HYDROCARBONS:** assessing the hydrocarbon potential in specific offshore "basins", through the analysis of past geological and geophysical surveys; reprocessing older data; and undertaking new surveys whenever possible; all particularly to attract interest that might lead to further exploratory drilling.

**OFFSHORE MINERALS:** undertaking and co-ordinating cruises, and assessing their results with regard to possible seafloor occurrences of manganese nodules and crusts (for copper, nickel, cobalt metals) and hydrothermal mineral deposits (for base metals).

**DATA MANAGEMENT:** the handling of modern data, especially from geophysical cruises and satellites, and producing usable/readable reports from a mass of data, requires sophisticated computer-based data management systems - initially at Techsec, but now increasingly in Member Country organisations as well.

**TRAINING:** CCOP/SOPAC arranges technical, scientific, and management training facilities for Member Country nationals, in their home countries, at Techsec, at CCOP/SOPAC Workshops and Courses, and at overseas institutions and universities.



## INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

The Intergovernmental Oceanographic Commission (IOC) is an autonomous body established within the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1960. Its purpose is "to promote scientific investigation with a view to learning

more about the nature and resources of the oceans through the concerted action of its members". It also functions as the co-ordinating body within the United Nations system for marine science and related activities. Co-operative scientific investigations of the ocean as well as world-wide ocean services, combined with a programme of training, education and mutual assistance, form the chief components of IOC's work.

Membership of the Commission is open to any state that is a member of any of the organisations of the United Nations system. At present (August 1989) 117 countries co-operate under this arrangement.

A guiding principle in IOC's approach to marine sciences is to co-operate with other international bodies through its various programmes and regional bodies.

Within IOC, the programme of Ocean Sciences in relation to Non-living Resources (OSNLR) is particularly concerned with programmes of relevance to CCOP/SOPAC with emphasis being placed on the coastal and nearshore zone and its resources, such as sand and gravel, carbonates, phosphorites, and the coastal zone as a resource (CZAR). OSNLR encourages scientific activities such as the study of past sealevel change, palaeoceanography, coastal dynamics and sediment budgets which are relevant to the formation, exploration, and exploitation of these marine non-living resources. These activities are mainly undertaken through regional bodies such as the Regional Committee for the Western Pacific (WESTPAC) and through co-operative programmes such as the Joint Working Group on South Pacific Tectonics and Resources (STAR). This has included the holding of international workshops, the exchange of data, and through TEMA (training, education and mutual assistance).



## **BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS**

The Bureau of Mineral Resources (BMR) is in essence the Australian Commonwealth national geological survey and is based in Canberra. It shares geoscience responsibilities with the State Geological Surveys and is a research bureau within the Department of Primary Industries and Energy. BMR was formed in 1946, and currently has about 550 staff and an annual budget of A\$43 million. Its role has recently been redefined as follows:

Develop a publicly available, comprehensive and integrated geoscientific knowledge base for the Australian continent, the Australian offshore area and the Australian Antarctic Territory, especially through the provision and coordination of appropriate databases, as a basis for encouraging and improving the effectiveness of exploration for, and assessment of, Australia's endowment of petroleum, mineral, and groundwater resources and for contributing to land-use planning and to the resolution of environmental issues, including the mitigation of natural hazards.

Provide independent and timely scientific and technical assessment, advice and information to Government, industry and the public to facilitate the formulation and implementation of policies necessary for the effective management of the land and its petroleum, mineral and groundwater resources.

Provide special national geoscientific capabilities, such as the geophysical observatory functions of seismic monitoring for both earthquake risk and underground nuclear explosions.

Participate in appropriate multilateral and bilateral geoscientific programmes to contribute to Australia's international policy objectives.

Among its many functions, those of special interest to CCOP/SOPAC are:

To carry out major offshore studies of the continental margins of Australia and its offshore territories and other strategic offshore areas;

To maintain geophysical observatories in Australia and Antarctica to monitor seismic, geomagnetic and other natural geophysical phenomena and to respond to specific Commonwealth Government requirements such as nuclear monitoring;

As the national geoscience survey organisation, to be a major focus for both national and international geoscience from an Australian perspective. To assist in the development of overseas programmes in the geosciences, and participate in appropriate bilateral and multilateral programmes.



