

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

Jil. 15, No. 1 (Vol. 15, No. 1)

Jan-Feb 1989

KANDUNGAN (Contents)

CATATAN GEOLOGI (Geological Notes)

- Lai Kok Hoong & Noor Bakri Endut: Photogeology of the Bukit Berentin area, Lipis, Pahang 1

PERTEMUAN PERSATUAN (Meetings of the Society)

- Annual Geological Conference '89 – Laporan (Report) 7
 Ucapan alu-aluan Presiden 8
 Ucapan Timbalan Ketua Pengarah Penyiasatan Kajibumi Malaysia 9
 Programme 10
 Abstracts of Papers 17
 Elio Poggiagliolmi: An integrated approach to reservoir petrophysical parameters evaluation 38
 Ismail Mohd. Noor: Development and sediment load – A case of Langat Basin 39

BERITA-BERITA PERSATUAN (News of the Society)

- GEOSEA V Proceedings Volume II 40
 Keahlian (Membership) 42
 Pertukaran Alamat (Change of Address) 43
 Pertambahan Baru Perpustakaan (New Library Additions) 44

BERITA-BERITA LAIN (Other News)

- Invitation to Membership – new IGCP Project No. 276 “Paleozoic Geodynamic Domains and their Alpidic Evolution in the Tethys” 45
 Jawatan Kosong (Job Opportunities – Core Laboratories) 46
 Application form – IGCP Project 274 “Coastal evolution in the Quaternary” 47
 Third International Archaean Symposium 49
 Earth science study and training opportunities 51
 Kursus-kursus Latihan & Bengkel-bengkel (Training Courses & Workshops) 54
 Kalendar (Calendar) 56



DIKELUARKAN DWIBULANAN
 ISSUED BIMONTHLY

PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Majlis (Council) 1989/90

Pegawai-pegawai (Officers)

- Presiden
(President) : Hamzah Mohamad
Jabatan Geologi, Universiti Kebangsaan
Malaysia
- Naib Presiden
(Vice-President) : Ahmad Said
PETRONAS
- Setiausaha Kehormat
(Honorary Secretary) : Ibrahim Komoo
Jabatan Geologi, Universiti Kebangsaan
Malaysia
- Penolong Setiausaha Kehormat
(Honorary Assistant Secretary) : Jimmy Khoo
Geological Survey Malaysia
- Bendahari Kehormat
(Honorary Treasurer) : Ahmad Tajuddin Ibrahim
Jabatan Geologi, Universiti Malaya
- Pengarang Kehormat
(Honorary Editor) : Teh Guan Hoe
Jabatan Geologi, Universiti Malaya
- Presiden Yang Dahulu
(Immediate Past President) : John Kuna Raj
Jabatan Geologi, Universiti Malaya
- Ahli-ahli Majlis, 1989-91
(Councillors, 1989-91) : Albert Loh
Malaysia Mining Corp.
S. Paramanathan
Jabatan Sains Tanah, Universiti Pertanian
Malaysia
Nik Ramli Nik Hassan
FORAD Group
Noor Azim Ibrahim
Petroleum Research Institute, PETRONAS
- Ahli-ahli Majlis, 1989-90
(Councillors, 1989-90) : Fateh Chand
Geological Survey Malaysia
Tan Boon Kong
Jabatan Geologi, Universiti Kebangsaan
Malaysia
Idris Mohamad
Jabatan Geologi, Universiti Malaya
Chin Lik Suan
Ahli Kajibumi (Persendirian)
- Juruodit Kehormat
(Honorary Auditor) : Peter Chew

*Published by the Geological Society of Malaysia, Department of Geology,
University of Malaya, 59100 Kuala Lumpur (Tel. 03-7577036).*

Printed by Art Printing Works Sdn. Bhd., 29 Jalan Riong, 59100 Kuala Lumpur.

CATATAN GEOLOGI (GEOLOGICAL NOTES)

PHOTO GEOLOGY OF THE BUKIT BERENTIN AREA, LIPIS, PAHANG

Lai Kok Hoong and Noor Bakri Endut,
Geological Survey of Malaysia, 31400 Ipoh, Perak.

Abstract

Remote sensing data interpretation shows the Bukit Berentin mountain range, which was previously reported as a granitic intrusive complex, to be made up of predominantly volcanic rocks of tuff and lava of rhyolitic to andesitic composition. Granitic rocks occur only as minor intrusives. The volcanic rocks are considered as part of the volcanic facies of the Gua Musang Formation.

Abstrak

Berasaskan kepada penafsiran data penginderaan jauh, banjaran gunung Bukit Berentin yang dahulunya dikatakan sebagai satu kompleks rejahan granit, adalah nyata terdiri terutamanya daripada batuan volkano yang mengandungi tuf dan lava yang berkomposisi riolit hingga andesit. Batuan granit hanya wujud sebagai jasad-jasad rejahan kecil. Batuan volkano tersebut dianggap sebagai sebahagian daripada fasies volkano Formasi Gua Musang.

Introduction

This paper is based on an interpretation of remote sensing data consisting of aerial photographs (scale, 1:25,000), LANDSAT imagery, airborne spectrometric and magnetic information (Compagnie Generale de Geophysique, 1982) over the Bukit Berentin region (Fig. 1). Limited ground checks were also carried out over selected spots.

Richardson (1950) mapped the Bukit Berentin as a granitic intrusive complex. The latest edition of the geological map of Peninsular Malaysia (1985) depicts Bukit Berentin as underlain by acid intrusives (Fig. 2).

Photogeology

A unit delineated over the Bukit Berentin mountain range is apparently made up predominantly of volcanic rocks as shown in the photogeological map (Fig. 3). It forms a distinct photolithological unit on both satellite imagery and aerial photographs as a roughly elliptical, elongated north-south body. It is characterised by moderate to high relief; moderate resistance to erosion; long, sub-parallel, prominent, sharp-crested ridges with intermontane valleys; a combination of subtrellis and sub-dendritic

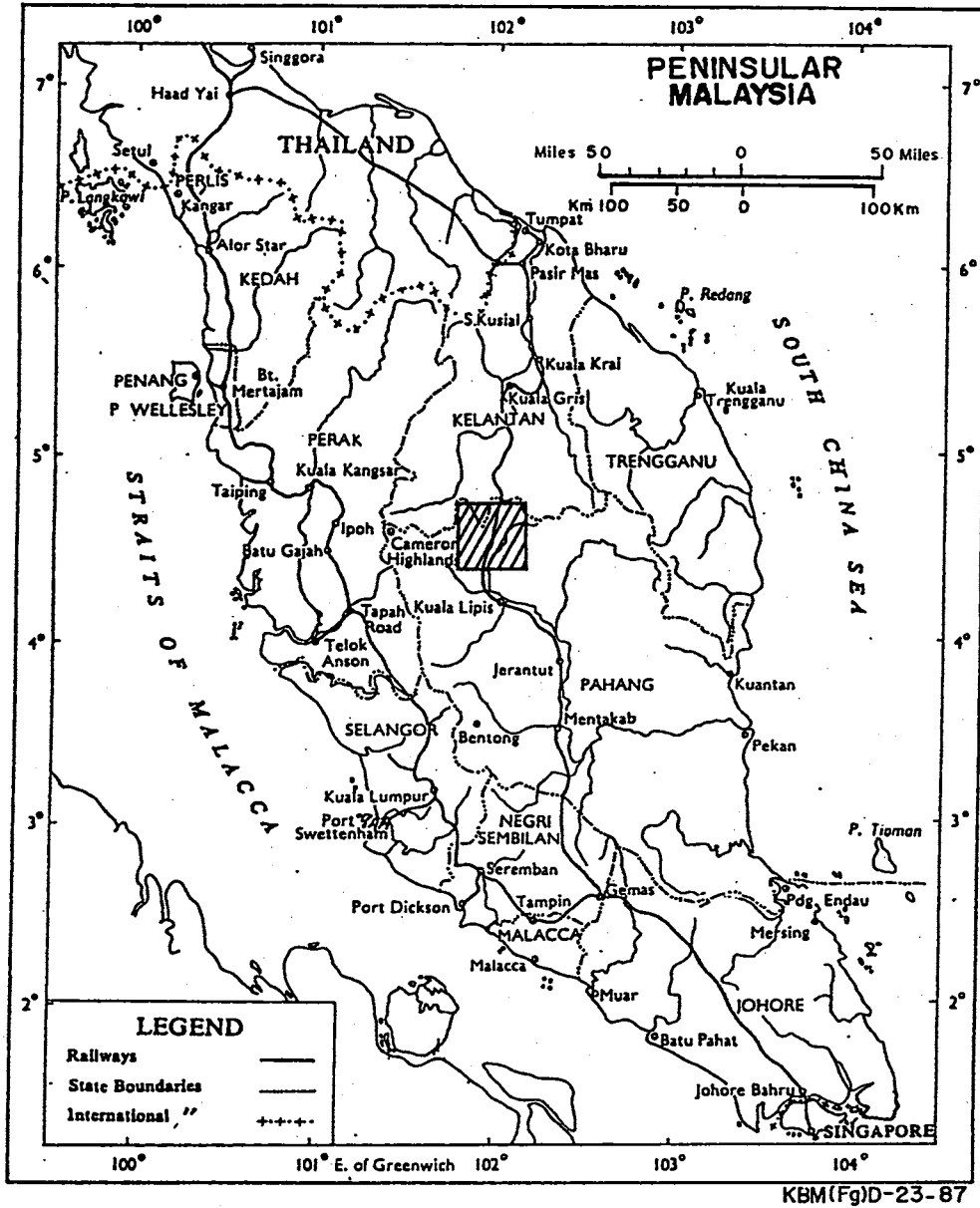
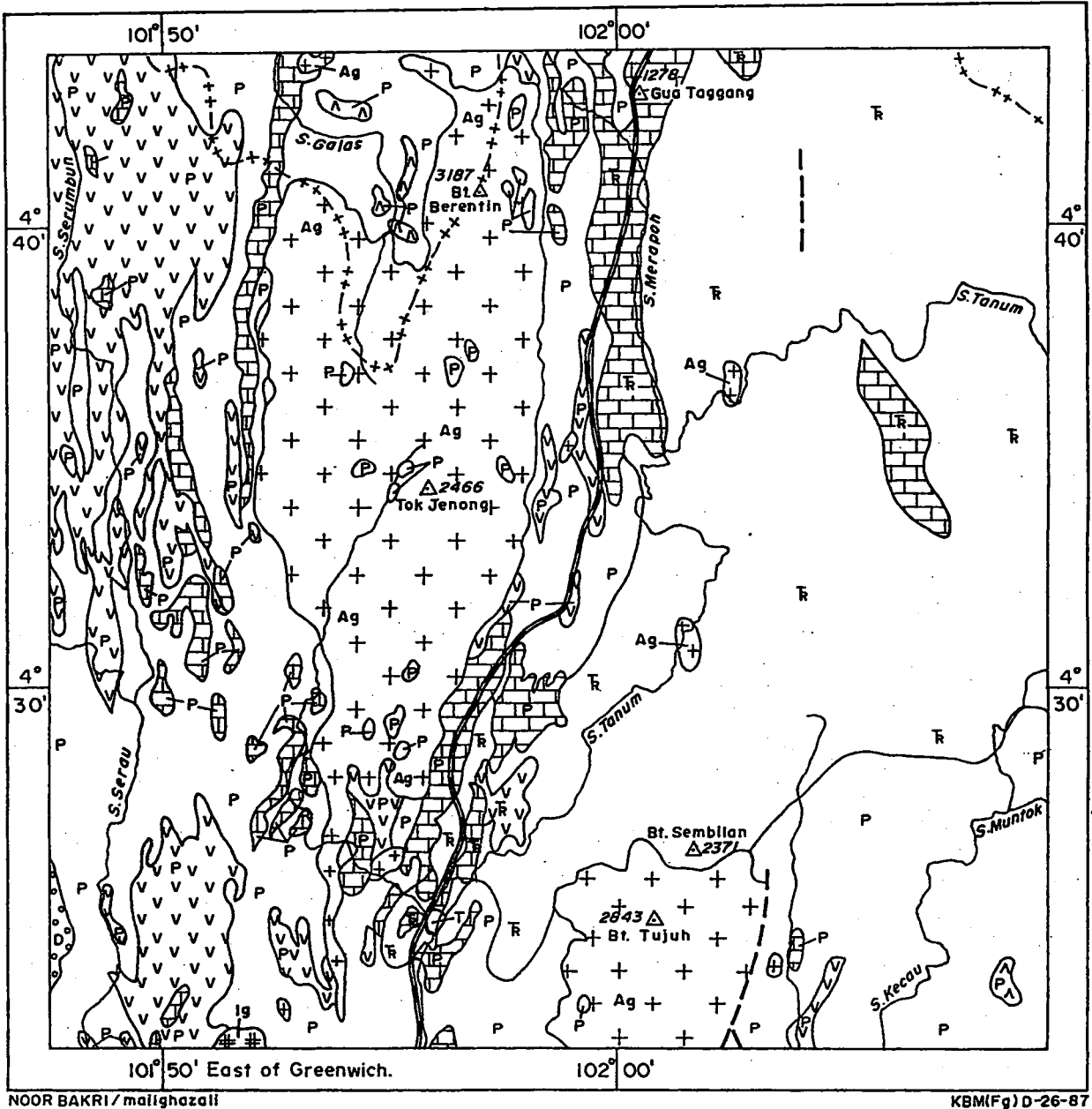
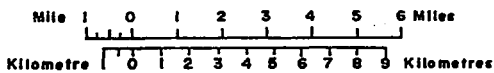


