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CATATAN GEOLOGI (GEOLOGICAL NOTES)

NOTE ON THE CUYO ARCHIPELAGO, SULU SEA, PHILIPPINES

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Abstract

The Cuyo Archipelago is formed by pre-Tertiary rocks (metamorphosed limestones, radiolarite) which are intruded by diorite (15 Ma in age) and covered by a Cenozoic limestone and the products of several Quaternary volcanoes.

Abstrak

Cuyo Archipelago terbentuk oleh batuan pra-Tersier (batu kapur termetamorf, radiolarit) yang ditrobosi oleh diorit (berusia 15 juta tahun). Batuan ini telah diselubungi (ditutupi) oleh batu kapur Kenozoik dan hasilan beberapa batuan volkano Kuaternari.

Introduction

The Cuyo Archipelago, located in the northern part of the Sulu Sea, consists of more than 30 islands (Fig. 1), scattered over a surface of four thousands square kilometers between $120^{\circ} 30'$ and $121^{\circ} 15'$ longitude E and between $10^{\circ} 30'$ and $11^{\circ} 30'$ latitude N. Two islands are relatively large: Cuyo Island which is 13 km long and Agutaya which is 6 km long. The other islands are smaller.

Access to Cuyo Town on Cuyo Island is more or less easy; a few boats connect that town with San Jose at Panay Island, Roxas and Puerto Princesa at Palawan Island. There is no public transportation to the other islands.

Geomorphology

The islands of Cuyo Group are physiographically diverse and may be divided into three units: tower karst at Quiminatin (Figs. 1a, 1b, 1c), gentle volcanic landform at Cuyo Island and many other islands (Figs 3a, 3b) and rugged topography almost deprived of vegetation at the Quinluban Islands Group north of Agutaya (Figs. 4a, 4b). These three topographies correspond to a varied geological substratum: marble at Quiminatin, volcanoes at many islands (cones are low and more-or-less symmetrical), and radiolarite at the Quinluban Group.

The radiolarite is covered by a thin soil while ground water turns to be a problem during the dry season and the vegetation is poor. The highest hill of the Cuyo Archipelago is located at the Quinluban Island; it reaches 293 m in elevation with steep slopes. Other radiolarite islands have these features.

The marble is denuded with a few plants thriving in fractures or on tiny patches of soil; water is absent and nobody lives at Quiminatin. The island reaches 188 m in elevation; slopes are steep to vertical and usually continue abruptly into the sea (Figs. 1a, 1b, 1c).

Volcanic islands are blanketed by a fertile soil without vermicular laterite; they are largely inhabited and cultivated. Volcanic cones display craters which are partly destroyed; and which form the high ground of the islands, reaching 271 m in elevation at Agutaya but commonly less than 200 m in other places. The main volcanoes and their elevations are Cuyo Island: Mount Bonbon 247 m, Mount Caymamis 104 m, Mount Boctong 271 m and other volcanoes without names 246, 194, and 137 m. Other islands are formed by a single volcano; Bisucay 105 m, Capnoyan 108 m, Canipo 164 m and Dit 231 m. Because of the well-preserved volcanic relief, the absence of laterite and the mild weathering, volcanic activity are assigned to the Quaternary.

Northeast of Cuyo Island, the Tacubuc Island is rugged according to the map of scale 1:50,000 and appears to be different from the other islands surrounding Cuyo Island. Because of bad weather, it was impossible to reach it during our trip.

In the vicinity of the Cuyo Archipelago according to maps, sea bottom displays conic elevations that might be extinct volcanoes.

Geology

During their short trip, the authors were able to visit the following islands: Algeciras, Quinluban, Dit, Imaruan, Agutaya, Guinlabog, Canipo, Bararin, Inagami (or Tagami), Putic, Adunbrat, Cuyo, Bisucay, Capnoyan and Quiminatin. Geology of the other islands was inferred from rock samples given by fishermen and from what was seen from the boat.

The Cuyo Archipelago consists of pre-Tertiary rocks (marble and radiolarite) associated with younger basalts (Quaternary). The presence of basalt has been indicated at Cuyo, Bisucay, Capnoyan and Cocoro Islands by the 'Geological Map of the Philippines' of the scale 1:1,000,000 printed in 1963; pre-Tertiary has been erroneously mentioned at Canipo Island and the geological nature of the other islands was unknown at that time. Recently (Bureau of Mines and Geosciences, 1981, p. 220), the basalt of Cuyo and Bisucay Islands had been considered probably equivalent in age to the 'Manguao Volcanics' of North Palawan Island.

Marble

It forms the Quiminatin Island which is isolated in sea and has no contact with other rocks. It is highly fractured and tectonised. No fossil were found.

Radiolarite

At Algeciras and Quinluban Islands radiolarite is thin- or thick-bedded, grey, green or red in colour, strongly folded; it contains

manganese ore distributed in fractures but not interbedded. A rock from Manamoc Island given by fishermen is a grey radiolarite. All the radiolarite islands display hills reaching high elevations; 293 m at Quinluban, 167 m at Algeciras, 123 m at Silad, 125 m at Tinituan, 216 m at Manamoc. Similar radiolarites are already known in the Calamian Islands, in the northern part of the Palawan Island and in the small islands northeast of that island. They are also present in the Buruanga Peninsula in the northwestern part of the Panay Island. Hence, it appears that radiolarite could be extensively developed in the North Sulu Sea. However, it is probably absent in Mindoro.

Volcanic Rocks

These consist of lava (basalt) and tuff. They were generated by volcanoes which were sometimes explosive; however, tuff is much less common than lava. Along the seashore, basalt bocks are widespread and have been interpreted as corals by aerial analysis (see topographic map of scale 1:50,000).

Basalt

It is compact or vesicular, more - or - less clearly porphyritic. Phenocrysts, subhedral to euhedral, form up to 16% of the whole rock; they consist mainly of olivine rimmed with coronas of iddingsite; a few zoned plagioclases may be observed. Intergranular matrix is dominated by randomly oriented fine laths of plagioclase; the interstices between these laths are filled with granules of clinopyroxene, olivine and magnetite. Dark volcanic glass is an occasional interstitial constituent. Near volcanoes, fragments of scoria are common whereas pumice is almost absent. The basalt is covered by a red-to-brown soil, not invaded by vermicular laterite. When the basalt is highly vesicular, it is quite weathered and it is easy to dig wells in that kind of rock.

Tuff

This pyroclastic deposit forms a few islands where it is associated with small lava flows: Bararin, Guinlabog, Putic, Inagami. It is eroded by wave action, displays high cliffs along the seashore and layers of rubbly material slightly dipping more-or-less towards the periphery of the island. At Putic Island, it contains abundant basaltic fragments (common vesicular basalt and scoria, less common compact basalt, very rare pumice) and fragments of diorite, limestone and corals.

The diorite is hypidiomorphic-granular, showing interlocking broad laths of plagioclase (44%), prisms of hornblende (12%) and plates of biotite (8%). Sphene (4%) is present in accessory amount as fine granules. Secondary minerals are represented by granular aggregates of quartz (11%), clay (10%), chlorite (3%) and calcite (8%).

This diorite is Early-Middle Miocene in age according to concordant K:Ar measurements of whole rock (15 ± 3 Ma), feldspar (15 ± 8 Ma) and biotite (15.7 ± 1.4 Ma). These results provide an isochron of 15.3 ± 0.5 Ma. The diorite fragments have been brought to the surface by the volcanoes, indicating the presence of a dioritic intrusion in depth.

Some limestone fragments included in the tuff are fossiliferous

and contain bivalves (Pectinidae), foraminifera and algae. They indicate the presence of a limestone in depth. Foraminifera are common and the following species have been identified: *Amphistegina radiata*, *Calcarina spengleri*, *Calcarina* sp., *Marginopora vertebralis*, *Operculina* cf. *complanata*, *Operculina* sp., *Alveolinella* cf. *quoyi*, *Quinqueloculina* sp., *Pyrgo* and other Miliolids. These foraminifera indicate a Late Miocene to Recent age, probably a Plio-Pleistocene age. Hence, they confirm the young age of the overlying basalts, already noticeable in the field from the good preservation of the volcanoes.

Sand

In the basaltic islands, sand forms only narrow beaches. Northwest of the Cuyo Island, it is more abundant, covers a large area and builds up the small Adunbrat Island.

In the northern part of the Cuyo Archipelago, erosion of the radiolarite has provided a huge amount of siliceous sand, locally emergent, covered by shallow water on large surfaces around the Algeciras-Quinluban Islands Group.

Conclusions

The radiolarite of the Cuyo Archipelago is considered to be probably Triassic in age because it is similar to the radiolarite dated by conodonts (Hashimoto and Sato, 1973; Hashimoto, 1981) and exposed in the Calamian Islands and in the northern part of the Palawan Island. The marble of the Quiminatin Island is probably older. Both marble and radiolarite have been intruded by Miocene diorite.

On this pre-Tertiary substratum, a Cenozoic limestone has been deposited; it is known only by fragments found in the volcanic tuff.

During the Quaternary, strong volcanic activity has built up many islands.

The Jurassic, widespread in Mindoro Island and the Calamian Islands, is absent in the Cuyo Archipelago.

