

ORSTOM, NOUMEA, NEW CALEDONIA

20-31 March 1983

INTRODUCTION AND BACKGROUND

Trip Report No.7

CCOP/SOPAC and ORSTOM jointly sponsored a cruise (GEOVAN II) of the N.O. CORIOLIS in November 1982. The cruise enabled work relevant to a number of CCOP/SOPAC work program elements to be undertaken, including PE/VA.4, PE/REG.9, and PE/REG.28. The field activities have been described in CCOP/SOPAC Cruise Report No.73 (Burne and Tiffin, 1983). The data gathered during this cruise are lodged at ORSTOM, Noumea, where they are currently being processed.

Geophysical records and dredge samples from former ORSTOM cruises are also stored in Noumea. Much of this information is unpublished, and includes material relevant to CCOP/SOPAC work program elements PE/SI.IO, PE/REG.4, PE/FJ.II, PE/FJ.16, as well as to the geophysical investigations undertaken during the GEOV AN II cruise.

OBJECTIVES OF VISIT

1. Review of the progress of the GEOV AN II cruise data processing.
2. Discussion of preliminary data interpretations with ORSTOM colleagues, and establishment of responsibilities for joint publication of cruise results.
3. Study of geophysical records obtained during the AUSTRADEC and GEORSTOM cruise program in areas of interest to CCOP/SOPAC.
4. Examination and sampling of dredge collections from areas of interest to CCOP/ SOPAC.

PERSONNEL PARTICIPATING

R.V. Burne, Marine Geologist, CCOP/SOPAC.

ACTIVITIES

A brief stopover in Port Vila enroute to Noumea enabled a visit to be made to the Geological Survey Department of Vanuatu. Commercial multi-channel seismic

profiles across the area west of Espiritu Santo and Malekula were examined. Progress of GEOV AN II and Tripartite studies were discussed with Mr A Macfarlane, national SOPAC representative and Chief Government Geologist.

At ORSTOM, Noumea an office was made available for my use, and all necessary drafting equipment, materials, and technical support were provided to facilitate my work.

The following results were achieved in pursuit of the stated objectives.

1 . Progress with GEOV AN II data processing

Problems with the computing system in the Lacoste and Romberg Gravimeter during the GEOV AN II cruise affected the quality of the gravity records and it is uncertain whether gravity information will be recovered for much of the cruise.

Bernard Pontoise is processing the results of the O.B.5. refraction experiments. It is anticipated that the initial results will be available by July.

Computer problems have also held up the processing of the navigation data. Because of this, a listing of all satellite fixes and dead-reckoning positions was made from the data base to enable the seismic reflection track lines to be manually plotted in Suva. The seismic reflection records have been studied in Suva, and no further work had been undertaken on them in ORSTOM, Noumea.

2 . Preliminary interpretations and plans for joint publication

Initial interpretations of the seismic reflection data from the GEOV AN II cruise were discussed with Patrick Maillet, Jean-Yves Collot and Jacques Daniel. The profiles generally support the suggestions advanced by Collot and Daniel to explain the tectonics of the central New Hebrides arc, and particularly to account for the absence of a trench in this region. These suggestions were based mainly on the bathymetric data gathered during the GEOV AN I cruise, and are the subject of a manuscript currently in preparation. I was asked to review a copy of this paper. "

It was agreed that I should prepare the first draft of a paper dealing with the interpretation of the seismic reflection data from GEOV AN II and drawing also

on GEORSTOM, LEE, and KANA KEOKI seismic data. The aims of the paper will be to:

- a) describe the nature of the eastern extremity of the d'Entrecasteaux Zone, and to compare it with the central and south-western parts recently described by Maillet . (submitted).
- b) describe the subduction/collision boundary between the d'Entrecasteaux Zone and the Santo-Malekula block, as revealed by the reflection records.

This manuscript will be prepared in English and will be co-authored by Daniel and possibly other ORSTOM contributors. The seismic refraction data processing is not yet sufficiently advanced to allow initial interpretation. Bernard Pontoise will forward the processed data along with a preliminary interpretation to Suva at the end of July for translation, revision, and submission for publication. The possibility of including the seismic reflection paper in the AAPG special publication describing the tripartite cruises will be examined. The seismic refraction paper will be submitted to a journal such as Marine Geological Researches.

3 . Study of AUSTRALDEC and GEORSTOM geophysical records

Photocopies were made of GEORSTOM single channel seismic lines 103, 104, 105, 106, 107, 108, 109, 202, 203, 204, 205, 206, 207, 209, 210, 211, 212, 213, 214, together with copies of accompanying reduced bathymetric and magnetic data. These lines cover the vicinities of the Rennell Arc (Solomon Islands), and the d'Entrecasteaux Zone. The copies will be added to the CCOP/SOPAC collections. Interpretation of this data commenced and will be completed in Suva.