## DESCRIPTION/ORGANISATION OF THE WORKSHOP

The Workshop will be held in the Department of Geology, Australian National University with accommodation available in Bruce Hall.

The Workshop is planned to last for seven days including registration, opening day formalities, presentation of papers, plenary and working group discussions, and the field trip. There will be two major themes:

- Plate Boundary Tectonics of the Southwest Pacific and associated mineral and hydrocarbon resources;
- Intraplate Dynamics and resources of the Pacific Ocean with special emphasis on manganese nodules and crusts.

There will be five working groups, three under the Plate Boundary Tectonics theme and two under the Intraplate Dynamics theme:

- Arc tectonics and hydrocarbons
- Arc tectonics and metals
- Backarc tectonics and polymetallic sulphides
- Seamounts and submarine plateaus: tectonics, petrology, metals and phosphates
- Deep ocean basins and manganese nodules

A Chairman and Rapporteur will be selected in advance for each working group. They will be responsible for the preparation of a report to be presented to the final plenary session of the Workshop. It is intended that the working groups will develop programmes of research that will assist in the identification and assessment of mineral resources in the region. These programmes may include both field and laboratory studies, an emphasis will be placed on the development of work programmes, including strategy and plans for further investigations and recommendations for coordination and implementation of future work.

On the last day of sessions, presenters of poster papers will be available at their posters for discussions. The Poster Session will be followed by a Plenary Session devoted to comments from representatives of island countries. The final Plenary Session will consider reports from the working groups, and will formulate a summary report (including a draft work programme and recommendations for action) which will be presented for adoption. This report and recommendations will subsequently be taken up at the CCOP/SOPAC Annual Session following the Workshop, and at the next IOC/WESTPAC meeting.

A field trip will commence immediately after the final Plenary Session.

## INFORMATION FOR SPEAKERS

Papers are to be presented in English. Presentation time should not exceed 25 minutes; 5 minutes will be available for discussion after each paper.

Speakers will be introduced by session Chairpersons. The meeting room will be equipped with two 35 mm slide projectors (for 5 cm x 5 cm transparencies), one overhead projector (for viewgraphs) and two screens. Carousels for loading slides, and facilities of previewing, will be available adjacent to the meeting room. Speakers should ensure that their carousels are loaded, properly identified, and handed to the projectionist before the start of the session in which the paper is to be delivered. Slide cards will be available for speakers who wish to use two projectors simultaneously.

Remember that a limited number of slides, each incorporating a few critical or main points, accompanied by a clear concisely spoken delivery is the key to getting one's message across. A profusion of complicated slides only detracts from the presentation.

Negotiations are in train to arrange for the publication of a selection of papers presented at the Workshop in the form of a Special Issue of "Marine Geology". It is likely that the Workshop Chairman and one other member of the Organising Committee will be co-editors of this Special Issue. Manuscripts submitted will undergo the normal refereeing procedures applicable to the international journal. Intending contributors are encouraged to provide completed manuscripts to the Workshop Chairman following the representation of their paper at the Workshop.

## FIELD TRIP INFORMATION

The field trip, which will be led by the Workshop Chairman, will examine aspects of the geology in Eden-Merimbula district on the NSW coast about 4 hours drive from Canberra.

Buses will depart from the rear of the Department of Geology, ANU, at 16.00 hours on Friday 29 September. Field trip participants should bring their luggage to the Geology Department before the beginning of the Friday afternoon session. Those staying in Bruce Hall must vacate their rooms on Friday 29 September.

The field trip buses will return to Canberra late in the evening on Sunday 1 October. Following the field trip accommodation will not be available in Bruce Hall, but the Workshop Secretariat will be happy to assist those requiring accommodation in Canberra to make the requisite bookings.

Alternatively, participants may elect to leave the field trip at Merimbula on Sunday afternoon. Connections to both Sydney and Melbourne are available from Merimbula airport as follows:

|                              |        |                             |
|------------------------------|--------|-----------------------------|
| Sydney (Air NSW)             | WX815  | departs 14.15 arrives 16.05 |
| Melbourne (Kendell Airlines) | KD1243 | departs 16.35 arrives 17.45 |

The cost of the field trip covers transport, accommodation and meals. Pre-dinner and post-dinner drinks are to be paid for by those requiring them.