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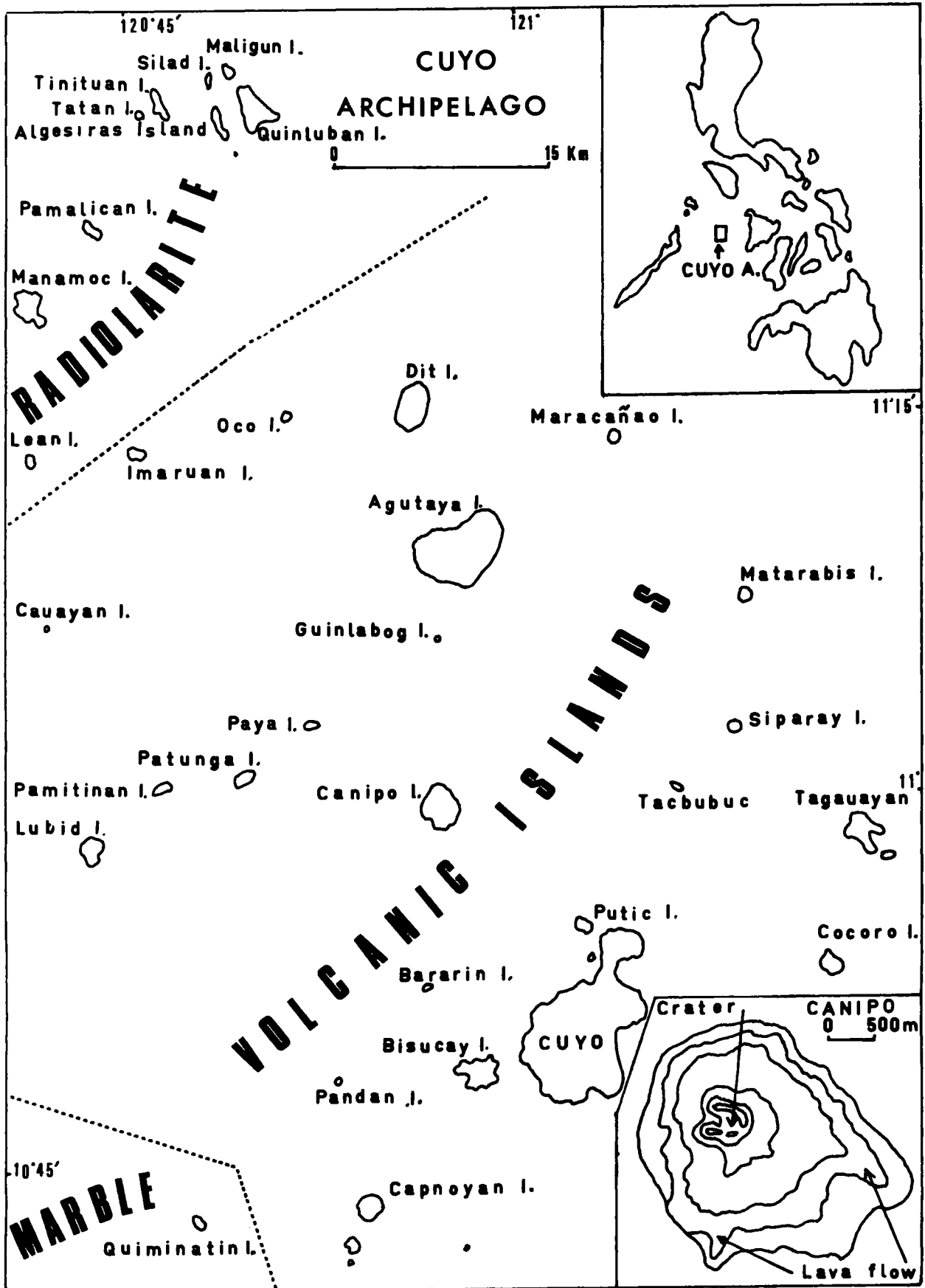
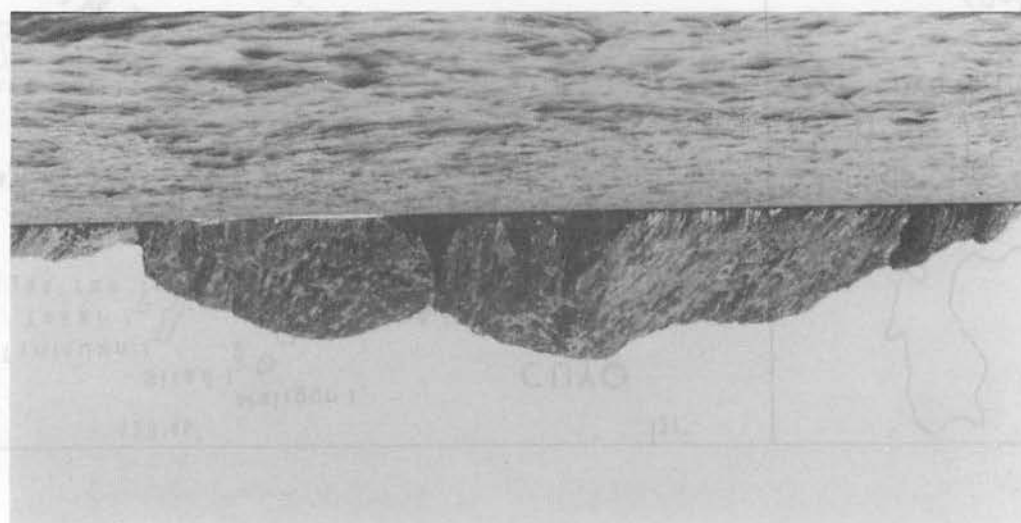
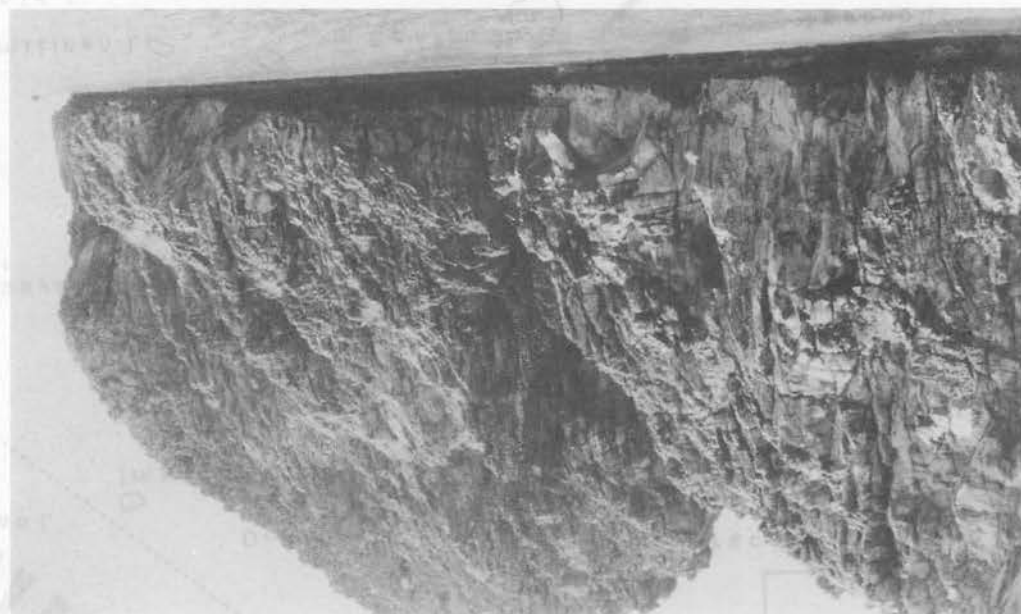
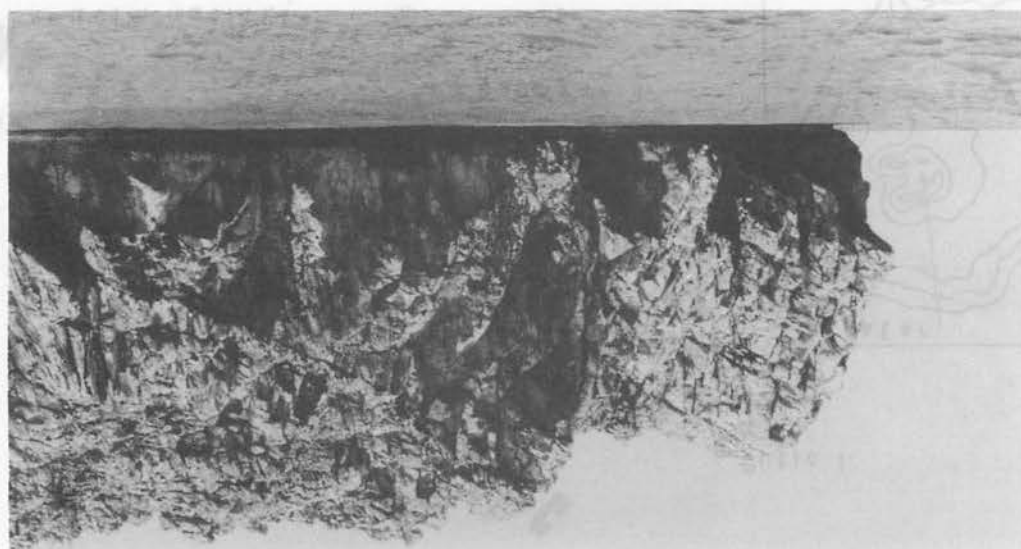


Fig. 1. Location map of the Cuyo Archipelago.

Fig. 2. Quimnatin Island with its steep marble slopes that continue abruptly to the sea.



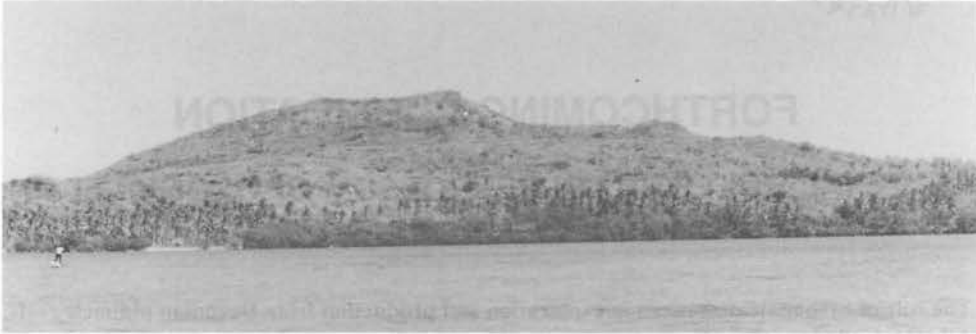


Fig. 3. Mount Boubon, the volcanic cone on the basaltic island of Canipo.

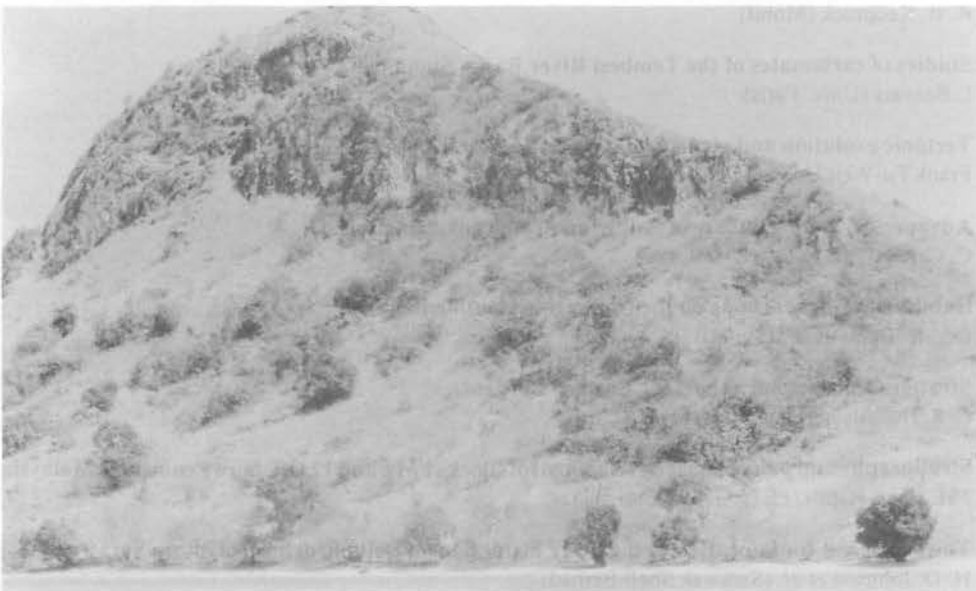


Fig. 4. Quinluban Island of radiolarite and with the highest hill in the Cuyo Archipelago.