Fig. 1. Location map of the Bukit Berentin area.



NOOR BAKRI / malighazali

KBM(Fg) D-26-87



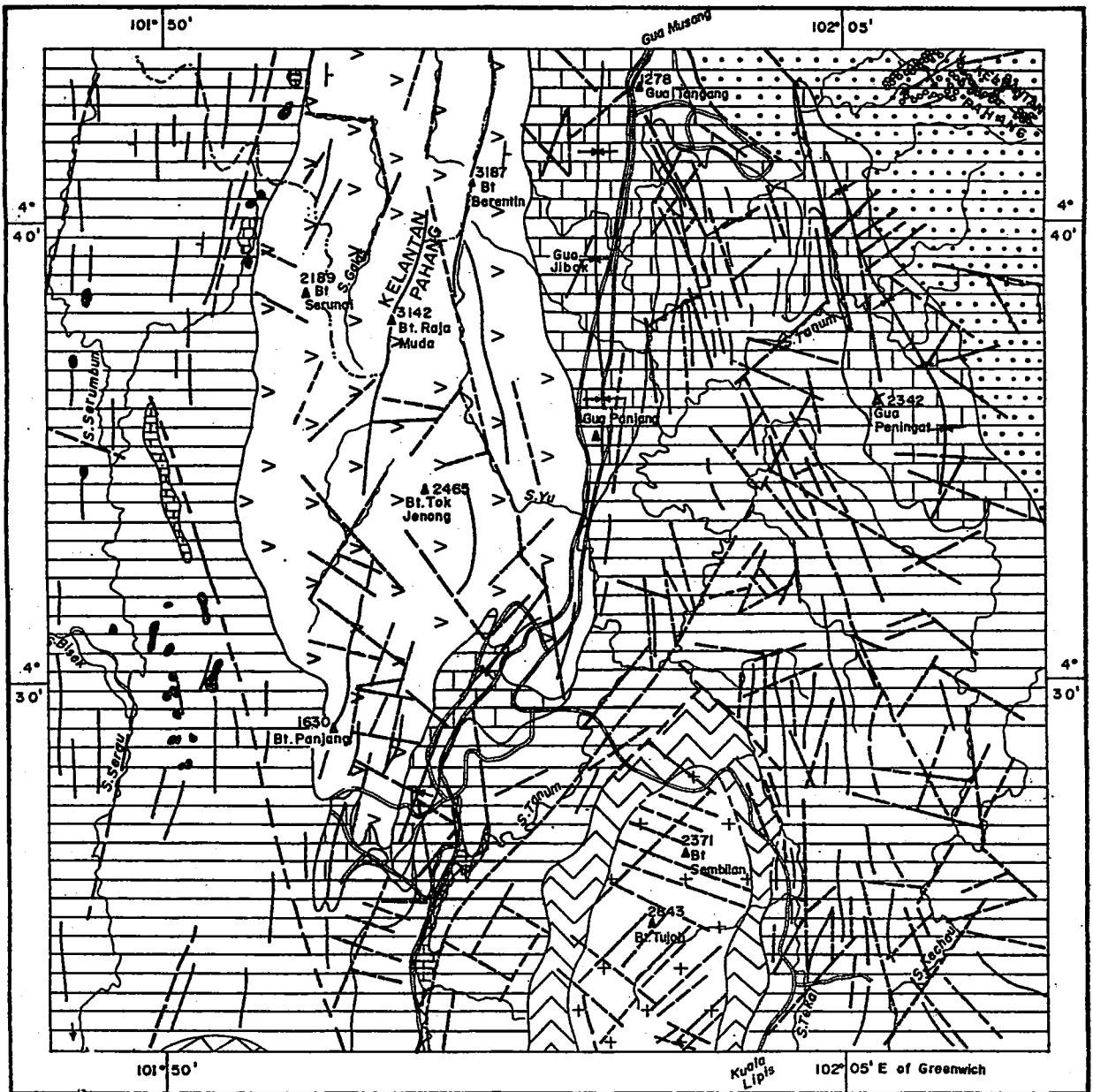
EXPLANATION

- TERTIARY** [T] Isolated continental basin deposits of Late Tertiary age: shale, sandstone, conglomerate and minor coal seams. Volcanics in the Segamat area.
- TRIASSIC** [R] Interbedded sandstone, siltstone and shale; widespread volcanics, mainly tuffs of rhyolitic to dacitic composition in central peninsula. Limestone prominent in lower part of the succession. Conglomerate and chert locally prominent.
- PERMIAN** [P] Phyllite, slate and shale with subordinate sandstone and schist. Prominent development of limestone throughout the succession. Volcanics, rhyolitic to andesitic in composition, widespread.
- DEVONIAN** [D] Phyllite, schist and slate; limestone and sandstone locally prominent. Some interbeds of conglomerate, chert and rare volcanics.

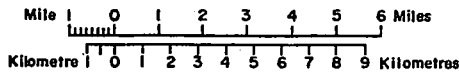
LITHOLOGY

- SEDIMENTARY AND METAMORPHIC ROCKS**
 - [Symbol: circles in a box] Conglomerate
 - [Symbol: brick pattern] Limestone/marble
- EXTRUSIVE ROCKS**
 - [Symbol: V's in a box] Acid to intermediate volcanics: mainly pyroclastics, rhyolitic to dacitic composition
 - [Symbol: A's in a box] Intermediate to basic volcanics: mainly pyroclastics
- INTRUSIVE ROCKS**
 - [Symbol: + Ag + in a box] Acid Intrusives (undifferentiated)
 - [Symbol: # in a box] Intermediate Intrusives (undifferentiated)
- SYMBOL**
 - [Symbol: dashed line] Fault

Fig. 2. Geological map of the Bukit Berentin area. Extract from 8th edition (1985) of Geological Map of Peninsular Malaysia.



KBM(F)C-22-87



PHOTOGEOLOGICAL SYMBOLS

LITHOLOGY

STRUCTURE & OTHERS

	Mainly rudaceous rocks		Limestone hills		Geological boundary		Syncline
	Mainly arenaceous rocks		Mainly Calcareous rocks		Fracture lineaments		Anticline
	Mainly argillaceous rocks		Contact metamorphic rocks		Strike ridges		Railway
	Mainly volcanic rocks		Granitoids		Photo bedding dip		Road & track

Fig. 3. Photogeological map of the Bukit Berentin area, Lipis, Pahang.

drainage patterns; thick primary forest showing medium grey photo-tone and medium to coarse texture. Bedding strikes are generally north-south as indicated by the alignment of sub-parallel lineaments like strike ridges and stream valleys. Occasional dip slopes express dominant easterly dips. Fractures are uncommon and shown by presence of few negative lineaments. Airborne radiometrics and magnetics indicate a heterogenous body with a crystalline basement. It has low range of spectrometric response and patchy high magnetic values.

In the field, the rock types encountered are mainly metatuff, rhyolite and andesite with minor occurrences of marble, microgranite, granite, mylonite, hornfels, meta-quartzite and slate. The beds strike generally north-south and dip east. Fine grained chlorite and epidote are common minerals in the metatuff and hornfels.

Discussion

The Bukit Berentin mountain range has been considered hitherto, as a granitic intrusive complex consisting mainly of quartz porphyry, granite porphyry and associated rocks by Richardson (1950). However, doubts have arisen over its actual composition as highlighted by Hutchison (1973) based on Richardson's descriptions of the structure and petrographic details of the rocks in this area. Hutchison suggested that the complex would be better interpreted as metatuff or metarhyolite-tuff.