The basement in the Eden-Merimbula district comprises Ordovician turbidities which are part of an accretionary prism, intruded by Early Devonian granitoids. Rifting at the end of the Middle Devonian was accompanied by bimodal volcanism, including ignimbrites, rhyolite domes, and basalt flows, some of which entered lakes in the rift zone. Gold and pyrophyllite mineralisation occurs within the felsic volcanics.

Following the cessation of extensional tectonism and volcanism, a paralic red-bed sequence was deposited. This overlies the syn-rift sequence and extends beyond the flanks of the rift. This Upper Devonian sequence is predominantly fluvial, but it contains the deposits of one major marine transgression. The Devonian sediments were deformed during the Early Carboniferous.

The area was uplifted during the Cretaceous rifting that formed the Tasman Sea Basin. It was a site of fluvial erosion, and local deposition, during the Tertiary. A ria coastline developed as a result of Holocene sea-level rise. Since sea-level stabilised (ca 6250 BP), coastal barrier systems and beach ridge strand-plains have developed within many embayments.

We will examine many of these units in excellent coastal exposures. Participants should wear sturdy footwear (boots or running shoes with rough treads). The weather may be windy, so a pullover and wind-proof jacket is recommended.

Eden was the site of shore-based whaling from the 1830s to the 1930s, relics of which can be seen at the Whaling Museum. A pack of killer whales worked with the human whalers during this period, and the skeleton of the pack leader, Old Tom, is preserved in the Museum.

### WORKSHOP ADDRESS

Participants contact in Canberra:

Attention: (Name)  
c/o CCOP/SOPAC Secretariat  
Department of Geology  
Australian National University  
GPO Box 4, Canberra 2601

Phone: 616 2495585  
Fax: 616 2495544  
Telex: AA 62693 RSES (clearly marked for Geology)

## WORKSHOP PROGRAMME

Sunday: 24th September

|             |                                       |
|-------------|---------------------------------------|
| 14.00-16.00 | Member Country and Techsec staff meet |
| 16.00-18.00 | Registration                          |
| 18.30-20.00 | Reception                             |

Monday: 25th September

|             |   |   |                             |
|-------------|---|---|-----------------------------|
| 08.30-09.0  | Chairman                                | - | welcoming remarks           |
|             | Australia                               | - | host country and sponsor    |
|             | CCOP/SOPAC                              | - | remarks from Director       |
|             | IOC                                     | - | remarks from Representative |
|             | ANU                                     | - | Opening Address             |
| 09.00-09.15 | Chairman - Introduction to the Workshop |   |                             |
| 09.15-10.45 | Plate Boundary Tectonics (2 papers)     |   |                             |
| 10.45-11.15 | Tea                                     |   |                             |
| 11.15-12.45 | Plate Boundary Tectonics (3 papers)     |   |                             |
| 12.45-14.00 | Lunch                                   |   |                             |
| 14.00-15.30 | Plate Boundary Tectonics (3 papers)     |   |                             |
| 15.30-16.00 | Tea                                     |   |                             |
| 16.00-18.00 | Plate Boundary Tectonics (4 papers)     |   |                             |

Tuesday: 26th September

|             |                                     |
|-------------|-------------------------------------|
| 08.30-10.00 | Plate Boundary Tectonics (3 papers) |
| 10.00-10.30 | Tea                                 |
| 10.30-12.30 | Plate Boundary Tectonics (4 papers) |
| 12.30-14.00 | Lunch                               |
| 14.00-15.30 | Plate Boundary Tectonics (3 papers) |
| 15.30-16.00 | Tea                                 |
| 16.00-18.00 | Plate Boundary Tectonics (4 papers) |
| 19.30       | Workshop dinner                     |

Wednesday: 27th September

|             |   |
|-------------|---|
| 08.30-10.00 | Plate Boundary Tectonics (2 papers)             |
| 10.00-10.30 | Tea   |
| 10.30-12.30 | Plate Boundary Tectonics Discussion             |
| 12.30-14.00 | Lunch   |
| 14.00-15.30 | Intraplate Dynamics (2 papers)                  |
| 15.30-16.00 | Tea   |
| 16.00-18.00 | Intraplate Dynamics (3 papers)                  |
| 19.30       | Plate Boundary Tectonics Working Group Meetings |