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THE RELATIONSHIP BETWEEN VEGETATION AND ULTRABASIC BEDROCK ON THE UPPER SLOPES OF MOUNT KINABALU, SABAH

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Abstract

A recent vegetation study of the Mount Kinabalu area, Sabah, shows the relationship between vegetation and ultrabasic bedrock on the upper slopes. Although plant communities characteristic of ultrabasic bedrock do occur in areas underlain by ultrabasic bedrock, they only occur in small, isolated patches, often overlapping onto sedimentary rocks and gravels downslope, while most of the ultrabasic bedrock is covered with plant communities which are characteristic of more acidic bedrock. This is believed to be due to the steep gradient and the narrowness of the ultrabasic bedrock.

A few anomalous patches of ultrabasic vegetation however occur east of the summit, upslope from any known occurrence of ultrabasic rocks, thus warranting further study of the area.

Abstrak

Kajian pertumbuhan baru-baru ini di kawasan Gunung Kinabalu, Sabah, menunjukkan perhubungan diantara pertumbuhan dan batuan asas ultrabasa di-cerun-cerun atas. Walau pun komuniti-momuniti tumbuhan yang mencirikan batuan asas ultrabasa terjadi di kawasan-kawasan yang mempunyai batuan asas ultrabasa, mereka hanya terjadi sebagai kelompok-kelompok yang kecil dan terasing yang kadang-kala bertindih dengan kawasan batuan enapan dan kelikit di bawah cerun. Kebanyakan batuan asas ultrabasa ini diselubungi oleh komuniti-komuniti tumbuhan yang mencirikan batuan atas lebih berasid. Keadaan ini dipercayai berasaskan daripada kecerunan cerun dan kesempitan batuan asas ultrabasa.

Beberapa kelompok-kelompok anomali pertumbuhan ultrabasa terjadi timur dari kemuncak, bahagian atas daripada kawasan-kawasan yang mempunyai batuan ultrabasa, kawasan kawasan ini berkehendakan kajian lanjutan.

Introduction

The effects of soils derived from ultrabasic bedrock on overlying plant communities has been noted by both botanists and geologists for some time. On a gross scale, it has been noted that trees growing on ultrabasic derived soils tend to have smaller crowns than those growing on other soil types (Fox & Tan, 1971; Jacobson, 1970), and on a more detailed scale, certain characteristic plant communities live on ultrabasic derived soils (Smith, 1977; Brooks, 1983). It is believed that

the high concentrations of chromium, cobalt, iron, magnesium and nickel, as well as low concentrations of calcium, molybdenum, nitrogen, phosphorus, and potassium found in ultrabasic soils are responsible for the unique plant communities, although it is still not known which specific element or group of elements controls the vegetation types (Brooks, 1983).

Previous studies of ultrabasic vegetation on Mount Kinabalu have been rather general. Jacobs (1961) noted that along the summit trail, south of Paka Cave, a drastic change in vegetation, to a *Leptospermum recurvum* community, indicated a serpentinite soil, and that the vegetation changed to a type representative of granitic bedrock near Paka Cave. Smith (1977) stated that on the south slope of Mount Kinabalu, ultrabasic soils produced a poor vegetation cover with *Leptospermum recurvum* and *Dacrydium gibbsiae* being the most prominent types.

Discussion

A vegetation survey of the Mount Kinabalu area, Sabah, was conducted from May 1984 to April 1986 by Kitayama and a detailed vegetation map was produced. Of the 18 natural vegetation community types mapped, four, namely *Tristania* dominance forest community, *Leptospermum-Tristania* dominance thicket community, *L. recurvum-Dacrydium gibbsiae* dominance thicket community, and *Graminoids* community were considered indicative of ultrabasic derived soils. Of these four communities, the latter three are found on the upper slopes, above 5000 ft elevation.

The most recent geologic map of the Mount Kinabalu area (Jacobson, 1970) shows that the summit region consists of adamellite, with a narrow ($\frac{1}{2}$ -1 km) serpentinite and serpentinitised peridotite intrusion to the south, a wider ultrabasic intrusion to the west and north west, and clastic sedimentary rocks and Quaternary gravels downslope from the ultrabasic intrusions. A simplified version of his map, showing only the ultrabasic rocks, combined with a simplified version of Kitayama's vegetation map, showing only the areas of ultrabasic plant communities, is shown in Figure 1.

Figure 1 shows that the ultrabasic plant communities generally occur as small patches within the ultrabasic rock areas, surrounded by other types of plant communities. They generally occur on the down-slope portion of the ultrabasic rock, and often extend a short distance downslope, on top of other rock types. They are most extensive where the ultrabasic rock is widest, such as west of the summit (where the ultrabasic vegetation is shown to extend slightly upslope from the ultrabasic bedrock, possibly a mapping error), southeast of the summit, and south of the Paka Cave. South of Paka Cave, the area of ultrabasic plant community roughly parallels the drainage. A notable exception occurs east of the summit, where several small patches of ultrabasic plant communities occur upslope from any ultrabasic rocks, according to Jacobson's map.

Conclusion

The relationship between ultrabasic plant communities and ultrabasic bedrock on the upper slopes of Mount Kinabalu appears to be

related to topography and the width of the ultrabasic bedrock. The steep gradient of the area, the relatively narrow (approximately $\frac{1}{2}$ -1 km wide) zone of ultrabasic bedrock south of the summit, and the large mass of predominately adamellite above the ultrabasic zone probably results in the contamination of any soil formed on the ultrabasic rock by material from above. The soils seem to retain their ultrabasic character, and thus support ultrabasic plant communities, only where the ultrabasic bedrock is rather wide.

It is also possible that the ultrabasic rock south of the summit region occurs as several small intrusions rather than one large one. Jacobson (1970), however, has shown several strike and dip of foliation symbols on the ultrabasic rock of his map, indicating the presence of ultrabasic outcrops, in places where no ultrabasic vegetation occurs. Even though the ultrabasic intrusion south of the summit may in fact be several smaller intrusions, there are definitely many areas where ultrabasic bedrock is not covered by ultrabasic plant communities.

The use of botany in mapping areas of ultrabasic rock appears to be rather limited in this case, at least as far as locating ultrabasic contacts is concerned. The small, scattered ultrabasic plant communities, however, do indicate the presence of ultrabasic bedrock, but do not define its extent.

The zones of ultrabasic plant communities east of the summit are still a mystery, and may indicate the presence of an unknown ultrabasic intrusion in the area. Further study in this area is definitely warranted.

Acknowledgement

The writer is indebted to Cik Baiba Ag. Asat for drafting the map.

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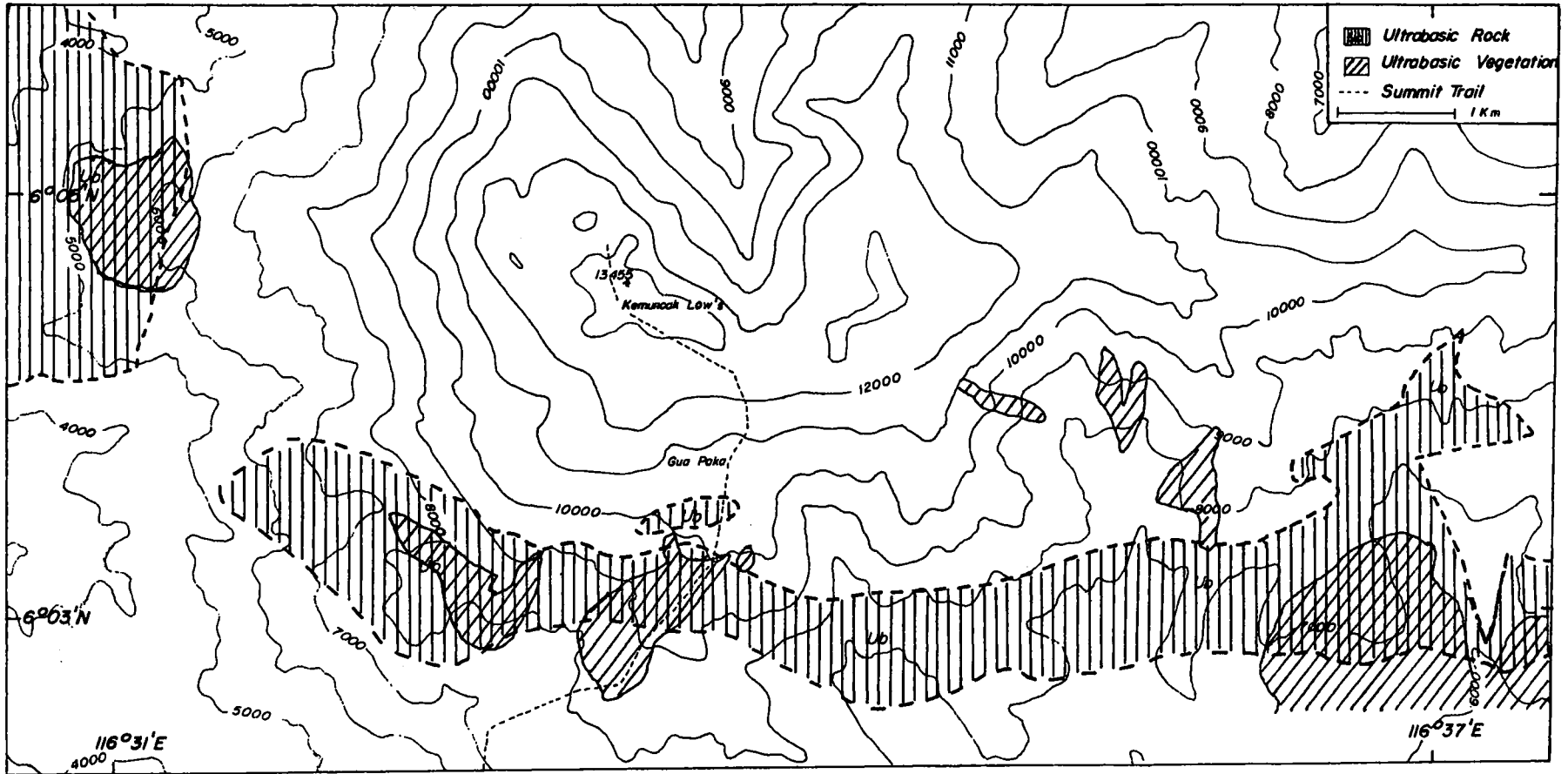


Fig. 1. Map of the upper slopes of Mount Kinabalu, Sabah, showing the relationship between ultrabasic bedrock and vegetation.

A GEOBOTANICAL STUDY, 18TH CENTURY STYLE

K.F.G. Hosking, 1B Penlu, Tuckingmill, Camborne, Cornwall TR14 8NL, England.