The Bukit Berentin volcanic unit has also been traced from both satellite imagery and aerial photographs to extend north into the Gua Musang area where it has been mapped by Yin (in manuscript) as rocks of the Gua Musang Formation of Lower Late Permian to Early Triassic age.

The Gua Musang Formation was described by Yin (in manuscript) as consisting mainly of calcareous and argillaceous rocks with subordinate volcanic and arenaceous beds. He had also noted the frequent occurrences of pyroclastics and lava in the upper reaches of the Sg. Galas and its tributaries just north of the area under discussion.

Conclusion

The Bukit Berentin mountain range is composed, at least superficially by mainly metamorphosed volcanic rocks. It is here considered being part of the volcanic facies of the Gua Musang Formation. Granitic rocks are of minor occurrence at the surface and perhaps only more predominant at shallow depth where it probably caused the widespread metamorphism of the intruded volcanics.

Acknowledgement

We are grateful to Mr. Aw Peck Chin and Mr. T. Suntharalingam for providing advice in writing this paper.

This paper is published with the permission of the Director-General, Geological Survey of Malaysia.

References

- Compagnie Generale de Geophysique, 1982. *Airborne Spectrometric and Magnetic Survey, Central Belt Project, April to November 1980*. Geological Survey of Malaysia Report, 52 p.
- Hutchison, C.S., 1973. Metamorphism. In Gobbett, D.J. and Hutchison, C.S. (eds.), "*Geology of the Malay Peninsula (West Malaysia and Singapore)*". Wiley-Interscience, New York, p. 253-303.
- Richardson, J.A., 1950. *The Geology and Mineral Resources of the Neighbourhood of Chegar Perah and Merapoh, Pahang*. Geological Survey Department Federation of Malaya, Memoir 4 (New Series), 162 p.
- Yin, E.H., (in manuscript). *Provisional Draft Report on the Geology and Mineral Resources of the Gua Musang area, South Kelantan, Sheet 45*. Geological Survey of Malaysia Memoir, 45 p.

Manuscript received 8 December 1988.

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

ANNUAL GEOLOGICAL CONFERENCE '89 - LAPORAN (REPORT)

The Annual Geological Conference '89 was held on the 14 & 15 January 1989 at Merlin Inn Resort, Cameron Highlands. This was once again a get-together with the members of the Geological Survey Malaysia who were up there for their own annual gathering.

It was a rainy, wet afternoon when most of the Society members arrived at the Merlin Inn Resort, Cameron Highlands, after appreciating the scenery (and geology?) along the winding road up to Tanah Rata. It was then quite a shock on arrival to be told by the Merlin Hotel staff that there were no rooms left and the GSM members had to be scattered around other hotels nearby. The rooms were reserved months ago! A mistake it seems, admitted the Manager! It was easy to detect where our rooms have gone (by mistake!) - a group tourists on Merlin's very own tour package. To ease the explosive atmosphere (apparently) a bouquet of juicy fruits and novelties were sent to the Organising Chairman's room. If not for the sacrifice of some of the Survey staff, at the very beginning, even the Organising Chairman had to go to another hotel down the road!

A record crowd of about 160 witnessed the Opening Ceremony on the morning of 14 January. It is heartening to note the presence of some geologists from the petroleum industry participating in the Annual Geological Conference this year. The Conference was officially declared open by the Deputy Director-General, Geological Survey Malaysia, Encik Fateh Chand. His speech together with that of the President's, are produced in full after this report.

A total of 27 papers were presented with topics that covered the many fields of geology. These were all well received and there were lively discussions. The technical sessions were brought to a most dramatic end by the very artistic and suspenseful presentation by David Lee, who tried to emulate the formation of Pulau Batu Hairan, special sound and light effects included.

At the football field, the Society's XI, despite some colourful imports, was streamrolled by the more formidable Survey XI for the second year running. Once again Bobby L.H. Teoh showed his scoring ability in leading the Survey's attack.

After a lively first day's technical session and an exhausting football game, the stage was set for the big event of the night, the sumptuous 10-course halal Chinese dinner hosted (once again) by Malaysia Mining Corporation. All present were appreciative of MMC's kind gesture.

All in all, it was again a most enjoyable and fruitful 2-day Annual Geological Conference. This tie-up with the Geological Survey Malaysia has proved to be most beneficial to all and almost everyone present echo that such an annual get-together should be further continued and developed upon for the good of geology in the country.

G.H. TEH

UCAPAN ALU-ALUAN PRESIDEN PERSATUAN GEOLOGI MALAYSIA DI PEMBUKAAN PERSIDANGAN TAHUNAN GEOLOGI '89, CAMERON HIGHLANDS, 14 JANUARI, 1989.

Marilah sama-sama kita mengucapkan syukur kerana dengan rahmat Allah jua dapat kita berkumpul di pagi yang dingin dan hening ini.

Bagi pihak Persatuan Geologi Malaysia, selaku Presiden saya mengucapkan selamat datang ke Persidangan Geologi kali ke-4 ini. Sekalung ucapan terima kasih ingin saya ajukan kepada Yang Sentiasa Berusaha En. Fateh Chand, Timbalan Pengarah Jabatan Penyiasatan Kajibumi Malaysia yang sudi bersama kita pagi ini dan seterusnya merasmikan Persidangan Tahunan ini.

Tuan-tuan dan Puan-puan,

Persidangan tahun ini merupakan yang kedua kalinya diadakan setempat dan semasa dengan Persidangan Tahunan Jabatan Penyiasatan Kajibumi Malaysia, kali ini kali ke-20. Persidangan serumah ini kami adakan lagi kerana percubaan kami kali pertama dahulu ternyata membuahkan hasil yang diharap-harapkan, iaitu jumlah penyertaan yang besar, dan keduanya, membina suasana dan atmosfera berinteraksi yang baik di kalangan ahli sains bumi negara kita, tanpa mengira batas tempat berkerja, dan jenis pekerjaan mereka. Di sini saya bagi pihak Persatuan ingin merakamkan ucapan penghargaan yang khusus kepada GSM di atas kesudian mereka mengongsikan kemudahan tuan rumah yang mereka ada dengan kita. Apabila kita bertandang ke rumah orang, lazimnya kita membawa buah tangan untuk tuan rumah. Tetapi apalah sangat pada buah tangan, tuan rumah jugalah yang kena menyediakan makanan dan keselesaan. Begitu jugalah kita dengan GSM ini.

Saya berharap kerjasama erat PGM-GSM ini akan berterusan di tahun-tahun yang akan datang. Dengar khabarnya Persidangan Tahunan GSM ini berselang-seli antara yang "low key" dan yang "high key". Selalunya yang "high key" itu melibatkan Menteri. Ada yang merasakan bila tiba masa "high key" nanti persidangan serumah ini akan bermasalah sedikit, Bagi saya rasanya masa "high key"lah kita patut duduk bersama, maklumlah kami di PGM ini tak bermenteri. Seseekali nak dengan amanat menteri apalah salahnya.

Tuan-tuan dan Puan-puan,

Persiapan persidangan seperti ini melibatkan banyak pihak yang menyumbangkan tenaga serta buah fikiran tanpa mengenal penat dan lelah. Ucapan setinggi-tinggi terima kasih kita tujukan kepada Jawatankuasa Penganjur yang dianggotai oleh pegawai-pegawai GSM dan PGM, dikepalai oleh Dr. Teh Guan Hoe. Sebagaimana biasa, di belakang Jawatankuasa ini terdapat ramai lagi kakitangan yang telah memainkan peranan besar dalam persiapan persidangan ini tetapi mereka memilih untuk menyumbang di sebalik tabir. Kepada mereka kita ucapkan terima kasih. Untuk mereka, saya tinggalkan sebuah pantun:-

Cantik sungguh ukirnya kendi,
Mari diatur di dalam taman,
Setitik peluh secebis budi,
Tidakkan luntur ditelan zaman.

Pada masa yang sama bagi pihak mereka, saya menyusun jari sepuluh memohon maaf di atas segala kekurangan yang mungkin timbul semasa persidangan ini berlangsung.

Saya juga mengucapkan terima kasih kepada para pembentang kertas-kerja yang telah sudi mengongsikan penemuan dalam penyelidikan mereka dengan kita semua. Dan tentunya juga kepada Pengerusi-Pengerusi Sidang yang menjanjikan kepada kita sesi-sesi Seminar yang kemas dan teratur. Saya tidak lupa mengucapkan terima kasih kepada para jemputan kehormat dan para peserta, yang menjadikan persidangan ini suatu perhimpunan yang besar dan meriah sekali. Penghargaan juga dirakamkan untuk para dermawan, baik orang-orang perseorangan mahupun syarikat-syarikat.

Akhirnya, saya menutup ucapan alu-aluan ini dengan sekali lagi mengucapkan terima kasih kepada Tuan Timbalan Ketua Pengarah, Jabatan Penyiasatan Kajibumi Malaysia atas kesudian merasmikan Persidangan Tahunan Geologi ke-4 ini.

Sekian, wasalamualaikum warahmatullah.

UCAPAN TIMBALAN KETUA PENGARAH PENYIASATAN KAJIBUMI MALAYSIA DI PEMBUKAAN RASMI PERSIDANGAN TAHUNAN GEOLOGI '89, PERSATUAN GEOLOGI MALAYSIA PADA 14 JANUARI 1989 DI MERLIN INN RESORT, CAMERON HIGHLANDS

Yang Mulia Tuan Pengerusi Majlis, Yang Berusaha Dr. Ibrahim Komoo, Wakil Dr. Hamzah Mohamad, Presiden Persatuan Geologi Malaysia, Rakan-rakan Persatuan, Rakan-rakan Sejawat, Tuan-tuan dan Puan-puan sekalian.

Saya, bagi pihak Jabatan Penyiasatan Kajibumi terlebih dahulu ingin mengucapkan ribuan terima kasih kepada Dr. Ibrahim Komoo di atas kata-kata penghargaan dalam ucapan alu-aluan beliau dan juga mengambil kesempatan ini untuk mengalu-alukan kehadiran tuan-tuan dan puan-puan sekalian.

Ladies and Gentlemen,

This is the Fourth Annual Conference of the Geological Society of Malaysia and I certainly hope this will be a recurrent annual meeting since it maximises participation by the staff of the department, not only from Semenanjung Malaysia but also from Sabah and Sarawak. Furthermore, those members of the staff from the Geological Survey of Malaysia who are not members of the Persatuan should take this opportunity to apply for membership and benefit from it in numerous ways, academically, professionally and socially. The Honorary Secretary, Dr. Ibrahim Komoo, is here to hand you the application forms and he will even collect them from you before the end of the Conference.