Thursday: 28th September

|             |  |
|-------------|--|
| 08.30-10.00 | Intraplate Dynamics (3 papers)             |
| 10.00-10.30 | Tea  |
| 10.30-12.30 | Intraplate Dynamics (4 papers)             |
| 12.30-14.00 | Lunch                                      |
| 14.00-15.30 | Intraplate Dynamics (2 papers)             |
| 15.30-16.00 | Tea  |
| 16.00-17.30 | Intraplate Dynamics Discussion             |
| 19.00       | Intraplate Dynamics Working Group Meetings |

Friday: 29th September

|             |   |
|-------------|---|
| 08.30-10.00 | Poster Session: Authors to be at posters                                      |
| 10.00-10.30 | Tea   |
| 10.30-12.00 | Plenary: Member Country comments  |
| 12.00-13.30 | Lunch   |
| 13.30-15.30 | Plenary: Consideration and Adoption of Workshop Report<br>and Recommendations |
| 16.00       | Field Excursion departs   |

## PAPERS SUBMITTED

ARTEMIEV, M.E.

Tectonic faults of the Viti Levu island (Fiji) as they are seen on satellite imagery.

AUZENDE, J.M., URABE, T. and SHIPBOARD PARTY

Preliminary results of the STARMER I cruise of the submersible "Nautille" in the North Fiji Basin.

BINNS, R.A. and SCOTT, S.

Propagation of Sea-Floor Spreading into Continental Crust, Western Propagation of Sea-Floor Spreading into Continental Crust, Western Woodlark Basin, PNG.

BOULTON, B.R.

Platinum-rich ferromanganese crusts from the Southwest Pacific.

COCHONAT, P., LE SUAVE, R., CHARLES, C., GREGER, B., HOFFERT, M., LENOBLE, J.P., MEUNIER, J. and PAUTOT, G.

The first Nautille submersible dives in French nodule mining area.

COLEMAN, P.J.

Island Arcs and Composite Transient Transforms - the Effects on their Hydrocarbon and Mineral Resources.

COULBOURN, W.T., HILL, P.J., BOG, J., DE CARLO, E.H., KEATING, B.H., BERGERSEN, D., PENNYWELL, P.A., KAMU, S. and YEETING, B.M.

CCOP/SOPAC Moana Wave Cruises 3 (MW87-02) to the Territorial Waters of Western Samoa, the Cook Islands and Kiribati: A summary of Results

CRONAN, D.S., HODKINSON, R.A. and MILLER, S.

An overview of manganese nodules and cobalt-rich crusts in the CCOP/SOPAC area.

CROOK, K.A.W., TAYLOR, B. and MUSGRAVE, R.J.

Triple-junction tectonics, eastern Woodlark Basin, Solomon Islands.

DE CARLO, E.H.

Relation of Intrasample REE Variability in Pacific Ocean Ferromanganese Crusts to Paleoceanographic conditions over Geologic time.

EISSEN, J.P., MORVAN, G., LEFEVRE, C., MAILLET, P., URABE, T., AUZENDE, J-M. and HONZA, E.

New data on the petrology and geochemistry of the central North Fiji Basin spreading center (SW Pacific).

EXON, N.F. and MARLOW, M.S.

Petroleum Prospects of the New Ireland Basin in Papua New Guinea.