It is no bad thing to be reminded occasionally that so many branches of science which are all too often regarded as having been recently established have in fact, long histories of development. Geobotany is one of these.

There is not point in describing in this note how geobotanical studies may facilitate geological mapping and mineral exploration as such information is readily available in the literature. The point of this note is to present certain geobotanical observations made in Devon, England, during the period 1794 - 1796 by Maton. They demonstrate that Maton must be regarded as one of the vanguard who advanced geobotany, some considerable time ago.

Maton wrote "*As I amused myself with these observations (on the distribution of certain species of lichen (K.H.), and remarked the great prevalence of some species of Lichen and the total absence of others, I was led to reflect on the aid that this curious tribe of vegetables affords to mineralogy. The most abundant plant, by far, was L. geographicus, L. lackeus, niger, aederi, tartareus, and fragilis were frequent, but scarcely any specimens of the common yellow liverwort (L. parietinus) were to be found. This circumstance alone would be sufficient to show that the composition of the rock was of a peculiar kind - L. calcareus and Byssus saxatilis being partial to limestone, wherever that stone occurs amongst others it may at once be distinguished, by these species adhering to it; L. coesius and cupularis are known to abound only in slate mountains; L. furfuraceous seems to prefer granite; and many others might be pointed out, equally nice with regard to their place of abode. Sudden variations then in the composition of rocks may often be discovered at merely a glance by becoming acquainted with their more obvious vegetable inhabitants.*"

Acknowledgements

I am grateful to my friend, Peter Embrey, Department of Mineralogy, British Museum (Natural History), for bringing Maton's geobotanical observations to my notice.

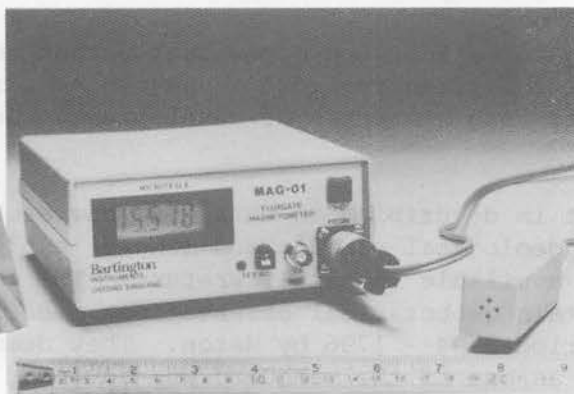
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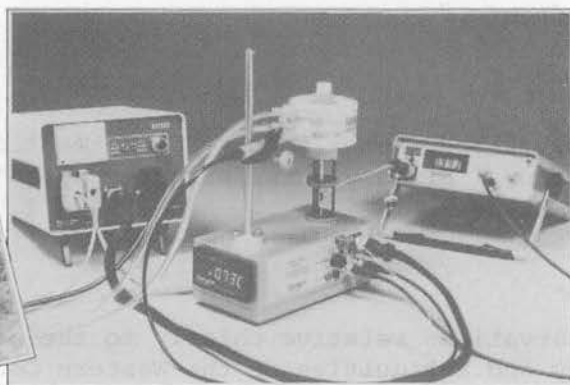
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Pejabat Pos Jalan Kelang Lama, 58700 KUALA LUMPUR. MALAYSIA.
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BERITA - BERITA PERSATUAN (NEWS OF THE SOCIETY)

INSTITUTE OF PROFESSIONAL GEOLOGISTS MALAYSIA - PROPOSED PROTEM COMMITTEE MEMBERS

The following is a list of members proposed by the GSM Council to serve on the Protem Committee formed to prepare the groundwork and help to establish the Institute of Professional Geologists Malaysia. The Council in its selection tried to select Members of the GSM who are recognised in their respective fields/institutions and who have been active in the Society. It is also important to note that in accordance with the Draft Constitution of the Institute, the GSM Council envisages that the Members of the Protem Committee will automatically become the founder Members of the Institute. They will also form the Committee which will vet and approve all future applications for membership in the Institute.

As agreed during the AGM of the GSM held in 1986, the list of the proposed candidates must be circulated to Members before it can be finalised. Members who have objections to any particular nominee should write to the Hon. Secretary (in confidence) giving the name of the person and stating reasons for the objection. Replies must be received not later than 19th March 1987.

List of Nominees:

1. Mr. Chin Lik Suan, Petaling Jaya
2. Mr. Koh Tuck Wai, Petronas
3. Mr. Ahmad Said, Petronas
4. Dr. John Kuna Raj, Universiti Malaya
5. Dr. Ahmad Tajuddin Ibrahim, Universiti Malaya
6. Dr. Azhar Hussin, Universiti Malaya
7. Dr. Syed Sheikh Almashoor, Universiti Kebangsaan Malaysia
8. Dr. Ibrahim Komoo, Universiti Kebangsaan Malaysia
9. Dr. Abdul Ghani Rafek, Universiti Kebangsaan Malaysia
10. Mr. Albert Loh, Malaysia Mining Corp.
11. Dr. S. Paramanathan, Universiti Pertanian Malaysia
12. Mr. Abdul Aziz Hussein, Universiti Teknologi Malaysia
13. Mr. Khee Kok Kean, Esso Production Malaysia
14. Mr. Yeoh Gaik Chooi, Esso Production Malaysia
15. Mr. Chong Foo Shin, Geological Survey Malaysia
16. Mr. Fateh Chand, Geological Survey Malaysia
17. Dr. Leong Lap Sau, Universiti Sains Malaysia
18. Dr. Zainol Mohd. Eusof, Rubber Research Institute.

INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS - SOCIETY'S REPRESENTATIVE

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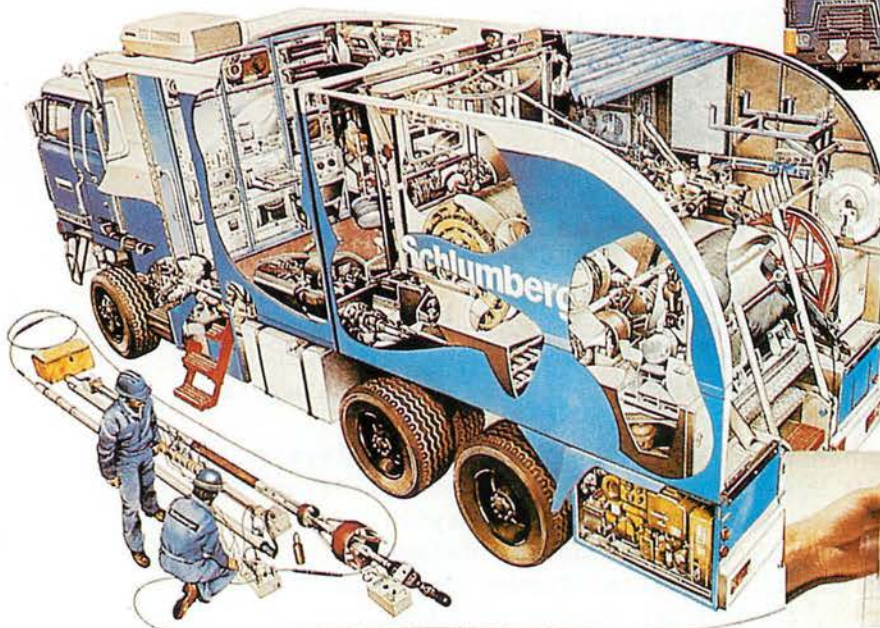
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Schlumberger engineer at work with the Cyber Service Unit system inside a wireline logging Unit

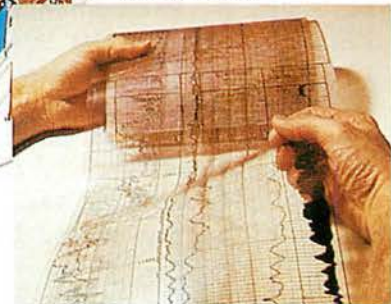


Cyber Service Unit on location.



Cyberlook, an interpreted log prepared at the wellsite by the CSU computer.

Schlumberger crew checking a logging tool.



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Telex: SCHLUM MA 31335.
Cable: SCHLUMEAD.

mentologists for a local representative, the Council nominated Dr. Nik Ramli of PETRONAS.

AHLI JAWATANKUASA BIBLIOGRAFI (BIBLIOGRAPHY COMMITTEE MEMBER)

The Council agreed to the following being appointed to the Bibliography Committee:

Dr. Ahmad Tajuddin Ibrahim (Chairman)
Dr. Ibrahim Komoo
Dr. S. Paramanathan.

The Committee will be involved in the gathering of all published materials concerning the geology of Malaysia since the beginning of 1968 and abstracts from them will be published.

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

1. Kazuo Itoh, OMRD Sabah Bhd. P.O. Box 5, 89307 Ranau, Sabah.
2. Low Yew Lim, Exploration Dept., Petronas, P.O. Box 12444, 50778 Kuala Lumpur.
3. Mazlan Hj. Madon, Petronas Laboratory, Lot 1026 PKNS Ind. Est., 54200 Ulu Klang
4. Noor Azim Ibrahim, - ditto -
5. Jean Marc Husson, Dresser Atlas, 2 Jalan Tun Sambanthan 3, 50470 Kuala Lumpur
6. Haziah Mohamed, Petronas, Exploration Dept., P.O. Box 12444, 50778 Kuala Lumpur
7. Sanudin Hj. Tahir, Jabatan Sains Bumi, UKMS, Locked Bag 62, 88996 Kota Kinabalu, Sabah
8. Ramli Mohd. Osman, Institut Penyelidikan Galian, P.S. 1016, 30820 Ipoh, Perak
9. Ahmad Munif Koraini, Petronas Laboratory, Lot 1026, PKNS Industrial Estate, 54200 Ulu Kelang
10. Michael P. Klimetz, 2115 Shore Parkway, Brooklyn, N.Y. 11214, USA.
11. Tako Koning, Texaco, P.O. Box 3333 Station M, Calgary, Alberta, Canada
12. G.A.M. Kruse, 2de Helmetstraat 49^I, Amsterdam 1054 CD, The Netherlands

Student Members

1. Robert Linnen, Dept. of Geological Sciences, McGill University,
3450 University St., Montreal, Quebec, Canada H3A 2A7
2. Chu Yun Shing, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi
3. Liow Pin Song, - ditto -
4. Lee Yuen Piau, - ditto -
5. Anne Swinitha Rajaratnam, - ditto -
6. Tay Sing Ui, - ditto -
7. Wan Abdul Manan Wan Abdullah, - ditto -
8. Salmah Abdul Rashid, - ditto -
9. Zaidin Satimin, - ditto -
10. Lim Peng Seong, K3G-202, Komsis Dato 'Onn, 43600 Universiti
Kebangsaan Malaysia, Bangi