In response to Dr. Ibrahim Lomoo's remarks on joint meetings, the Geological Survey of Malaysia (GSM) will endeavour to accommodate the Persatuan for a joint meeting even if GSM is to have their conference on a high key.

Judging from the topics the papers will cover a wide range of subjects, hopefully to meet the interests of all the participants. I am sure some of the papers will encourage the healthy exchange of ideas and I certainly look forward to a lively two-days programme.

Tuan-tuan dan Puan-puan,

Oleh itu saya dengan sukacitanya merasmikan pembukaan Persidangan Tahunan Geologi '89 Persatuan Geologi Malaysia bersama-sama dengan Persidangan Tahunan Ke 20 Jabatan Penyiasatan Kajibumi, Malaysia.

Terima kasih.

ANNUAL GEOLOGICAL CONFERENCE '89

PROGRAMME

Saturday, 14th January, 1989

- 8.00 a.m. : Late Registration
- 8.40 a.m. : Welcoming Address by Dr. Hamzah Mohamad, President, Geological Society of Malaysia.
- 8.50 a.m. : Address by Mr. Fateh Chand Deputy Director-General, Geological Survey of Malaysia.
- 9.00 a.m. : Coffee Break

SESSION I

- 9.30 a.m. : KEYNOTE PAPER I
AHMAD JANTAN & BASIR JASIN - A Need for a Proper 'Malaysian Code of Stratigraphic Nomenclature' - its Formulation, Adoption and Adherence.
- 10.00 a.m. : CHOW WENG SUM & AB. MAJID SAHAT - Potential Alkali-Silica Reactivity of Tuffaceous Rocks in the Pengerang Area, Johore.
- 10.20 a.m. : ABDUL GHANI RAFEK & HJ. ABDUL RAHIM SAMSUDIN - Hasil Awalan Pemetaan Lapisan Lempung Samudera dengan Kaedah Kerintangan Geoelektrik di kawasan Lebu Raya Tangkak-Pagoh, Johor, Malaysia.
- 10.40 a.m. : M.B. IDRIS & K.H. KOK - Geology of the Mantannani Islands, Sabah.
- 11.00 a.m. : HAMZAH MOHAMAD & MOHAMAD MD. TAN - Major and Trace Element Geochemistry of Lanchang Volcanics, Pahang and their tectonic significance.
- 11.20 a.m. : ALAN J. BURLEY & JAMALUDIN OTHMAN - A Gravity Survey of Perlis, Kedah and Penang.
- 11.40 a.m. : TAN BOON KONG - Subsurface Geology of Ipoh, Perak.

- 12.00 noon : V.R. VIJAYAN - Gravity Survey of the Layang-Layang Tertiary Basin in Johore, Peninsular Malaysia.
- 12.20 p.m. : MOHAMAD ALI HASAN & ZAKARIA MARZUKI - A Preliminary Appraisal of the Hydrogeology of Klang Valley, Malaysia.
- 12.40 p.m. : Lunch Break

SESSION II

- 2.00 p.m. : KEYNOTE PAPER II
K.R. CHAKRABORTY - Granitoid Batholiths of Peninsular Malaysia: Typology and Geodynamic Implications.
- 2.30 p.m. : IBRAHIM KOMOO - Field Characterization of Weathering Profiles of Metasediments in Tropical Terrain.
- 2.50 p.m. : KAMALUDIN HASSAN - Quaternary Geology of Seberang Prai, Pulau Pinang and Kuala Kurau.
- 3.10 p.m. : KADDERI MD. DESA - Perbandingan Perubahan Kimia dan Mineralogi Kaolin dari Jerantut, Pahang dan Pengerang, Johor.
- 3.30 p.m. : Coffee Break
- 4.00 p.m. : TAN BOON KONG - Earthwork Excavation - Soil or Rock?
- 4.20 p.m. : G.H. TEH & H.L. KEE - The Igneous Rocks of the Kuala Kerai-Manek Urai Area, Kelantan: Petrological and Geochemical Aspects.
- 5.00 p.m. : FOOTBALL - Persatuan Geologi Malaysia Selection vs Geological Survey Malaysia.
- 7.30 p.m. : DINNER - Hosted by Malaysia Mining Corporation (MMC).

Sunday, 15th January, 1989

SESSION III

- 8.50 a.m. : KEYNOTE PAPER III
S.P. SIVAM, M.B. IDRIS & MUSTAFA KAMAL SHUIB - Geologic Evolution and Paleoclimatic Changes of Peninsular Malaysia.
- 9.20 a.m. : AHMAD JANTAN, BASIR JASIN, IBRAHIM ABDULLAH, UYOP SAID & ABDUL RAHIM SAMSUDIN - The Semanggol Formation - Lithology, Facies Association and Distribution, and Probable Basin Setting.
- 9.40 a.m. : IBRAHIM ABDULLAH, BASIR JASIN, AHMAD JANTAN, ABDUL RAHIM SAMSUDIN & UYOP SAID - The Semanggol Formation - Post Semanggol Structures and their Significance to Regional Geology.
- 10.00 a.m. : BASIR JASIN, AHMAD JANTAN, IBRAHIM ABDULLAH, UYOP SAID & ABDUL RAHIM SAMSUDIN - The Semanggol Formation - Lithostratigraphy of the Semanggol Rocks in the Light of Latest Concept in Stratigraphic Practice: A suggestion.

- 10.40 a.m. : Coffee Break
- 11.10 a.m. : KEYNOTE PAPER IV
I. METCALFE - Triassic Conodont Biostratigraphy in the Malay Peninsula.
- 11.30 a.m. : MOHAMAD HATTA AB. KARIM - Variation in some Groundwater Characteristics, Belawai Water Supply, Sarikei Division, Sarawak.
- 11.50 a.m. : H.D. TJIA - Superimposed structures in Upper Palaeozoic Metasediments, Eastern Johore.
- 12.10 p.m. : G.H. TEH & MOHD SABAR AHMAD - Volcanogenic Ba-Fe-Mn Mineralization at Bukit Ketaya, Tasik Cini area, Pahang.
- 12.50 p.m. : Lunch Break

SESSION IV

- 2.00 p.m. : KEYNOTE PAPER V
J.K. RAJ, S.P. SIVAM, IDRIS B. MOHAMED & S. PARAMANANTHAN
- The Bilut Valley of Pahang State and the Cezonoic of Peninsular Malaysia.
- 2.30 p.m. : KWAN TAI SEONG - K-Ar Dating of Micas from Granitoids in the Kuala Lumpur-Seremban areas.
- 2.50 p.m. : LIM KIN LEONG & TAN TEONG HING - Environment of Placer Gold Deposits in Northern Pahang.
- 3.10 p.m. : DAVID LEE TIEN CHOI - Formation of Pulau Batu Hairan and other islands around Pulau Banggi, Northern Sabah.
- 3.30 p.m. : Closing Remarks
- 3.50 p.m. : COFFEE

PERSIDANGAN TAHUNAN GEOLOGI '89
Annual Geological Conference '89

Merlin Inn Resort
Cameron Highlands
14th-15th January 1989

PERSIDANGAN TAHUNAN GEOLOGI 1989

ANNUAL GEOLOGICAL CONFERENCE 1989



PERSIDANGAN TAHUNAN GEOLOGI 1989

ANNUAL GEOLOGICAL CONFERENCE 1989



Captions to photos

1. The backdrop announcing the Conference.
- 2-3. At the registration desk.
- 4-5. The large turnout.
6. Organising Chairman, G.H. Teh, welcoming the participants.
7. Participants in the middle of the hall.
8. Ibrahim Komoo, reading out the President's speech.
9. Participants at the back of the hall.
10. Deputy Director General, Geological Survey Malaysia, Fateh Chand with his opening address.
11. Coffee break at the balcony.
12. Ahmad Jantan on the 'Malaysia Code of Stratigraphic Nomenclature'.
13. Session Chairman, Suntharalingam congratulating Chow Weng Sum.
14. Abd. Ghani Rafek on 'Kaedah Kerintangan Geoelektrik'.
15. M.B. Idris with his paper.
16. Khoo Han Peng with a question.
17. Alan J. Burley on the gravity survey in NW Peninsular Malaysia.
18. Wong Ting Woon with a query.
19. V.R. Vijayan with his paper.
20. K.R. Chakraborty with a comment.
21. Kadderi Md. Desa receiving his momento from Session Chairman, Fateh Chand.
22. Mohamad Ali Hasan on hydrogeology.
23. Ng Chak Ngoon expressing his view.
24. Kamaludin Hassan stressing a point.
25. Tan Boon Kong on subsurface geology of Ipoh.
26. Seet Chin Peng asking a question.
27. H.D. Tjia elaborating.
28. Session Chairman, Aw Peck Chin congratulating Lim Kin Leong.
29. I. Metcalfe making a comment.
30. Mohamad Hatta on the Belawai water supply.
31. Session Chairman, Foo Khong Yee with a momento for Ibrahim Abdullah.
32. Richard Mani with a light note.
33. Ibrahim Komoo receiving his momento.
34. J.K. Raj on the Bilut Valley.
35. Kwan Tai Seong on K-Ar dating
36. S.P. Sivam stressing a point.
37. Basir Jasin on the Semanggol Formation.
38. Hackman making a comment.
39. G.H. Teh answering a query.
40. Teoh Lay Hock with his question.
41. David Lee on Pulau Batu Hairan.
42. The initial line-ups for the Society XI and Survey XI.
43. A spectacular header from Ibrahim Komoo.
44. Albert Loh speaking on behalf of MMC at the dinner.
- 45-59. The participants at the sumptuous dinner, sponsored by MMC.

PERSIDANGAN TAHUNAN GEOLOGI 1989

ANNUAL GEOLOGICAL CONFERENCE 1989



ABSTRACTS OF PAPERS

Geological Society of Malaysia - Annual Geological Conference 1989

A NEED FOR A PROPER 'MALAYSIAN CODE OF STRATIGRAPHIC NOMENCLATURE' - ITS FORMULATION, ADOPTION AND ADHERENCE

AHMAD JANTAN and BASIR JASIN
Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor.

Many of us have been, are, and will be, involved in geological mapping and in logging and describing sedimentary, metasedimentary and associated rocks on the surface and in the subsurface, both on land and offshore. As in any other field of research, we need to refer to available literature to find out if such areas of research have been undertaken before, how much have been done, and how much more or what other aspects of the subject we can go into. In geological mapping work, we need to at least know if such areas have been mapped before, what aspect of the geology has been mapped, and for lithostratigraphic work, what geological formations have been recognised or erected, what their geological description and where the type/reference sections areas are.