- ROGERSON, R. and HILYARD, D.  
Scrapland: A Suspect Composite Terrane in Papua New Guinea.
- SCHOLL, D.W., HERZER, R.W., and STEVENSON, A.  
Southern Tonga and Lau Ridges; implications of tectonism and submergence histories for petroleum resources.
- SCHOLL, D.W. and VALLIER, T.L.  
Tonga and Lau Ridges: implications of tectonism and submergence histories for petroleum resources in the Southwestern Pacific.
- SCHOLL, D.W., STEVENSON, A.J., VALLIER, T.L. RYAN, H.H. and GEIST, E.L.  
Arc-massif shearing, block rotation and transportation -- a consequence of oblique convergence along the Aleutian Ridge.
- STOFFERS, P., BOTZ, R., DEVEY, C.W., HARTMANN, M., KOGLER, F., MUHE, R.K. and PUTEANUS, D.  
Geology and Petrology of active hotspot volcanism in the Austral Islands: The Macdonald Region.
- STOFFERS, P., PUTEANUS, D., GLASBY, G.P. and KUNZENDORF, H.  
Hydrothermal iron-rich deposits from the Teahitia-Mehetia and Macdonald Hot Spot areas, SW Pacific.
- TANAHASI, M., KISIMOTO, K., JOSHIMA, M., LAFOY, Y., HONZA, E. and AUZENDE, J.M.  
Geological structure of the North Fiji Basin.
- TAYLOR, B., LIU, L., MALLONEE, R., SINTON, J. and CROOK, K.A.W.  
Transtension in the Manus backarc basin.
- USAMI, T.  
Research and Development of the Marine Technology in Japan.
- URABE, T.  
An Overview of the Seafloor Hydrothermal Mineralization in Northwestern Pacific Basin.
- VEDDER, J.G., BRUNS, T.R. and COLWELL, J.B.  
Geologic setting and Petroleum Prospects of Basin sequences, Offshore Solomon Islands and Eastern Papua New Guinea.
- VON STACKELBERG, U. and SHIPBOARD PARTY.  
Extensive low-temperature hydrothermal activity in the southern Lau Basin (Diving with Nautila).
- VON STACKELBERG, U.  
Growth History of Manganese Nodules of the Equatorial North Pacific Ocean.

WRIGHT, I.

Tectonics of the Havre Trough - Taupo volcanic zone, Bay of Plenty: evidence from Gloria Side-Scan.

ZONENSHAIN, L.P.

Mussau Ridge (SW Pacific): geology, origin and plate tectonic setting.



## CANBERRA GENERAL INFORMATION

### CANBERRA'S LOCATION:

Canberra is at approximately 35 degrees south and 150 degrees west. It lies among hills at an elevation of about 2000 feet (600 metres). Time zone is GMT plus 10 hours.

### CLIMATE AND DRESS:

In spring (September-November) the weather can be very variable, and the nights are cold, so bring some warm clothes. Dress tends to be casual, but a sports coat will be handy for some occasions.

### ACCESS:

**By Air:** Ansett and Australian Airlines operate daily flights from Sydney and Melbourne with connecting flights from major cities. East-West Airlines has budget flights.

**By Rail:** The Canberra Express operates daily except Sundays from Sydney to Canberra. The Inter-capital Daylight leaves Melbourne daily, except Sundays, to Yass Junction with one-hour coach connection to Canberra.

**By Road:** There are express coach services between Sydney or Melbourne and Canberra, offering a view of varied, scenic countryside. Ansett Pioneer and Greyhound operate services, connecting with other State capitals at Sydney or Melbourne.

### BANKING:

There are branches of most major banks in Canberra, including Westpac Banking Corporation, ANZ, Commonwealth, and Banque Nationaux De Paris.

### BUSINESS HOURS:

General shopping hours are Monday to Thursday 09.00 to 17.00. Friday 09.00 to 21.00, Saturdays 09.00 to 12.00.

### POST OFFICE:

Post offices in the city and most suburban shopping centres are open Monday to Friday from 08.30 to 17.00. The G.P.O. is located in Alinga Street, Canberra City.

### PASSPORTS:

A passport is required by everyone entering Australia.

### VISAS:

Applications should be made to the nearest Australian High Commission or Embassy Office for entry visas to Australia. These should be obtained prior to departure for Australia.

#### DEPARTURE TAX:

A departure tax of A\$10.00 per person over 18 years of age is payable at the international airport terminals.

#### ELECTRICITY SUPPLY:

240 volts, 50 cycles AC, Australian-type plug (3 flat pins). Some hotels have 110 volt converters for razors and hairdryers.

#### WATER SUPPLY:

Tap water is completely safe.

#### COMMUNICATION ON CAMPUS:

Most modern facilities are available on the Australian National University campus.