Institutional Members

1. Total-CFP, TEP/DE/BBG, 24 Cours Michelet La Defence, 92800 Puteaux,
France. Attn: Mr. A. Fediaevsky
2. Britoil (Alpha) Ltd., Setiabudi Building 1, 2nd Floor, A4-6, Jl.
H.R. Rasuna Said no. 62, Kuningan, Jakarta Selatan, Indonesia

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The Society has received the following publications:

1. The limestone deposits of New South Wales by S.R. Lishmund, et al.,
1986
2. Records of the Geological Survey of New South Wales, vol. 22, pt.
2, 1986
3. Berliner Geowissenschaftliche Abhandlungen, Band 66, (Teil I & II)
Band 70, 1986, Band 75 (1-3), 1987
4. Bulletin Science & Technology Malaysia, vol. 5, no. 3 & 4, 1986
5. Annual Report 1985: The National Council for Scientific Research
& Development
6. Institute of Geoscience, The University of Tsukuba, no. 12, 1986
7. Commonwealth Science Council, Jan-June, 1987
8. The Science Reports of the Tohoku University, vol. 57(1), 1986
9. Contributions from the Institute of Geology & Paleontology,
Tohoku University, nos. 88 & 89, 1986
10. Institute of Mining & Metallurgy Bulletin nos. 963 - 967, 1987
11. Acta Palaeontologica Sinica, vol. 25, nos. 4-6, 1986
12. Acta Micropalaeontologica Sinica, vol. 3, nos. 3 & 4, 1986
13. Journal of stratigraphy, vol. 10, no.3, 1986

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BERITA - BERITA LAIN (OTHER NEWS)

SEMINAR PENGGUNAAN TEKNIK-TEKNIK NUKLEAR DALAM BIDANG INDUSTRI (SEMINAR ON THE APPLICATION OF NUCLEAR TECHNIQUES IN INDUSTRY) - ANNOUNCEMENT

Date: 17-19 November 1987

Venue: Holiday Inn on the Park, Kuala Lumpur

Organised by: Unit Tenaga Nuklear, Jabatan Perdana Menteri

Introduction

The first seminar on the Application of Nuclear Techniques in Industry was held in November, 1981. Since then a rapid development has taken place. The increase in the application of radioactive tracer techniques, nuclear gauging, non-destructive testing (NDT), radiation processing, neutron activation analysis (NAA) and nuclear dating and other nuclear techniques has played and will continue to play an important role in our quest for quality, products increased safety and reliability and increased accuracy in measurement and control. The commissioning of the PUSPATI TRIGA Reactor (RTP) as well as the Cobalt-60 irradiation facilities marked a new era in the national industrialisation process.

Malaysia is experiencing a rapid progress in the area of industrialization. The application of nuclear techniques in industry is expected to increase and become more important. The Nuclear Energy Unit (UTN) under the Prime Minister's Department is organising this Seminar for the second time to further discuss and review the progress achieved in the utilization of these techniques in industry as a follow-up exercise to the first Seminar. This is in line of the UTN's role to promote greater awareness and understanding of the benefits that can be obtained from the application of nuclear techniques among the general public and in the industrial sector.

Objectives

1. To provide a forum for the discussion and exchange of ideas pertaining to the application of nuclear techniques in industry encompassing technical, legal, safety, organisational together with other aspects;
2. To promote greater understanding and cooperation between local industries and the scientific and technical research community;
3. To promote greater awareness in the potential benefits of nuclear technology applications in industry and public enterprise.

Call for Papers

Selected papers from local and international participants, will include the following aspects:-

- research, development and application of nuclear techniques in Malaysia and in other countries (e.g. NDT tracer, gauging, NAA, radiation processing, geology, etc)
- nuclear instrumentation facilities, maintenance and services and their applications in industry
- safety and regulatory aspects in the utilization of radiation and radioactive materials, and
- reactor utilization and its role in the application of nuclear technique.

Those actively involved in the aspects mentioned above are invited to submit papers, which should be submitted not later than 14 July 1987.

Participants

This Seminar is relevant to engineers, researchers, academicians and managers from public and private sectors who are already or will be involved in the application of nuclear techniques in industry.

Registration Fees

Governmental and quasi-governmental organisations	-	M\$150.00
Non-governmental organisations	-	M\$225.00

The fees will cover seminar materials, teas and lunches. Those presenting papers will be exempted from payment of registration fees. Payment should be made to the Director General, Nuclear Energy Unit.

Application

Application to attend the Seminar may be made together with registration fees before 17th October, 1987 to:

Director General
Nuclear Energy Unit
Prime Minister's Department
Kompleks PUSPATI
Bangi
43000 Kajang, Malaysia
(Attn: Mrs Rafeah Amin Nuddin)
Tel : 8250510 ext 1064
Telex : MA31619 ATOMAL

For technical information please contact:

Mr. Dwud Mohamad, Tel. 8250510 ext 1166.

FIRST INTERNATIONAL CONFERENCE ON GOLD MINING - GEOLOGY -
FEASIBILITY - MINING - EXTRACTION - November 23, 24, 25, 1987,
Vancouver, British Columbia, Canada

Extensive interest has recently developed in gold mining throughout the world. This conference is the first to deal with the overall program of the location of gold deposits through to mining extraction, waste disposal and reclamation. World recognized specialists will be Keynote speakers. Numerous case examples will be featured.

Technical displays will be featured.

The conference will be of interest to the following:

- Mining companies
- Exploration companies
- Government Mining and Regulatory Dept.
- Consulting Engineers and Geologists
- Testing, Monitoring and Blasting specialists
- University Staff
- Mining Research Agencies
- Mine and Plant Suppliers

Special technical sessions will emphasize the following areas of interest:

- Geology of gold deposits
- Geochemistry of Gold Deposits
- Exploration
- Feasibility Studies
- Mine Evaluation
- Mine Design
- Mine Development
- Mining Methods
- Gold Mineralogy
- Extraction and Processing
- Leaching
- Waste Disposal
- Environmental Control
- Mine Reclamation

Conference Advisory Organizations:

- Society of Mining Engineers of AIME
- B.C. and Yukon Chamber of Mines
- B.C. Mining Association
- B.C. Dept. of Mines and Petroleum Resources.

The official language of the conference is English.

For further information: Coordinator - Gold Mining Conference
P.O. Box 91651
West Vancouver, B.C.
Canada V7V 3P3

NINTH SOUTHEAST ASIAN GEOTECHNICAL CONFERENCE

Bangkok, Thailand. December 7 - 11, 1987

Sponsored by: Southeast Asian Geotechnical Society
Asian Institute of Technology

Conference Theme

The Conference theme is 'Geotechnical Engineering in Southeast Asia' with specific emphasis on:

- (1) Engineering behaviour of soils and rocks
- (2) Site investigations and *in-situ* tests
- (3) Ground improvement
- (4) Shallow and deep foundations
- (5) Settlement and structures
- (6) Earth and earth supported structures
- (7) Slope stability and landslides

Date and Venue

The conference will be held at the AIT Center Auditorium from 7-11 December 1987.

Participants

The conference is arranged for the benefit of engineers, geologist and other scientists of the Southeast Asian region and elsewhere. All interested persons are cordially invited to participate. A special programme will be arranged for persons accompanying the participants.

Official Language

The official language of the Conference will be English.

Submission of Summaries and Papers

Intending authors are requested to complete and return the Preliminary Registration Form as soon as possible. Summaries of papers, not exceeding 300 words in length, should be submitted in triplicate to the Hon. Secretary not later than 30th September 1986. Intending authors will be notified of the preliminary acceptance of their papers by 30th November 1986. The final acceptance of a paper will be made after a review of the complete manuscript and the final date for the submission of papers will be 31st May 1987. The length of each paper should generally not exceed 5000 words, but longer papers of outstanding merit will be considered. Information related to the preparation of the paper shall be sent to authors after acceptance of the summary. In accepting a paper for publication at the Conference, account may be taken of the author's ability to attend. The Conference Committee is hoping to publish the papers accepted for the Conference early and to mail them to the participants, so that they will have a chance of studying the papers before the conference. Hence, the authors are requested to adhere to the given deadlines regarding papers.

Correspondence

All correspondence relating to the Conference should be addressed to: The Hon. Secretary, 9th SEAGC, c/o Division of Geotechnical & Transportation Engineering, Asian Institute of Technology, P.O. Box 2754, Bangkok 10501, Thailand.

CARE 88 - CONFERENCE ON APPLIED ROCK ENGINEERING

6-8 January 1988, University of Newcastle upon Tyne

Organized by The Institution of Mining and Metallurgy and The Department of Mining Engineering, University of Newcastle upon Tyne.

CARE '88 - Conference on Applied Rock Engineering, organized by the Institution of Mining and Metallurgy and the Department of Mining Engineering, University of Newcastle upon Tyne, in association with the British Geotechnical Society, the British Tunnelling Society, the Institution of Mining Engineers and the Society of Petroleum Engineers, will be devoted to the presentation and discussion of papers by international experts in the field of rock engineering.

The Organizing Committee invites the submission of abstracts (250-300 words) of proposed papers - in particular, in the following areas:

Laboratory and field measurements

- Rock strength indices
- Novel methods of measuring rock strength
- *In-situ* measurements of stress
- Hydrofracturing techniques
- Monitoring of rock mass performance
- Instrumentation

Rock drilling and excavation

- High pressure assisted cutting techniques
- Shallow drilling
- Exploration drilling
- Oilwell and geothermal drilling
- Water wells
- Blasting techniques

Underground openings and structures

- Design of tunnels and underground structures
- Support requirements and roof design
- Roof bolting
- Pre-mining state of stress
- Subsidence
- Case studies

Computer methods and modelling

- Stress determination around structures
- Hydrofracturing and prediction of fracture length and direction
- Modelling

Surface mining operations

- Slope design

Abstracts must be submitted to: The Conference Office, CARE '88, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England.

In addition to the three days of technical sessions, a programme of field visits and social events is planned, together with an exhibition of relevant products and services.

Full details of the conference and its associated events will be given in the Second Circular.

Enquiries

All enquiries in connection with CARE '88 should be addressed to:

The Conference Office
The Institution of Mining and Metallurgy
44 Portland Place
London W1N 4BR
England
(telephone 01-580 3802; Telex 261410 IMM G).

KURSUS-KURSUS LATIHAN & BENGKEL-BENGKEL (TRAINING COURSES & WORKSHOPS)

1988

February 1988

METALLOGENY (Quito, Ecuador). Annual 3-week training course for Latin Americans organized by Central University of Quito, the Autonomous University of Madrid (Spain), and Unesco. Language: Spanish. For information: Director, Curso Internacional de Metalogenia, Escuela de Geologia, Minas y Petroleos, Division de Post-grado, Universidad Central, Apartado Postal 8779, Quito, Ecuador.