Many of the geological mapping work, especially those by the Geological Survey Department, the Geology Departments of Universiti Kebangsaan Malaysia and Universiti Malaya, involved lithostratigraphic mapping. A scan through the work done give the impression that not only many of us did not adhere to a 'stratigraphic guide' but some of us may not even be aware that one needs such a guide in stratigraphic practice, though we do have 1968's 'Malaysian Code of Stratigraphic Nomenclature' and we voted 'yes' to adopt the International Subcommission on Stratigraphic Classification's International Stratigraphic Guide (Hedberg, 1976 ed.).

The importance of a stratigraphic guide, proper stratigraphic practice and the maintenance of a proper record for reference need no extra emphasis. Such a need was felt way back in 1967 when a 'Malaysian Code on Stratigraphic Nomenclature', based on the Australian Code (4th Edition, 1964) was drafted and provisionally accepted by the Council of the Geological Society of Malaysia at that time. A revival of that feeling arose again in 1974 when Dr. Thomas Yancey, then a lecturer at Universiti Malaya, found it difficult to locate proper description of type sections and or proposed type sections that one could refer to even though there were many named lithostratigraphic units in publications. A subcommittee, with representatives from the Geology Departments of the two universities together with the Director General of the Geological Survey Department as the chairman, was formed to look into the matter. Unfortunately this subcommittee did not live long.

Many of us, especially foreign geologists and foreign-trained local geologists, have had similar experiences as Dr. Thomas Yancey had. It is therefore still not too late, though it may have been quite late, for us to start make a proper record of stratigraphy and to start practise stratigraphy in accordance with proper stratigraphic code. The 1968 provisional 'Malaysian Code of Stratigraphic Nomenclature' need be revised and formalised in line with latest stratigraphic guide, for example that of 1982's North American Stratigraphic Code and the 1985's Field Geologist's Guide to Lithostratigraphic Nomenclature in Australia.

The present state of our lithostratigraphic nomenclature will be discussed.

POTENTIAL ALKALI-SILICA REACTIVITY OF TUFFACEOUS ROCKS IN THE PENGERANG AREA, JOHORE

CHOW WENG SUM & AB. MAJID SAHAT
Geological Survey Malaysia
Ipoh

Concrete is known to deteriorate as a result of interaction between certain reactive minerals in some types of aggregates and the alkaline pore fluids originating from Portland cement. This interaction which is known as alkali-silica reaction (ASR), was highlighted in Malaysia in March 1988 when the Singapore Government banned the import of volcanic quarry stones from the Pengerang area in Johore.

Based on rock aggregate tests, the mechanical and physical properties of tuffaceous rocks are within the acceptable limits as recommended by JKR Malaysia for use as constructional aggregates. However, chemical tests on potential alkali-silica reactivity showed that the tuffs from Pengerang contained reactive minerals. X-Ray Diffraction studies showed the possible occurrences of reactive tridymite and cristobalite in some of the samples. Petrographic studies showed that other reactive minerals are chalcedony and strained quartz, and also possibly, the crypto- to microcrystalline quartz which form the groundmass of the tuffs.

However, as granites which are innocuous are abundant in Peninsular Malaysia, the problem of alkali-silica reactivity should not be too worrying.

HASIL AWALAN PEMETAAN LAPISAN LEMPUNG SAMUDERA DENGAN KAEDAH KERINTANGAN GEOELEKTRIK DI KAWASAN LEBUH RAYA TANGKAK-PAGOH, JOHOR, MALAYSIA

ABDUL GHANI RAFEK & HJ. ABDUL RAHIM SAMSUDIN
Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi

Di beberapa lokasi di antara km 90 dan km 120 lebuhraya Tangkak-Pagoh yang sedang dibina terdapat lapisan lempung samudera pada kedalaman beberapa meter dari permukaan bumi. Lapisan lempung samudera tersebut menimbulkan beberapa masalah kejuruteraan bagi pembinaan lebuhraya kerana lapisan tersebut sensitif terhadap penurunan dan tepu dengan air. Pengerudian diperlakukan oleh pakar perunding untuk menentukan kedalaman dan ketebalan lapisan lempung samudera ini.

Suatu kaedah geofizik yang mungkin boleh digunakan untuk mengesan dan memeta lapisan lempung sedemikian ialah kaedah kerintangan geoelektrik. Ini adalah kerana lapisan lempung lazimnya mempunyai nilai kerintangan elektrik spesifik yang rendah bila dibandingkan dengan lapisan bahan bumi longgar yang lain. Penepuan dengan air akan merendahkan lagi kerintangan spesifik. Berdasarkan perkara-perkara ini satu program survei duga dalam kerintangan geoelektrik dijalankan di kawasan lebuhraya Tangkak-Pagoh untuk pemetaan dan pencirian lapisan lempung samudera tersebut. Sebanyak 23 stesen duga dalam kerintangan sudah diukur sejak April 1988.

Lengkung kerintangan bagi lapisan lempung mempunyai bentuk yang berbeza daripada lengkung kerintangan yang diperolehi untuk bahan bumi yang lain. Ciri ini membolehkan pemetaan kawasan lapisan lempung. Penafsiran separuh kuantitatif data-data yang diperolehi menunjukkan korelasi kedalaman dan ketebalan lapisan lempung hasil survei kerintangan geoelektrik dengan data penggerudian yang baik.

Geological Society of Malaysia – Annual Geological Conference 1989

GEOLOGY OF THE MANTANNANI ISLANDS, SABAH

M.B. IDRIS & K.H. KOK

Jabatan Geologi
Universiti Malaya
59100 Kuala Lumpur

The Mantannani Islands consist entirely of Tertiary strata and Quaternary carbonate sands. The dominant steeply dipping limestone strata form elongate ridges on these islands. It is here proposed as the Mantannani Limestone with the type section designated at the eastern end of Pulau Mantannani Kecil. This formation is subdivided into:— (a) a massive 'conglomeratic' unit and (b) a well-bedded unit. The lithological and faunal characteristics indicate that the Mantannani Limestone is deposited in a warm shallow marine shelf during the late Lower Miocene to early Middle Miocene.

Geological Society of Malaysia – Annual Geological Conference 1989

GEOKIMIA UNSUR MAJOR DAN NADIR BUMI BAGI BATUAN VOLKANO LANCHANG, PAHANG DAN KEPENTINGAN TEKTONIKNYA

**Major and Trace Element Geochemistry of Lanchang Volcanics, Pahang
and their Tectonic Significance**

HAMZAH MOHAMAD dan MOHAMAD MD. TAN

Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi.

Batuan afanit kelabu pucat kehijauan-hijauan yang tersingkap pada sebuah kuari batu jalan tinggal, 2 km ke arah timurlaut pekan Lanchang, Pahang telah diselidiki. Kepekatan Si, Al, Ti, Fe, Mn, Mg, Ca, Na, K dan P serta unsur nadir bumi La, Ce, Nd, Sm, Eu, Tb, Dy, Yb dan Lu bagi 21 sampel batuan yang dipercayai berusia Trias Tengah Lewat ini dibentangkan. Kandungan unsur major, dibantu oleh petrografi, telah dapat memastikan asalan volkano batuan ini. Nama dasit (keandesitan) didapati lebih sesuai digunakan berbanding riolit, memandangkan nisbah Na_2O terhadap K_2O yang amat tinggi, SiO_2 yang agak rendah daripada riolit biasa, serta tingginya nilai CaO. Gambarajah Masuda-Coryell bagi keseluruhan batuan memperlihatkan anomali Eu negatif yang mencadangkan kemungkinan batuan ini menghablur daripada fraksi magma dasit yang terevolusi daripada magma lebih bes, mungkin andesit. Penghabluran berperingkat melibatkan penyingkiran plagioklas, piroksen dan mungkin olivin dijangka merupakan mekanismenya. Kemungkinan adanya evolusi ini disokong oleh kewujudan perkaitan positif antara SiO_2 dan $(\text{La}+\text{Sm}+\text{Lu})$. Kandungan unsur nadir bumi batuan amat volkano Lanchang ini terletak 20 km sahaja ke timur zon Garis Bentong, pola kandungan unsur nadir bumi ini dijangka penting dan dapat menyokong (atau meragui) model-model tektonik Garis Bentong yang pernah dicadangkan sebelum ini.

The greenish, pale grey aphanitic rocks exposed in an abandoned road metal quarry, 2 km to the northeast of Lanchang, Pahang were investigated. The concentrations of Si, Al, Ti, Fe, Mn, Mg, Ca, Na, K and P and of rare earth elements La, Ce, Nd, Sm, Eu, Tb, Dy, Yb and Lu for 21 samples under study are presented. Major element content, complemented by petrography, has ascertained the volcanic origin of the rocks, which is believed to be Late Middle Triassic in age. The name (andesitic) dacite was found more appropriate, compared to rhyolite owing to the very high Na₂O to K₂O ratio, a relatively low SiO₂ then normal rhyolite, as well as the high content of CaO. Masuda-Coryell diagram for the whole analysis shows a negative Eu anomaly, which suggests the possibility that the rocks have crystallized from a dacitic magma fraction, evolved from a more basic

magma, probably andesite. It is thought that fractional crystallization involving separation of plagioclase, pyroxene and perhaps olivine being the mechanism. The possible existence of such evolution is supported by the positive correlation between SiO₂ and (La+Sm+Lu). The rare earth content closely resembles those for andesite, particularly continental andesite. Being located only 20 km to the east of the proposed Bentong Line zone, the Lanchang volcanics rare earth element content is expected to be of significance in supporting (or disfavouring) the previously proposed tectonic models for the area.

Geological Society of Malaysia – Annual Geological Conference 1989

A GRAVITY SURVEY OF PERLIS, KEDAH AND PENANG

ALAN J. BURLEY and JAMALUDIN OTHMAN
Geological Survey Malaysia
Ipoh

The results of a gravity survey of northwest Peninsular Malaysia are presented, forming the first stage of a survey of the whole Peninsula. The aim is to obtain as uniform a coverage as possible using 4WD vehicles and boats for transport. At a later stage it is anticipated that areas not otherwise accessible will be reached using a helicopter. The results can be largely explained in terms of the configuration of granitic rocks. A steep gravity gradient follows approximately the boundary of the Main Range granite in a series of *en echelon* north-west and north-east trending sections. The extent and steepness of the gradient along some sections implies steeply dipping contacts between granite and sediments extending to depths of many kilometres. It is steepest along the section coinciding with the Bok Bak fault, for which there is some evidence of a possible extension northwestwards into Perlis: here it could have influenced the deposition of the Tertiary Bukit Arang coal beds, which show a significant gravity response. If there has been major lateral movement along this fault and/or faults parallel to it, a net sinistral displacement of about 30 kilometres is suggested by the gravity results.