The AUSTRALDEC surveys covered large areas of the southwest Pacific, all of interest to CCOP/SOPAC. Lines 112, 113, 302, 305, 306 (multi-channel) and 408, 409 (single channel) were examined. Because of the commercial funding of the AUSTRALDEC program, these lines could not be photocopied. However interpretive tracings were made, using a reducing apparatus. The lines covered the areas of the Rennell Arc, the d'Entrecasteaux Zone, and the Vitiaz Trench.

4 . Examination and sampling of dredge collections

The GEORSTOM .III Nord cruise program recovered dredge samples from the vicinity of the Rennell Arc, the d'Entrecasteaux Zone and other areas. These

samples have been described in an unpublished ORSTOM report by Michel Monzier (Monzier, 1976) but further analyses have been restricted to some basalt samples. Examination of the report and the samples showed that a remarkable association of gypsum, cryptocrystalline carbonates, and other chemical sediments was recovered in dredge GO 302D from the 2000m deep floor of the eastern Coral Sea, south-west of Rennell Island. These lithologies were examined and samples obtained for isotopic, XRD and faunal analysis.

Polymetallic nodules and encrustations were recovered in "dredges from the d'Entrecasteaux Zone from the flanks of the basaltic north d'Entrecasteaux Ridge. These were examined and samples selected from dredged GO 3140, GO 3150, GO 3160, and GO 3170 for geochemical analysis.

PERSONS CONSULTED

Vanuatu

A. Macfarlane, Geological Department, Port Vila

New Caledonia:

The following ORSTOM scientists:

Jacques Recy

Jacques Daniel

Jean- Yves Collot

Michel Monzier

Remy Louat

Patrick Maillet

Bernard Pontoise

CONCLUSIONS AND RECOMMENDATIONS

ORSTOM program are being adversely affected by staff shortages, and active SOPAC participation in writing up results of the GEOVAN II cruise is essential if they are to be published in a timely manner. The proposed timetable and arrangements for publication mean that contractual obligations will be met. It will be necessary for me to return to Noumea late in 1983 when data processing has finished in order to finalise drafts of the two papers.

Samples of polymetallic nodules from the d'Entrecasteaux Zone promise to yield information on the origin of this feature. Their economic potential is presently unknown. Arrangements have been made to undertake a geochemical study of this material jointly with Barrie Bolton, of La Trobe University, Australia, and samples have been forwarded to him for analysis.

The gypsum and associated sediments from the ocean floor, southwest of the Rennell Arc pose a number of problems. The economic significance of this occurrence has to be examined since, on the one hand, saline deposits are often associated with hydrocarbon plays, and on the other hand sulphates in the deep sea are associated with deep-sea sulphide emplacement. Arrangements have been made to have Sulphur Isotope and XRD analyses undertaken at the Baas Becking Laboratory in Canberra to attempt to define the true nature and origin of these deposits.

ACKNOWLEDGEMENT

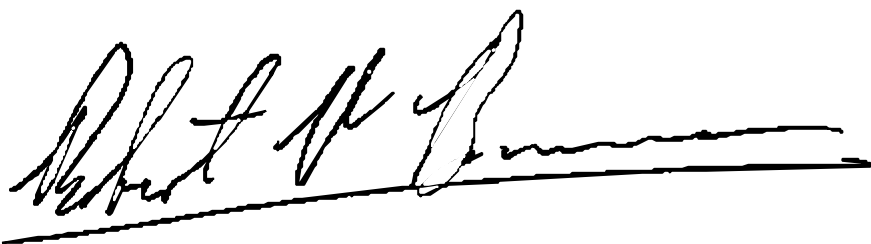
I am grateful for the assistance and support provided by the technical staff of both the Vanuatu Geology Department, and ORSTOM Noumea.

REFERENCES

Burne, R~V. and D.L. Tiffin, 1983. The E V A 10 (GEOV AN II) Geophysical Survey in Vanuatu Waters. CCOP/SOPAC Cruise Report No.74.

Maillet, P ., Monzier, M., Selo, M., and D. Storzer (submi tted). The d'Entrecasteaux Zone (South-West Pacific) A Petrological and Geochronological Reappraisal. MARINE GEOLOGY.

Monzier, M., 1976: GEORSTOM III NORD, Rapport Preliminaire sur les Echantillons Dragues. Premiere Partie. ORSTOM Noumea.

A handwritten signature in black ink, appearing to read 'Robert V. Burne', written over a horizontal line.

Robert V. Burne 21 April 1983