February 1988 - March 1988

GEOCHEMICAL PROSPECTING TECHNIQUES (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. Language: French. For information: Musee royal de l'Afrique centrale, Steenveg op Leuven, 13, B-1980 Tervuren, Belgium.

February 1988 - June 1988

MINERAL EXPLORATION (Leoben, Austria). Diploma course organized annually by the University of Mining and Metallurgy in Leoben and sponsored by Unesco. Language: English. For information: University for Mining and Metallurgy, Post-graduate course on mineral exploration, Montanuniversitat, Leoben, A-8700, Austria.

March 1988

REMOTE SENSING APPLIED TO HYDROGEOLOGY (Bogota, Colombia). Special course from IGAC. For information: Subdireccion de Docencia e Investigacion del IGAC, Apartado Aereo 53754 y 6721, Bogota 2, Colombia, South America.

March 1988 - November 1988

PHOTOINTERPRETATION APPLIED TO GEOLOGY AND GEOTECHNICS (Bogota, Colombia). Annual post-graduate diploma courses organized by the Government of Colombia, Centro Interamericano de Fotointerpretacion, International Institute for Aerial Survey and Earth Sciences and Unesco. Language: Spanish. For information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

March 1988 - April 1988

MINERAL EXPLORATION (Paris, France). A 4-week annual course organized by the Ecole Nationale Supérieure des Mines and sponsored by Unesco. Language: French. For information: Prof. H. Pelissonnier, Ecole des Mines, 60 Bd Saint Michel, 75272 Paris, Cedex 06, France.

June 1988

SEDIMENT TECHNOLOGY (Ankara, Turkey). An annual four-week Unesco-sponsored postgraduate course. For information: Dr. Ergun Demiroz, DSI Teknik Arastirma ve Kalite Kontrol, Dairesi Baskanligi, 06100 Ankara, Turkey.

June 1988 - August 1988

TECHNIQUES OF HYDROLOGIC INVESTIGATIONS (Washington, D.C. and Denver, Colorado, USA). Annual training course for international participants. For information: Office of International Hydrology, Water Resources Division, U.S. Geological Survey, 470 National Center, Reston, Virginia 22092, USA.

July 1988 - August 1988

SUMMER COURSE ON EARTH SCIENCES; CRYSTALLOGRAPHY, MINERALOGY, METALLOGENY (Madrid, Spain). Annual course organized by the Department of Geology and Geochemistry of the Universidad Autonoma de Madrid and sponsored by Unesco. Language: Spanish. For information: Prof. T. Monseur, Departamento de Geologia y Geoquimica, Facultad de Ciencias, Universidad Autonoma de Madrid, Canto Blanco, Madrid 34, Spain.

September 1988 - July 1989

PETROLEUM EXPLORATION GEOLOGY (Headington, Oxford, UK). An annual diploma course designed by Oxford Polytechnic to prepare post-graduate geologists for the duties of geologists in oil exploration teams. For information: M. Hoggins, Department of Geology and Physical Sciences, Oxford Polytechnic, Headington, Oxford OX3 0BP, U.K.

September 1988 - August 1989

MINERAL EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Language: English. For information: Student Registration Office, ITC (ME), P.O. Box 6, 7500 AA Enschede, The Netherlands.

October 1988 - November 1988

TECTONICS, SEISMOLOGY AND SEISMIC RISK ASSESSMENTS (Potsdam, East Germany). One-month training course organized annually by East German Academy of Sciences in collaboration with Unesco. Language: English. For information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR-500 Postdam, German Democratic Republic.

October 1988 - July 1989

ENGINEERING HYDROLOGY (Galway, Ireland). Annual diploma and post-graduate courses organized by the Department of Engineering Hydrology, University College Galway, Ireland. Sponsored by Unesco-IHP and the World Meteorological Organization. For information: Prof. J.E. Nash, Department of Engineering Hydrology, University College Galway, Galway, Ireland.

October 1988 - September 1989

HYDRAULIC ENGINEERING AND HYDROLOGY (Delft, The Netherlands). Diploma courses organized annually by the International Institute for Hydraulic and Environmental Engineering and sponsored by Unesco for professionals from developing countries. Language: English. For information: International Institute for Hydraulic and Environmental Engineering (IHE), Oude Delft 95, P.O. Box 3015, 2601 DA Delft, The Netherlands.

October 1988 - September 1990

FUNDAMENTAL AND APPLIED QUATERNARY GEOLOGY (Brussels, Belgium). Annually organized training course leading to a Master's degree in Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. Language: English. For information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

October 1988 - September 1990

GEOLOGICAL EXPLORATION METHODS (Nottingham, U.K.). Two-year M.Sc. course starting every other year with emphasis on applied methodology, data acquisition and interpretations. For information: Dr. M.A. Lovell, Department of Geology, University of Nottingham NG7 2RD, U.K.

1989

May 1989

HYDROLOGY OF FRACTURED ROCKS (Montpellier, France). Annual three-week post-graduate course sponsored by Unesco. For information: Professeur C. Drogue, Laboratoire d'Hydrogeologie, Universite des Sciences et Techniques du Languedoc, Place Eugene Bataillon, 34060 Montpellier, France.

August 1989 - June 1991

SOIL SCIENCE AND WATER MANAGEMENT (Wageningen, The Netherlands). A 2-year M.Sc. course organized by Agricultural University Wageningen. Course starts every other year. Language: English. For information: The Director of Studies of the M.Sc. Course in Soil Science and Water Management, P.O. Box 37, 6700 AA Wageningen, The Netherlands.

August 1989 - October 1989

GEOCHEMICAL PROSPECTING METHODS (Prague, Czechoslovakia). Certificate course organized every second year by the Geological Survey of Czechoslovakia and sponsored by Unesco, IAGC and Czechoslovakia. Language: English. For information: GEOCHIM Unesco CSSR, Geological Survey of Prague, Malostranske nam. 19, 11821 Prague 1, Czechoslovakia.

September 1989 - October 1989

GROUNDWATER TRACING TECHNIQUES (Graz, Austria). Five-week course organized every other year by the Institute of Technical Geology, Petrography and Mineralogy and sponsored by Unesco. Language: English. For information: Institute of Technical Geology, Petrography and Mineralogy of the University of Technology, Rechbauerstrasse 12, A-8010 Graz, Austria.

BULETIN PERSATUAN GEOLOGI MALAYSIA

BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

SPECIAL ISSUE ON PETROLEUM GEOLOGY VOL. II

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Editor
G.H. TEH



DECEMBER 1987

No. 21

KALENDAR (CALENDAR)

1987

November 9-18, 1987

HYDROTHERMAL SYSTEMS (4th IUGS Workshop on Mineral Deposit Modelling), Santiago, Chile. (Charles G. Cunningham, U.S. Geological Survey, 913 National Center, Reston, Va. 22092, USA).

December 7-10, 1987

PETROGENESIS AND MINERALIZATION OF GRANITOIDS (International Symposium), Guangzhou, P.R. China. Language: English. (International Symposium on Petrogenesis and Mineralization of Granitoids, c/o Institute of Geochemistry, Academia Sinica, Guiyang, Guizhou Province, People's Republic of China).

December 7-11, 1987

SOUTHEAST ASIAN GEOTECHNICAL CONFERENCE (9th), Bangkok, Thailand. Language: English. (The Hon. Secretary, 9th SEAGC, c/o GTE Division, Asian Institute of Technology, P.O. Box 2754, Bangkok 10501, Thailand).

December 7-19, 1987

PRECAMBRIAN METALLOGENY RELATED TO TECTONICS AND COMPUTERIZED MINERAL RESOURCE ASSESSMENT METHODS APPLIED TO METALLOGENIC PROVINCES (International Conference), Arusha, Tanzania. Co-sponsored by IGCP-247, COGEODATA and Geological Society of Africa. (Dr. E. Malisa, University of Dar-es-Salaam, Department of Geology, P.O. Box 35052, Dar-es-Salaam, Tanzania).

1988

January 6-8, 1988

CARE - '88 (Conference on Applied Rock Engineering), Newcastle upon Tyne, U.K. (Conference Office, IMM, 44 Portland Place, London W1N 4BR, U.K.).

February 2-5, 1988

OFFSHORE S.E. ASIA (7th Conference and Exhibition), Singapore. (D.H. Morgan, SEAPEX Program Committee, Southeast Asia Petroleum Exploration Society, P.O. Box 423, Tanjong Pagar, Singapore 9124).

February 24-27, 1988

ASIA/PACIFIC MINING (Conference), Bangkok, Thailand. (Asia/Pacific Mining Conference Secretariat, c/o Cahners Exposition Group, 1 Maritime Square 12-03 World Trade Centre, Singapore 0409).

March 8-11, 1988

ASIAN MINING '88 (3rd International Conference and Exhibition), Kuala Lumpur, Malaysia. (The Conference Office, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.).

March 17-18, 1988

CLAY DIAGENESIS IN HYDROCARBON RESERVOIRS AND SHALES (4th Cambridge Meeting, Mineral Diagenesis), Cambridge, U.K. (Dr. C.V. Jeans, Dept. of Applied Biology, Pembroke Street, Cambridge CB2 3DX, U.K.).

March 20-23, 1988

AAPG/SEPM (Annual Meeting), Houston, Texas, USA. (Convention Department AAPG, Box 979, Tulsa, Ok. 74101, USA).

March 21-23, 1988

THE NEOGENE OF THE KARAKORAM AND HIMALAYA (Conference), Leicester, U.K. (E. Derbyshire, Dept. of Geography, University of Leicester, Leicester LE1 7RH, U.K.).

March 23-25, 1988

OCEAN DRILLING PROGRAM (GAC-MAC-CSPG Special Session), St. John's, Newfoundland, Canada. (Paul T. Robinson, Centre for Marine Geology, Dalhousie University, Halifax, N.S., Canada B3H 3J5).

March 28-30, 1988

MOBILITY AND CONCENTRATION OF BASE METALS IN SEDIMENTARY COVER ROCKS (International Colloquium), Paris-Orleans, France. (J.F. Sureau, Bureau de Recherches Geologiques et Minières, B.P. 6009, 45060 Orleans Cedex, France).

April 6-8, 1988

THE CADOMIAN OROGENY (Meeting), Oxford, U.K., Co-sponsored by IGCP-233, (R. D'Lemos, Dept. of Geology, Oxford Polytechnic, Headington, Oxford OX3 0BP, U.K.).

April 7-9, 1988

EXPERIMENTAL MINERALOGY, PETROLOGY AND GEOCHEMISTRY (2nd International Symposium), Bochum, F.R.G. Co-sponsored in part by IUGS. (Bochum Symposium, Institut für Mineralogie, Ruhr-Universität, Postfach 10 21 48, D-4630 Bochum 1, F.R.G.).

April 10-15, 1988

LANDSLIDES (5th International Symposium), Lausanne, Switzerland. (Ch. Bonnard, Case Postale 83, CH-1015 Lausanne 15, Switzerland).