The Gunung Jerai granite is shown to be much more extensive underground than at outcrop, and the results show that the Pulau Pinang, Kulim and Main Range granites are all connected at relatively shallow levels. The Sintok granite on the Thai border may also be connected to the Main Range granite at considerable depth. In Langkawi the various granite outcrops are probably all parts of a single body. There is no evidence of any major change in crustal thickness in that area or elsewhere.

This work was done with the cooperation of the Department of National Mapping, who provided a surveyor, maps and height information, and the Universiti Teknologi Malaysia who established the gravity base network used in this survey.

SUBSURFACE GEOLOGY OF IPOH, PERAK

TAN BOON KONG
Jabatan Geologi,
Universiti Kebangsaan Malaysia
Bangi

An examination of data from some 340 boreholes covering about 50 project sites in the Ipoh area revealed that:

- the subsurface profile consists of complex layerings of alluvial sands, silts and clays on top of pinnacled limestone bedrock,
- most of the clays in the alluvium/mine tailings comprise inorganic clays with high plasticity (CH),
- the Standard Penetration Test (S.P.T) values for the alluvium/mine tailings are generally low (S.P.T. = 0 - 10), indicating very soft slimes or very loose sands,
- the depths to limestone bedrock range from 0 - 35 m, with most values falling between 5 - 15 m,
- some 50 occurrences of cavities in the limestone bedrock were detected, and they range in size from 0.2 m - 5.6 m, with the majority having sizes of <3.0 m. Cavities can and often occur at multiple levels.
- A weak soil zone (S.P.T. \approx 0) occurs immediately above the limestone bedrock at some of the sites. This weak soil zone represents collapsed soil materials or cavities within the soil.

Geological Society of Malaysia - Annual Geological Conference 1989

GRAVITY SURVEY OF THE LAYANG-LAYANG TERTIARY BASIN IN JOHORE, PENINSULAR MALAYSIA

V.R. VIJAYAN
Geological Survey Malaysia
Ipoh

A gravity survey was recently carried out to determine the structure of the Layang-Layang Tertiary Basin which is the southernmost of the known Tertiary basins in Peninsular Malaysia. The survey covered 549 stations over an area of 45 km by 23 km and included the entire area geologically mapped as the Tertiary Layang-Layang Formation and part of the Pre-Tertiary Tebak, Sedili and Linggiu formations to the east. Measurements over the granitic area surrounding the basin provided regional control.

The results show a prominent negative gravity anomaly with a maximum amplitude of 20 mgals covering an area of 165 sq. km which includes the Tebak Formation as well as the Layang-Layang Formation. The anomaly is centred within the Tebak Formation about 2 km from the boundary of the Layang-Layang Formation where the Bouguer Anomaly value reaches - 9 mgals.

It is believed that the basin is a half-graben structure bounded to the north-east by a listric normal fault with a minimum throw of 1 km. The survey shows that the basin is a closed one comprising both the Tertiary and Pre-Tertiary sediments.

The unusually high gravity values over the granites (up to +30 mgals in the south) as compared to the Main Range Granites and Eastern Belt Granites, are probably due to combination of factors including thinning of the granite batholith and the occurrence of a denser and more basic upper crust beneath the granite. The strong gravity gradient along the southern edge represents a major structural discontinuity probably a fault plane, and possibly includes the effect of further thinning of the granite.

Geological Society of Malaysia Annual Geological Conference 1989

A PRELIMINARY APPRAISAL OF THE HYDROGEOLOGY OF KLANG VALLEY, MALAYSIA

MOHAMAD ALI HASAN & ZAKARIA MARZUKI

Jabatan Geologi
Universiti Malaya
59100 Kuala Lumpur

The Klang Valley or the Klang River Basin, being the most populated area in Malaysia, has a catchment area of 1,288.4km² and occupies the central parts of Selangor state together with the Federal Territory of Kuala Lumpur. There are two major tributaries, namely Sungai Gombak and Sungai Batu in the upper basin. These tributaries then merge before joining the Klang River in the City Center. The lower stretch downstream of the City Center, the Klang River follows a rather meandering course. The annual mean rainfall in the Valley for the period from 1976 to 1985 is estimated as being 2,250mm, ranging from 2,700mm in the upstream mountainous area to 1,850mm along the main Klang River. The mean annual evaporation amount is estimated at around 1,070mm. The geology of the study area consists of the following: Hawthornden Formation, Kuala Lumpur Limestone, Kajang Formation, Kenny Hill Formation, Granite and its differentiates and Alluvium.

In this presentation the important geological and stratigraphical formations of the study area are highlighted. This is followed by a preliminary finding on the analysis of the hydrogeologic potentials within the study area based on the interpretation of available geological data and existing well and borehole records as well as previous reports. Lastly some recommendations are forwarded for detailed investigations of the potential areas for groundwater exploitation.

GRANITOID BATHOLITHS OF PENINSULAR MALAYSIA: TYPOLOGY AND GEODYNAMIC IMPLICATIONS

K.R. CHAKRABORTY

Dept. of Geology
University of Malaya
59100 Kuala Lumpur

The chemical-mineralogical typology and other characteristics of the three plutonic belts of Peninsular Malaysia are defined and their geodynamic implications are considered.

The plutonic magmatism in the Eastern and Central Belts is bimodal, but dominated by acidic rocks. The granitoid batholiths of these two belts are calc-alkaline to aluminocafemic, and most of them are either typically subalkaline (i.e. monzonitic) or transitional to calc-alkaline. The batholiths do not show any space-time-composition relationships. The bimodality and the typology do not correspond to the typical calc-alkaline magmatism of the island arcs or active continental margins, but are comparable to those related to crustal tension associated with the development of the ensialic basin. The granitoids are probably derived in substantial part by melting of heterogeneous basal crust induced by decompression and convective heat transfer.

The Main Range granitoids of the Western Belt are typically aluminocafemic and subalkaline. They bear many characteristics of A-type granites. The generation of the Western Belt granitoids cannot be linked to crustal anatexis consequent upon collisional thickening. Combined effects of high radiogenic heat production and heat retention may largely be responsible for raising the temperature sufficiently high to cause crustal anatexis. It seems that the thermal evolution and the P-T-t paths of the Western Belt were different from those of the other two belts.

Geological Society of Malaysia - Annual Geological Conference 1989

PENCIRIAN LAPANGAN PROFIL LULUHAWA BATUAN METASEDIMEN DI TERAIN TROPIKA (Field Characterization of Weathering Profiles of Metasediments in Tropical Terrain)

IBRAHIM KOMOO

Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi

Cirikan profil luluhawa pada batuan metasedimen lazimnya berkeadaan kompleks. Hal ini disebabkan beberapa faktor bergabung mempengaruhi profil yang terhasil. Beberapa faktor utama meliputi keadaan morfologi, jenis litologi, kehomogenan (masif atau berlapis), dan struktur geologi. Cerapan lapangan pada sejumlah cerun potongan menunjukkan meskipun wujud kerencaman dan kepelbagaian, tetapi satu pendekatan untuk mencirikan profil luluhawa batuan metasedimen ini masih boleh dikemukakan.

Berdasarkan kajian pada beberapa litologi yang secara relatif masif, beberapa cirian fizik yang boleh dicerap di lapangan dapat digunakan sebagai asas pengelasan profil luluhawa. Cirian 'bahan' yang boleh digunakan termasuk perubahan warna, kepupusan tekstur dan sifat kebolehperoian. Sementara cirian 'jasad' meliputi keadaan perubahan dan peratus pengawetan struktur, pengaruh oksida-besi. dan anggaran kekuatan.

Profil luluhawa batuan metasedimen di terain tropika sangat tebal, sama ada bahan atau jasad profil luluhawa ini merupakan satu unit yang mustahak dalam pelbagai projek kejuruteraan awam. Oleh itu, semasa penyiasatan tapak, terutamanya kerja penglogan lubang gerudi, pengelasan yang bersystem terhadap profil ini diperlukan. Pengalaman pencirian di lapangan ini dapat digunakan untuk memenuhi kehendak ini.

Geological Society of Malaysia - Annual Geological Conference 1989

QUATERNARY GEOLOGY OF SEBERANG PRAI, PULAU PINANG AND KUALA KURAU

KAMALUDIN BIN HASSAN
Geological Survey Malaysia
Ipoh

Quaternary geological mapping in Seberang Prai, Penang Island and Kuala Kurau was started in February 1983 and completed in September 1988. It covers the lowlands and coastal areas of the Topographic Map Sheets 28, 39 and southern part of Sheet 16. A total of 12 deep boreholes and 288 shallow holes were drilled in the course of the investigation.

Generally the stratigraphy of the area is divided into Simpang Formation, Gula Formation and Beruas Formation. The lithology of the Simpang Formation is made up of gravel, sand, clay and locally silt and peat. It is accumulated or deposited in terrestrial environment by fluvial processes during the Pleistocene. The Gula Formation is subdivided into five members viz. the Bagan Datoh, Telok Intan, Port Weld, Parit Buntar and Matang Gelugor. Generally the lithology consists of silt, clay, sand, sometimes gravel and peat and often contain shells. The environment of deposition is interpreted as shallow marine, estuarine and littoral and Holocene in age. The Beruas Formation constitutes sand, gravel, clay, silt and occasionally peat accumulated or deposited in terrestrial environment by fluvial processes during the Holocene.

Clay deposits of economic significance are found south of Bukit Mertajam and in the north-eastern part of the area. Potential aquifers were located around Kepala Batas and east of Butterworth.

PERBANDINGAN PERUBAHAN KIMIA DAN MINERALOGI KAOLIN DARI JERANTUT, PAHANG DAN Pengerang, JOHOR.

KADDERI MD. DESA
Jabatan Geologi FSFG
Universiti Kebangsaan Malaysia
43600 Bangi

Perubahan terhadap dua longgokan kaolin yang terbentuk hasil proses luluhawa dua jenis batuan telah dikaji dan dibandingkan. Longgokan yang pertama terbentuk hasil luluhawa batuan riolit porfir di Pengerang Johor, dan longgokan yang kedua pula terbentuk hasil luluhawa batuan sedimen bertuf di kawasan Felda Gelangi, Jerantut, Pahang. Perubahan unsur utama (Si, Al, Ti, dan Fe) serta mineraloginya dibincangkan. Perubahan kimia dan mineralogi kaolin dari Pengerang, Johor membentuk bauksit melalui pengayaan relatif aluminium dan pengeluaran selektif besi, sebaliknya perubahan terhadap kaolin dari Jerantut pulka membentuk laterit melalui proses pengayaan relatif besi dan pengeluaran selektif aluminium. Dipercayai topografi dan perubahan paras laut telah memainkan peranan dalam mempengaruhi saliran dan kelarutan silika, dan seterusnya kelarutan besi serta aluminium. Hasil daripada perbezaan kelarutan besi dan aluminium ini membolehkan pengayaan relatif dan pengeluaran selektif unsur besi dan aluminium.