#### Important phone numbers are:

|                        |        |
|------------------------|--------|
| ANU Geology Department | 492056 |
| BMR                    | 499111 |
| Tourist Information    | 456464 |

#### CAR RENTALS:

A considerable variety of rental firms are present, and most of them will charge about A\$60, A\$70, and A\$80 per day, for small, medium and large cars respectively. Among the firms present are Avis (ph. 496088), Budget (ph. 489788), Hertz (ph. 574877) and Thrifty (ph. 489081).

#### TAXIS/BUSES:

Both are widely available. A taxi from the airport to ANU campus will cost approx. A\$15 (ph. 460444). Some hotels have courtesy cars from the airport.

#### RESTAURANTS, NIGHTCLUBS AND DISCOS:

These are many and varied. Among the cheapest restaurants are those on the ANU campus. There are a number of "bring your own" restaurants in Canberra, and one should check when booking (all supermarkets sell alcohol).

## EXCHANGE RATES:

The basic unit of currency is the Australian dollar. Some exchange rates on 14 June 1989 were:

|                        | <i>buy/sell</i> |
|------------------------|-----------------|
| United States dollar   | 0.7422/0.7388   |
| United Kingdom pound   | 0.4887/0.4828   |
| Canada, dollar         | 0.8940/0.8795   |
| China, yuan            | 2.7833/2.7188   |
| Fiji, dollar           | 1.1613/1.1349   |
| France, franc          | 5.0890/5.0077   |
| French Pacific, franc  | 92.08/90.60     |
| Germany (West) Dmark   | 1.5029/1.4791   |
| Japan, yen             | 1.6917/1.6643   |
| Netherlands, guilder   | 1.6917/1.6643   |
| New Zealand, dollar    | 1.3105/1.3038   |
| Norway, krone          | 5.4274/5.3410   |
| Papua New Guinea, kina | 0.6550/0.6470   |
| Singapore, dollar      | 1.7313/1.7009   |
| Solomon Is, dollar     | 1.0275/0.9830   |
| Tonga, pa'anga         | 1.0275/0.9830   |
| Vanuatu, vatu          | 88.95/87.07     |
| Western Samoa, tala    | On App/1.6841   |

## SOME PLACES OF INTEREST:

New Parliament House - impressive and well worth visiting;  
National War Memorial - excellent war museum;  
National Science and Technology Centre - "hands-on" exhibits;  
Australian National Gallery - aboriginal, white Australian, and international art;  
Australian National Botanic Gardens - superb walks in a variety of floral settings;  
Tidbinbilla Nature Reserve - kangaroos, emus and other Australian fauna in a lovely wilderness setting;  
Telecom Tower - great view of Canberra.  
Commonwealth Park - near BMR, with Floriade floral festival in full swing.

**FOURTH INTERNATIONAL WORKSHOP ON GEOLOGY GEOPHYSICS  
AND MINERAL RESOURCES OF THE SOUTHWEST PACIFIC**

24 September to 1 October, 1989

**PRE-REGISTRATION FORM**

To be returned to Keith Crook, Geology Department, ANU, by post or by FAX before 1st September. Numbers attending are restricted to 80 and acceptance of late registration cannot be guaranteed.

NAME .....  
ADDRESS .....  
.....  
.....  
.....

FAX .....  
PHONE .....  
TELEX .....

**Arrival Details:** Flight No..... Date..... Time.....

Do you wish to be met at Canberra airport YES/NO

**Accommodation:** Making own arrangements YES/NO

Bruce Hall, University, YES/NO  
(A\$28/day bed and breakfast)

**Departure Details:** Flight No..... Date..... Time.....

**Workshop Dinner:** I wish/do not wish to attend the Workshop Dinner, cost A\$25 per person

**Field Trip:** I wish/do not wish to attend the Field Trip,  
cost A\$150 per person (See notes on field trip elsewhere in circular)

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I enclose a bank draft in Australian dollars and made payable to CCOP/SOPAC Workshop for the following:

Accommodation at Bruce Hall for ..... nights A\$.....  
Workshop Dinner A\$.....  
Field Trip A\$.....

TOTAL A\$ \_\_\_\_\_

I intend/do not intend to leave the field trip at Merimbula for Sydney/Melbourne.