April 18-21, 1988

TUNNELLING '88 (5th International Symposium), London, U.K. (The Conference Office, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.).

April 24-27, 1988

INDUSTRIAL MINERALS (International Congress), Boston, USA. (Barry Harris, Metal Bulletin Conferences Ltd., Park House, Park Terrace, Worcester Park, Surrey KT4 7HY, England, U.K.).

May 11-12, 1988

CLASSIC PETROLEUM PROVINCES (Geological Society Meeting), London, U.K. (Dr. J.S. Brooks, 10 Langside Drive, Newlands, Glasgow G43 2EE, Scotland, U.K.).

May 11-20, 1988

INTERNATIONAL COMMITTEE FOR THE STUDY OF BAUXITE, ALUMINA AND ALUMINIUM (6th International ICSOBA Congress), Sao Paulo, Brazil. (A.J. Melfi, Inst. Astronomico et Geofisico, Univ. Sao Paulo, C.P. 30.267, Sao Paulo 01051, Brazil).

May 16-20, 1988

BICENTENNIAL GOLD '88 (Conference), Melbourne, Australia. Co-sponsored by Society of Economic Geologists. (Dr. R.R. Keays, Department of Geology, University of Melbourne, Parkville, Vic. 3052, Australia).

May 16-20, 1988

AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Maryland, USA. (AGU Meetings, 2000 Florida Avenue NW, Washington, D.C. 20009, USA.).

May 16-20, 1988

HYDROLOGICAL PROCESSES AND WATER MANAGEMENT IN URBAN AREAS (IAHS/IUGG-IAH/IUGS-Unesco Meeting), Duisburg, F.R.G. (Dr. E. Romijn, Provincial Waterboard of Gelderland, Marktstraat 1, P.O. Box 9090, 6800 GX Arnhem, The Netherlands).

May 22-25, 1988

GAC/MAC/CSPG (Annual Meeting), St. John's, Newfoundland, Canada. (J.M. Fleming, Department of Mines and Energy, P.O. Box 4750, St. John's Newfoundland, Canada A1C 5T7).

May 29 - June 3, 1988

WATER FOR WORLD DEVELOPMENT (6th IWRA World Congress), Ottawa, Canada. Languages: English, French, and Spanish. (P.J. Reynolds, University of Ottawa, 631 King Edward Av., Ottawa, ON, Canada K1N 6N5).

May 30 - June 3, 1988

INTERACTION BETWEEN GROUNDWATER AND SURFACE WATER (International Symposium), Lund, Sweden. (Prof. Dr. G. Lindh, Lund Inst. of Technology, S-22007 Lund, Sweden).

May 31 - June 4, 1988

SEISMIC ANISOTROPY IN THE EARTH'S CRUST (AGU Chapman Conference), Berkeley, Calif., USA. (AGU Meetings, 2000 Florida Av, NW., Washington, D.C. 20009, USA).

June 1-5, 1988

CASE HISTORIES IN GEOTECHNICAL ENGINEERING (2nd International Conference and GSA Penrose Conference), St. Louis, Missouri, USA. (Shamsher Prakash, Room 308, Department of Civil Engineering, University of Missouri, Rolla, MO 65401, USA).

June 5-10, 1988

ENERGY '88 (2nd International Congress), Tiberias, Israel. Language: English. (Miriam Malz Exhibition Services Ltd., 30 Hey B'iyar Street, 62988 Tel-Aviv, Israel).

June 21-24, 1988

FLUID FLOW, HEAT TRANSFER AND MASS TRANSPORT IN FRACTURED ROCKS (4th Canadian/American Conference), Banff, Alberta, Canada. (Dr. Claude M. Sauveplane, ARC, P.O. Box 8330, Station F, Edmonton, Alberta, Canada T6H 5X2).

July 9-15, 1988

MINERALS AND EXPLORATION AT THE CROSSROADS (Annual Conference Australasian Institute of Mining and Metallurgy), Sydney, NSW, Australia. (Bicentenary Conference, c/o The Aus IMM, P.O. Box 122, Parkville, Victoria 3052, Australia).

July 10-15, 1988

LANDSLIDES (5th International Symposium), Lausanne, Switzerland. (C. Bonnard, P.O. Box 83, CH-1015, Lausanne 15, Switzerland).

July 11-16, 1988

GEOCHEMICAL EVOLUTION OF THE CONTINENTAL CRUST (IAGC Conference), Sao Paulo, Brazil. Language: English. (Dr. A.J. Melfi, Institute of Astronomy and Geophysics, University of Sao Paulo, C.P. 30627, Sao Paulo 01000, Brazil).

July 18-20, 1988

RADIOLARIA (International Conference), Marburg, F.R.G. (Prof. Dr. R. Schmidt-Effing, Internrad - Conference, Department of Geosciences, Philipps Universitat, Lahnberge, D-3550 Marburg, Federal Republic of Germany; or Dr. J.R. Blueford, U.S. Geological Survey, 345 Middlefield Road, MS 144, Menlo Park, Ca. 94025, USA).

July 18-22, 1988

GONDWANA (7th International Symposium), Sao Paulo, Brazil. Co-sponsored by IUGS (A.C. Rocha-Campos, Instituto de Geociencias, Universidade de Sao Paulo, C.P. 20899, Sao Paulo, SP, Brazil).

July 25-29, 1988

FOSSIL CNIDARIA (5th International Symposium), Brisbane, Australia. (Dr. J.S. Jell, Department of Geology and Mineralogy, University of Queensland, St. Lucia, Queensland 4067, Australia).

July 25-29, 1988

OSTRACODA AND GLOBAL EVENTS (10th International Symposium), Aberystwyth, Wales, U.K. (Dr. R.C. Whatley, Micropalaeontology Division, Department of Geology, University College of Wales, Aberystwyth, Dyfed SY23 3DB, Wales, U.K.)

July 30 - August 4, 1988

SEDIMENTOLOGY RELATED TO MINERAL DEPOSITS (IAS International Symposium), Beijing, P.R. China. Co-sponsored by IGCP 219 and 226. Language: English. (Dr. Wang Shousong, IAS International Symposium, c/o Institute of Geology, Academia Sinica, P.O. Box 634, Beijing, P.R. China).

August 1988

GEOLOGICAL MAPS OF THE WORLD (3rd Exhibition), Edinburgh, Scotland. (Mr. D.H. Land, Hon. Secretary, Edinburgh Geological Society, c/o British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, Scotland, UK).

August 9-12, 1988

ORDOVICIAN SYSTEM (5th International Symposium), St. John's, Newfoundland, IUGS Subcommittee on Ordovician Stratigraphy and IGCP 216. (Dr. C.R. Barnes, ISOS, Department of Earth Sciences, Memorial University, St. John's, Newfoundland, Canada A1B 3X5).

August 14-19, 1988

THE ORIGIN AND EVOLUTION OF ANORTHOSITES AND ASSOCIATED ROCKS (GSA Penrose Conference), Cheyenne, Wyoming, USA. (B. Ronald Frost, Department of Geology, University of Wyoming, P.O. Box 3006 University Station, Laramie, WY 82071, USA).

August 28 - September 2, 1988

INTERNATIONAL PALYNOLOGICAL CONGRESS (7th), Brisbane, Australia. (Dr. John Rigby, Conventions Department, P.O. Box 489, G.P.O., Sydney, NSW 2001, Australia).

August 28 - September 2, 1988

CLAY (AIPEA 9th International Conference), Strasbourg, France. (Dr. Helene Paquet, 9th International Clay Conference, Institut de Geologie, 1 rue Blessig, F-67084 Strasbourg Cedex, France).

August 29 - September 2, 1988

GEOCHEMISTRY AND COSMOCHEMISTRY (European Association of Geochemistry International Congress), Paris, France. (Pr. C.J. Allegre, Laboratoire de Geochimie et Cosmochimie, 4 place Jussieu, Tous 14-15, 3 eme etage, 75252 Paris Cedex, France).

September 5-9, 1988

PETROLOGY AND GEOCHEMISTRY OF GRANULITES AND RELATED ROCKS (International Workshop), Clermont-Ferrand, France. (Dra. D. Vielzeuf and Ph. Vidal, Departement de Geologie, 5 rue Kessler, 63038 Clermont-Ferrand, France).

September 5-9, 1988

FISSION TRACK DATING (6th International Congress), Besancon, France. (Laboratoire de Microanalyses nucleaires, UER Sciences et Techniques, La Bouloie, Route de Gray, 25030 Besancon Cedex, France).

September 5-9, 1988

GEOSTATISTICS (3rd International Congress), Avignon, France. Languages: English and French. (Geostat Congress 1988, Centre de Geostatistique, 35 rue Saint-Honore, 77305 Fontainebleau, France).

September 5-10, 1988

FAN DELTAS (International Workshop), Calabria, Italy. Sponsored by IAS. (Dr. Albina Colella, Dipartimento di Scienze della Terra, Universita della Calabria, 87030 Castiglione Cosentino SC. (CS), Italy).

September 6-10, 1988

GEOCHEMISTRY AND MINERALIZATION OF PROTEROZOIC MOBILE BELTS (International Symposium), Beijing, P.R. China. Partly co-sponsored by IGCP-217 and IGCP National Committee of China. Languages: English and Chinese. (Prof. Sun Dazhong, Tianjin Institute of Geology and Mineral Resources, CAGS, No. 4, 8th Road, Dazhigu, Tianjin 300170, P.R. China).

September 7-10, 1988

ASIAN MARINE GEOLOGY (International Conference), Shanghai, P.R. China. Co-sponsored by IUGS Commission for Marine Geology. (Prof. Wang Pinxian, Department of Marine Geology, Tongji University, Shanghai 200092, P.R. China).

September 19-23, 1988

ENGINEERING GEOLOGY AS RELATED TO THE STUDY, PRESERVATION OF ANCIENT WORKS, MONUMENTS AND HISTORICAL SITES (IAEG International Symposium), Athens, Greece. Languages: English, French, and Greek. (Greek Committee of Engineering Geology, 1988 Symposium Secretariat, P.O. Box 19140, GR-117 10 Athens, Greece).

September 20-22, 1988

BARITE (Symposium), Kutna Hora, Czechoslovakia. (Geological Survey /UUG/Symposium Barite, Malostranske nam. 19, 118 21 Praha 1, Czechoslovakia).

September 20-23, 1988

METAMORPHISM AND CRUSTAL EVOLUTION (International Symposium), Changchun, P.R. China. Languages: English and Chinese. (Yan Hongquan, Changchun College of Geology, Changchun, Jilin, P.R. China).

September 25-28, 1988

MEDITERRANEAN BASINS (AAPG European Geological Conference & Exhibition), Nice, France. (AAPG Convention Department, Box 979, Tulsa, OK 74101, USA).