Geological Society of Malaysia - Annual Geological Conference 1989

THE IGNEOUS ROCKS OF THE KUALA KERAI-MANEK URAI AREA, KELANTAN: PETROLOGICAL AND GEOCHEMICAL ASPECTS

G.H. TEH & H.L. KEE
Dept. of Geology
University of Malaya
59100 Kuala Lumpur

The area stretching from Kuala Kerai in the north (demarcated by Sg. Durian) and Manek Urai to the south (demarcated by Sg. Rek) and bordered on the west by Sg. Lebir and the east by the Boundary Range hosts a broad spectrum of igneous rocks which range from acidic, through intermediate, basic and ultrabasic and pyroclastic rocks based on their mineralogical, chemical and textural variations.

The acidic rocks comprise at least 9 different rocks types, either as plutonic rocks or their volcanic equivalents. The dominant ones being granodiorite, biotite adamellite, hornblende-biotite adamellite, hornblende-biotite tonalite, porphyritic pink granite, rhyolite and biotite granite porphyry.

The intermediate rocks include hornblende diorite, biotite-quartz diorite, biotite diorite and pyroxene andesite. The basic rocks are mainly hornblende pyroxene basalt while pyroxenite is the ultrabasic rock. Pyroclastic rocks include welded tuff and crystal tuff.

Late phase phenomena as minor intrusions include dolerite dykes, hornblende basalt dykes, microgranite and graphic granite.

Systematic mineralogical and textural variations of the various igneous rocks in the area coupled with their spatial proximity indicate a petrogenetic link between them. Preliminary geochemical data demonstrate that these various rock types probably represent a differentiated series from a single parental magma. The geochemistry of the rocks show a calc-alkaline trend with increasing differentiation that includes enrichment in SiO_2 and alkalis and the depletion in CaO , MgO and Fe_2O_3 .

Geological Society of Malaysia – Annual Geological Conference 1989

GEOLOGIC EVOLUTION AND PALEOCLIMATIC CHANGES OF PENINSULAR MALAYSIA

S.P. SIVAM, M.B. IDRIS & MUSTAFA KAMAL SHUIB

Department of Geology,
University of Malaya,
59100 Kuala Lumpur

The geologic and climatic histories of the eastern and western blocks of Peninsular Malaysia strongly differed till the Rhaetian. Zircon and isotope studies indicate that the age of the Pre-Cambrian basement of both blocks differ. The eastern block exhibits bimodal magmatism, whereas in the western block basic magmatism is apparently rare or absent. Granites in both these blocks differ in various aspects including their age, size, enclave types, isotopic composition, major and minor trace elements, mineralogy, textures and levels of emplacements. In addition, Cretaceous and Cenozoic magmatic activities appear to be concentrated in the eastern belt though the abundance of hot springs is greater in the west.

Throughout the Paleozoic, the western belt appears to have been representative of a passive rifted margin. Sedimentation occurred in a shallow marine deltaic continental sequence in the Cambrian. Probably because of the absence of vegetation, weathering intensity was less in spite of higher temperatures. Eolian activity must have been extensive but has been masked by aqueous reworking, suggesting a humid climate. During the Ordovician – Early Devonian, sedimentation in the Langkawi Islands occurred in a slowly subsiding oscillatory basin dominated by carbonates. In the mainland, similar Lower Paleozoic sequences are reported, but more basinal sediment types are represented in areas where subsidence outpaced carbonate deposition. Intermittent volcanic activity prevailed in various places during this period.

Folding and deformation of the Lower Paleozoic took place sometime in the Devonian. However, they did not produce any major significant topographic relief. By Late Paleozoic, a return to a stable, slowly subsiding basin is envisaged.

To date, no Lower Paleozoic has been proven in the eastern belt. As such, correlation is attempted with the geology of its Indochinese counter-part. During the Upper Paleozoic to Rhaetian times, the eastern belt consisted of vegetated volcanic landmasses with carbonate reefs and atolls on submarine highs. In the more basinal areas, sediments from these volcanic islands were deposited by debris flows, turbidity and tractive currents on deltas, submarine slopes and basins.

Subsequently, orogeny and union of both blocks convened during late Late Triassic. Essentially extensional tectonics with deposition of continental molasse and volcanism in many basins around the peninsula ensued. Deformation of these molasse basins appeared to have been dominated by injection folding due to probable diapiric uprise of thick plastically deformed fine sediments. Alternatively, the basins and their foldings may be the products of wrench faulting. Thus, both syn-sedimentary and post-sedimentary deformations and folding were prevalent. This probably explains particularly the conflict in the interpretations of the structural history of these basins.

Widespread late Cretaceous and Cenozoic magmatic activities are noted with some continuing even late in the Tertiary and Quaternary. Subsequent movements along faults during these periods are recognised.

An attempt is made in correlating sedimentary and faunal characteristics of the Paleozoic of the western belt with the global sea-level curves as this region has basically been tectonically stable.

The paleoclimate of the Peninsula has varied greatly from humid desert, semi-arid, cool periglacial, savannah type to humid tropical of the present day. The present distribution of salt licks suggest that salt deposits may be present at depths below the level of groundwater circulation. These are precipitates from oversaturated solutions of beds, especially of the molasse facies. Similarly, black shales occurrences suggest probable correlation with world-wide sea-level and climatic changes.

PERSATUAN GEOLOGI MALAYSIA
Geological Society of Malaysia

JABATAN PENYIASATAN KAJIBUMI MALAYSIA
Geological Survey Malaysia

PERSIDANGAN TAHUNAN GEOLOGI '89
Annual Geological Conference '89

**THE SEMANGGOL FORMATION – LITHOLOGY, FACIES
ASSOCIATION AND DISTRIBUTION, AND
PROBABLE BASIN SETTING**

**AHMAD JANTAN, BASIR JASIN, IBRAHIM ABDULLAH,
UYOP SAID and ABDUL RAHIM SAMSUDIN**
Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi

The Semanggol rocks, located at three separate fault-displaced areas in north and south Kedah and east-central Perak, are gently folded and consist of conglomerate, sandstone with interbedded shale, shale with interbedded sandstone, shale and chert, interpreted to be in lateral and interfingering contact, representing lateral facies variation rather than in sequential superposition as have previously been reported. Based on lithology and facies relationship, the Semanggol rocks are interpreted to be of submarine fan, turbidite and basin deposits.

In north Kedah (Padang Terap), the conglomerate is found in the east, followed by interbedded sandstone and shale, shale and chert to the west, suggesting a source area in the east and basinal area in the west. Conglomerate is not found in south Kedah (Kulim-Baling); interbedded sandstone and shale are found in the east whilst chert and grey and red mudstone in the west, similarly suggesting an eastern source area with the basin in the west. In east – central Perak (Larut-Matang), however, conglomerate is found in the west, followed by interbedded sandstone and shale, black shale, red shale and chert to the east, suggesting an opposite situation, i.e. a source area in the west and the basin in the east.

Individually, the three areas seem to represent half-graben situations, the north and south Kedah areas having a west-facing half-graben, and the west-central Perak area having an east-facing half-graben. If the fault displacement is undone, a full graben situation is envisaged. The Semanggol rocks are further interpreted to have been deposited in a basin having full-graben configuration.

**THE SEMANGGOL FORMATION – POST SEMANGGOL STRUCTURES
AND THEIR SIGNIFICANCE TO REGIONAL GEOLOGY**

**IBRAHIM ABDULLAH, BASIR JASIN, AHMAD JANTAN,
ABDUL RAHIM SHAMSUDDIN & UYOP SAID**
Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi

The Semanggol rocks have been folded into open to slightly asymmetrical folds. At several localities, where the bedding becomes very steeply dipping or even overturned, it is interpreted that the reversed to thrust faults have modified the previously quite simple structures. Strike-slip faults also played a very important role in reorientating the strike-ridges, especially in the south Kedah (Kulim-Baling) area.

In Gunung Semanggol area, North Perak, the strike-ridges are lying almost in the north-south direction, with slight deflections near the interpreted strike-slip faults. In south Kedah (Kulim-Baling), the strike-ridges changes from almost north-south at the southern end into north-northeast in the middle parts and back into almost north-south at the northern end. In north Kedah (Padang Terap), the ridges are oriented in the north-south direction, as at the Gunung Semanggol area.

Based on observations in the three areas, it is believed that the regional structural trend of the Semanggol Formation is in the north-south direction as shown in the Padang Terap and Gunung Semanggol areas. The apparently different trend in Kulim-Baling area is interpreted to have been modified by the nearby granite intrusions and the drag due to the strike-slip faults movement.

Geological Society of Malaysia – Annual Geological Conference 1989

THE SEMANGGOL FORMATION – LITHOSTRATIGRAPHY OF THE SEMANGGOL ROCKS IN THE LIGHT OF LATEST CONCEPT IN STRATIGRAPHIC PRACTICE: A SUGGESTION

**BASIR JASIN, AHMAD JANTAN, IBRAHIM ABDULLAH,
UYOP SAID and ABDUL RAHIM SAMSUDIN**
Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi

Semanggol Rocks were recorded in three major areas, vis West-Central Perak, South and North Kedah. The type section of the formation was designated at Bukit Merah near Taiping, Perak (Burton, 1973). This stratotype was not properly described and does not contain all the three major lithologic types of the formation. This type-section consists mainly of the Conglomerate Member and Rhythmite Member. The Chert Member is not represented. The complete section, however, is better exposed in North Kedah where all the three members are represented. A new type area must be designated, and if feasible the local name should be adopted according to the Stratigraphic Code.

The present investigation on the Semanggol Formation in the three areas suggests that originally they probably belong to the same sedimentary basin, and were later displaced by wrenched faults during the post-Semanggol tectonics. The three members of the formation were in fact synchronously deposited. They are just facies variation of the deep marine environment. The Chert Member represents basin deposit lacking in terrigenous supply. The Rhythmite Member consists of turbidite sequeces which interfinger with the Chert and Conglomerate Members. The Conglomerate Member represents submarine fan facies near the slope of a basin. All these three distinct members are roughly synchronous and they should therefore be considered as separate lithostratigraphic units, in line with latest concept in stratigraphic practice. Two alternative lithostratigraphic classifications will be proposed.