September 26-29, 1988

THE APPLICATION OF GEOLOGY IN THE DEVELOPING COUNTRIES (International Conference), Nottingham, U.K. Co-sponsored by AGID. (Conference Secretariat, Dept. of Geology, University of Nottingham, Nottingham, NG7 2RD, U.K.).

October 1988

COAL RESEARCH (International Conference), Tokyo, Japan. (Dr. W.G. Jensen, International Committee for Coal Research, Bte 11, B-1150 Brussels, Belgium).

October 1-3, 1988

NEOTECTONICS (INQUA Colloquium), Orleans, France. (J. Fourniquet, BRGM/SGN, B.P. 6009, 45060 Orleans Cedex 2, France).

October 11-17, 1988

GEOLOGY '88, CHINA (International Exhibition), Beijing, P.R. China. (M.C. Morley-Hall, SHK International Services Ltd., 3/F Prince Rupert House, 64 Queen Street, London EC4R 1AD, England, UK).

October 12, 1988

HYDROTHERMAL PROCESSES IN VOLCANIC TERRANES (Joint Meetings: Geological Society of London and Mineralogical Society of Great Britain), Cardiff, Wales, U.K. (Dr. R.E. Bevins, Department of Geology, National Museum of Wales, Cardiff CF1 3NP, UK).

October 23-28, 1988

MINE WATER (3rd International Congress), Melbourne, Australia. (Australasian Institute of Mining and Metallurgy, P.O. Box 122, Parkville, Victoria 3052, Australia).

October 30 - November 3, 1988

SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Anaheim, California, USA. (Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Ok. 74101, USA).

October 31 - November 3, 1988

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Denver, Colorado, USA. (Meetings Department, GSA, P.O. Box 9140, Boulder, Co. 80301, USA).

November 1988

GLOBAL GEOSCIENCE TRANSECTS (ICL Symposium and Workshops), Belem, Brazil. (J. Monger, Geological Survey, 100 W. Pender Street, Vancouver, B.C., Canada V6B 1R8).

November 10-14, 1988

EXPLORATION AND DEVELOPMENT OF GEOTHERMAL RESOURCES (Meeting), Kumamoto and Beppu, Japan. (Geothermal Research Society, c/o Geological Survey of Japan, 1-1-3 Higashi, Yatabe, Tsukuba, Ibaraki 305, Japan).

November 21-24, 1988

SILVER-EXPLORATION, MINING AND TREATMENT (Conference), Mexico City. (IMM Conference Office, 44 Portland Place, London W1N 4BR, U.K.).

1989

January 1989

SOIL MECHANICS AND FOUNDATION ENGINEERING (12th International Conference), Rio de Janeiro, Brazil. (XII ICSMFE, Caixa Postal 1559, 20000 Rio de Janeiro, PJ, Brazil).

January 15-27, 1989

OMAN OPHIOLITE-STRUCTURE-PETROLOGY-STRATIGRAPHY (International Symposium), Muscat, Sultanate of Oman. (Secretary, Hilal Azry, Ministry of Petroleum and Minerals, P.O. Box 551, Muscat, Oman).

February 8-11, 1989

MODEL OPTIMIZATION IN EXPLORATION GEOPHYSICS (7th International Seminar), Berlin. (Institut für Geophysikalische Wissenschaften, Mathematische Geophysik, Freie Universität Berlin, Podbielskiallee 60, D-1000 Berlin 33, Federal Republic of Germany).

February 28-March 3, 1989

APPLICATION OF COMPUTERS AND OPERATIONS RESEARCH IN THE MINERAL INDUSTRY (21st International Symposium), Las Vegas, Nev., USA. (Society of Mining Engineers, Caller No. D, Littleton, Co. 80162-5002, USA).

March 28 - April 9, 1989

SILURIAN SYSTEM (International 'Murchison' Symposium), Keele, Staffs., U.K. Co-sponsored by the IUGS Subcommittee on Silurian Stratigraphy. (Dr. M.G. Bassett, National Museum of Wales, Cathays Park, Cardiff CF1 3NP, Wales, UK).

May 17-18, 1989

GOLD IN EUROPE (International Conference), Toulouse, France. (R.P. Foster, Department of Geology, University of Southampton, Hants, SO9 5NH, U.K.).

June 26-29, 1989

ENGINEERING GEOLOGY IN TROPICAL TERRAINS (International Conference), Selangor Darul Ehsan, Malaysia. Co-sponsored by IAEG. (Secretariat, International Conference, Dept. of Geology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan, Malaysia).

July 9-19, 1989

INTERNATIONAL GEOLOGICAL CONGRESS (28th), Washington, D.C., USA. (International Geological Congress, P.O. Box 1001, Herndon, Va. 22070, USA).

July 27-August 1, 1989

WATER-ROCK INTERACTION (6th International Symposium), Bath, U.K. (Dr. W.M. Edmunds, Hydrogeology Group, BGS, Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, U.K.).

August 14-16, 1989

PRECAMBRIAN GRANITOIDS: PETROGENESIS, GEOCHEMISTRY AND METALLOGENY (IGCP 217 and 247 Symposium), Helsinki, Finland. (Precambrian Granitoids Symposium, Department of Geology, University of Helsinki, P.O. Box 115, SF-00171 Helsinki, Finland).

September 3-9, 1989

GEOMORPHOLOGY (2nd International Conference), Frankfurt/Main, F.R.G. (Prof. Dr. Arno Semmel, Institut für Physische Geographie, Universität Frankfurt, Senckenberganlage 36, Postfach 11 19 32, D-6000 Frankfurt/Main, F.R. Germany).

September 4-8, 1989

NON-METALLIC MINERALS (2nd World Congress), Beijing, P.R. China. (Prof. Xu Changyou, Wuhan University of Technology, Wuhan, Hubei Province, P.R. China).

September 14-19, 1989

EDITING IN THE 90'S (Joint CBE, EASE, AESE Meeting), Ottawa, Ontario, Canada. (Barbara Drew, Research Journals, National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6).

September 17-24, 1989

ENERGY (14th World Congress), Montreal, Quebec, Canada. (World Energy Conf., 34th St. James's Street, London SW1A 1HD, UK).

October 2-4, 1989

GEOCHEMICAL EXPLORATION (13th International Symposium), Rio de Janeiro, Brazil. Co-sponsored by AEG. (Organizing Committee, 13th IGES, P.O. Box 2432, 20010 Rio de Janeiro, Brazil).

October 2-4, 1989

FLUVIAL SEDIMENTOLOGY (4th International Conference), Barcelona, Spain. (C. Puigdefabregas, Servei Geològic de Catalunya, carrer Diputació 92, 08015 Barcelona, Spain).

October 29 - November 2, 1989

SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Dallas, Texas, USA. (Convention Assistant, SEG, P.O. Box 3098, Tulsa, Ok. 74101, USA).

November 9-12, 1989

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), St. Louis, Missouri, USA. (Meetings Department, GSA, P.O. Box 9140, Boulder, Co. 80301, USA).

1990

August 1990

INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (8th Symposium), Ottawa, Canada. (Dr. R.W. Boyle, Geological Survey of Canada, 601 Booth Street, Ottawa, Canada K1A 0E8).

August 12-18, 1990

INTERNATIONAL MINERALOGICAL ASSOCIATION (15th Meeting), Beijing, China. (Prof. Huang Yunhui, Institute of Mineral Deposits, Chinese Academy of Geological Sciences, Baiwanzhuang Rd. 26, Fuchengmenwai, Beijing, China).

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

General Information

The Society publishes the *Buletin Persatuan Geologi Malaysia* (Bulletin Geological Society of Malaysia) and the *Warta Geologi* (Newsletter of the Geological Society of Malaysia) which is issued bimonthly.

Papers of general interest or on the geology of the Southeast Asian region (South China, Burma, Thailand, Indochina, Malaysia, Singapore, Indonesia, Brunei and the Philippines) and also marine areas within the region are welcome for publication in the *Bulletin*. Short notes, progress reports and general items of information are best submitted to the *Warta Geologi*.

Papers should be as concise as possible. However, there is no fixed limit as to the length and number of illustrations. Therefore, papers of monograph length are also welcome. Normally, the whole paper should not exceed 30 printed pages and it is advisable that authors of papers longer than 30 printed pages should obtain the consent of the Editor before submission of the papers.

The final decision of any paper submitted for publication rests with the Editor who is aided by an Editorial Advisory Board. The Editor may send any paper submitted for review by one or more reviewers. Scripts of papers found to be unsuitable for publication may not be returned to the authors but reasons for the rejection will be given. The authors of papers found to be unsuitable for publication may appeal only to the Editor for re-consideration if they do not agree with the reasons for rejection. The Editor will consider the appeal together with the Editorial Advisory Board.

Unless with the consent of the Editor, papers which have been published before should not be submitted for consideration.

Authors must agree not to publish elsewhere a paper submitted to and accepted by the Society.

Authors alone are responsible for the facts and opinions given in their papers and for the correctness of references etc.

Twenty-five reprints of each paper are free-of-charge. Contributors should notify the Editor of extra reprints (which are of non-profit costs) required.

All papers should be submitted to the Editor, Geological Society of Malaysia, c/o Department of Geology, University of Malaya, 59100 Kuala Lumpur, MALAYSIA

Script Requirements

Scripts must be written in Bahasa Malaysia (Malay) or English.

Two copies of the text and illustrations must be submitted. The scripts must be typewritten double-spaced on papers not exceeding 21 × 33 cm. One side of the page must only be typed on.

Figure captions must be typed on a separate sheet of paper. The captions must not be drafted on the figures.

Original maps and illustrations or as glossy prints should ideally be submitted with sufficiently bold and large lettering to permit reduction to 15 × 22 cm: fold-outs and large maps will be considered only under special circumstances.

Photographs should be of good quality, sharp and with contrast. For each photograph, submit two glossy prints, at least 8 × 12 cm and preferably larger. Use of metric system of measurements (ISU) is strongly urged wherever possible.

Reference cited in the text should be listed at the end of the paper and arranged in alphabetical order and typed double-spaced. The references should be quoted in the following manner:

Suntharalingam, T., 1968. Upper Palaeozoic stratigraphy of the area west of Kampar, Perak. *Geol. Soc. Malaysia Bull.*, 1, 1-15.

Hosking, K.F.G., 1973. Primary mineral deposits. In Gobbett, D.J. and Hutchison, C.S. (Eds), "*Geology of the Malay Peninsula (West Malaysia and Singapore)*". Wiley-Interscience, New York, 335-390.

The name of the book or publication must be underlined and will be later printed in italics.

A concise and informative abstract in English is required for each paper written in Bahasa Malaysia or English. A paper written in Bahasa Malaysia must have an abstract in Bahasa Malaysia as well.

For format, kinds of subheadings and general style, use this and the previous *Bulletins* as a guide.

The final decision regarding the size of the illustrations, sections of the text to be in small type and other matters relating to printing rests with the Editor.

If authors have trouble over the script requirements, please write in to the Editor.