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA
WARTA GEOLOGI - NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

ADVERTISING SPACE ORDER FORM

RATES:	WARTA GEOLOGI		BULLETIN	
	Black & White	Colour	Black & White	Colour
	Format: 20 cm X 28 cm		Format: 18 cm X 25 cm	
Inside full page per issue	M\$300	M\$600	M\$1000	M\$1500
Inside half page per issue	M\$200	M\$500	M\$500	M\$800
Inside full page for 6 issues	M\$1500	M\$3000	-	-
Inside half page for 6 issues	M\$1000	M\$2500	-	-

Artwork and positive films or slides (for colour or black & white) should be supplied by the advertiser.

Please send the completed form below together with remittance payable to "Geological Society of Malaysia" to

The Editor,
 Geological Society of Malaysia
 c/o Dept. of Geology,
 University of Malaya,
 59100 Kuala Lumpur, Malaysia.

For further information, please ring 03-7577036.

The Editor,
 Geological Society of Malaysia,
 c/o Dept. of Geology,
 University of Malaya,
 59100 Kuala Lumpur.

We would like to take up advertising space in WARTA GEOLOGI/BULLETIN in the form (please tick as appropriate):

	WARTA GEOLOGI		BULLETIN	
	Black & White	Colour	Black & White	Colour
Inside full page	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>
	six issues <input type="checkbox"/>	six issues <input type="checkbox"/>	issues <input type="checkbox"/>	issues <input type="checkbox"/>
Inside half page	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>
	six issues <input type="checkbox"/>	six issues <input type="checkbox"/>	issues <input type="checkbox"/>	issues <input type="checkbox"/>
Artwork/Positive film/slide*	enclosed <input type="checkbox"/>	not enclosed <input type="checkbox"/>		

Company

Address

Enclosed cheque/money order/bank draft* for M\$

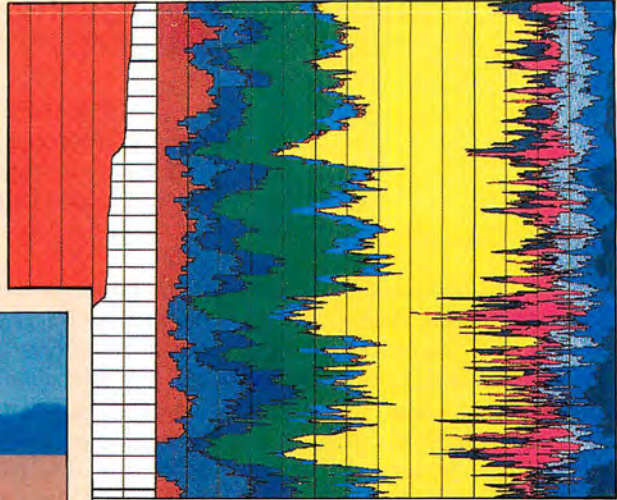
Person to be contacted Tel

Designation Signature

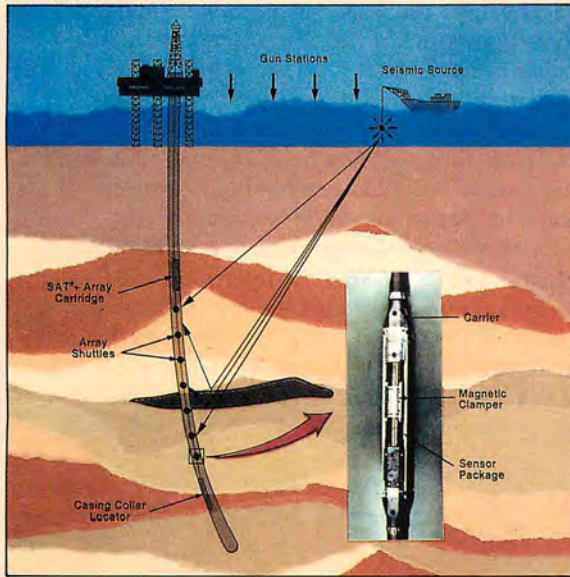
* Please delete as appropriate

WIRELINE, TESTING, DATA PROCESSING & SEISMIC SERVICES

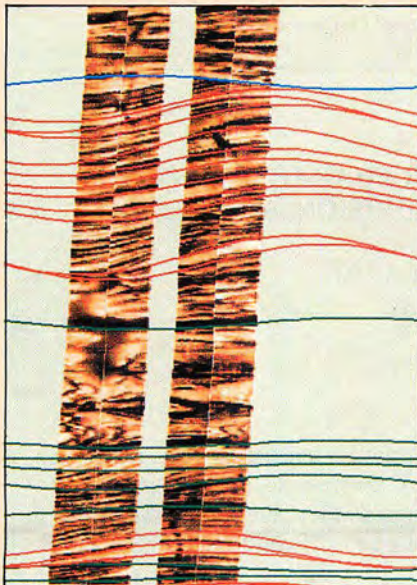
Geochemical Log



Downhole Seismic Array



Array Sonic Service



The Formation Microscanner Log

Pioneering and advancing Wireline Technology is our commitment to the oil industry.

Schlumberger

Schlumberger (Malaysia) Sdn. Bhd.
Wellog (Malaysia) Sdn. Bhd.

32nd Floor, Menara Promet, Jalan Sultan Ismail, 50250 Kuala Lumpur.
Tel: 03-2485533/2485621/2485947. Telex: SCHLUM MA 31335.
Cable: SCHLUMEAD. Fax: 03-2421291.

TRIASSIC CONODONT BIOSTRATIGRAPHY IN THE MALAY PENINSULA

I. METCALFE

Institute of Advanced Studies
University of Malaya
59100 Kuala Lumpur

Conodonts representative of the Lower, Middle and Upper Triassic are now known in the Malay Peninsula and all the Triassic Stages except the Rhaetian are represented. The best known sequence of Triassic conodonts occurs in the Kodiang Limestone of Kedah but there are still significant gaps in the known conodont succession. In particular, Griesbachian and Dienerian conodonts are poorly known and the Upper Spathian, Lower Ladinian, Middle and Upper Norian and Rhaetian are unrepresented. Lower Norian conodonts, previously unknown in the Malay Peninsula, are here confirmed for the first time. New data from the Kodiang Limestone of Bukit Mulong and Bukit Kepelu help to fill some of these gaps in the Carnian and Norian conodont succession. The Chuping Limestone of Perlis has also recently yielded some Lower Norian conodonts which implies a correlation with the Kodiang Limestone to the south. Other recent discoveries include early Late Triassic (Lower Carnian) conodonts from the Chert Member of the Semanggol Formation, Kedah, Early Triassic (Spathian) conodonts from west Pahang and Early Triassic (Upper Dienerian) and Middle Triassic (Upper Anisian) conodonts from the Jerus Limestone, Cheroh, west Pahang. The conodont faunas of Gunong Keriang, Kedah are reinterpreted to be ?Smithian – Spathian in age.

Geological Society of Malaysia – Annual Geological Conference 1989

VARIATIONS IN SOME GROUNDWATER CHARACTERISTICS, BELAWAI WATER SUPPLY, SARIKEI DIVISION, SARAWAK

MOHAMMED HATTA ABD. KARIM

Geological Survey Malaysia
Kuching
Sarawak

Kajian pemantauan yang bersistematik telah dijalankan semenjak Ogos 1987 ke atas Kawasan Tadahan Punca Air Tanah Belawai untuk memperolehi dan mengumpul data-data kuantiti dan kualiti air, juga jumlah permintaan penduduk; dengan tujuan untuk mengenalpasti dan menyelesaikan sebarang masalah yang akan timbul semasa peringkat penggunaannya.

Akuifer di Kawasan Tadahan Belawai adalah jenis terdedah yang cetek di mana ianya terdiri dari pasir pantai dan pasir laut.

Air tanah pada amnya mengalir dari selatan ke utara Kawasan Tadahan. Walau bagaimanapun aliran air akan berubah bergantung kepada pertalian antara imbuhan dan luahan air Kawasan Tadahan.

Punca imbuhan adalah dari penyerapan air hujan dan larian air tanah. Masa sambutan yang dilihat adalah pendek dimana air hujan didapati sampai ke paras air dengan kadar yang segera. Punca luahan adalah dari pemampaan perigi pengeluaran, evapotranspirasi, larian air tanah dan larian permukaan menerusi parit. Semasa musim kemarau, jumlah luahan adalah melebihi jumlah imbuhan yang mengakibatkan punca air terpaksa di ambil dari simpanan akuifer. Kesan kegunaan air dalam akuifer Kawasan Tadahan didapati berubah mengikut corak pemampaan dan keadaan paras air tanah pada peringkat awal.

Kualiti air berubah pada setiap perigi dan pada bulan yang berlainan. Didapati ada pertalian antara kandungan klorida komposit dengan jumlah hujan yang turun. Dari rajah trilinear, kualiti air berubah menjadi kurang memuaskan apabila jumlah imbuhan berkurangan.

Untuk memperbaiki hasil kajian Sistem Bekalan Air Belawai, data evapotranspirasi dan data jumlah larian permukaan menerusi parit hendaklah diperolehi dengan lebih tepat lagi.

Geological Society of Malaysia – Annual Geological Conference 1989

SUPERIMPOSED STRUCTURES IN UPPER PALAEOZOIC METASEDIMENTS, EASTERN JOHOR

H.D. TJIA
Department of Geology,
Universiti Kebangsaan Malaysia
43600 Bangi

At Tanjung Sedili Besar crops out a medium size recumbent fold verging east that became coaxially refolded about NW-striking F_2 axis. Structures of both deformation phases, D1 and D2, were probably refolded about a NE-trending F_3 axis. At Tanjung Balau, three fold axes, F_1 and F_2 coaxially deformed about a north-trending direction, and an east-west striking F_3 are indicated by superimposed structures. F_1 , F_2 , and F_3 are represented by refolded recumbent folds, upright asymmetrical folds and open folds, respectively. Some of the S_1 cleavages were deformed into open folds during the D2 deformation. These outcrops are part of a Late Palaeozoic tectonic front that is known to extend for several hundred kilometres along the east coast between Tanjung Cenering in Terengganu and Tanjung Balau. The tectonic type of this compressional front is not yet established.

VOLCANOGENIC Ba-Fe-Mn MASSIVE SULPHIDE MINERALIZATION AT BUKIT KETAYA, TASIK CINI AREA, PAHANG

G.H. TEH & MOHD SABAR AHMAD

Dept. of Geology,
University of Malaya
59100 Kuala Lumpur

Ba-Fe-Mn-massive sulphide mineralization is situated on the southwestern and northern slopes of Bukit Ketaya, southeast of Tasik Cini. This is 3 km northwest from the classic volcanogenic Ba-Fe-Mn-massive sulphide mineralization at Bukit Botol.

Barite, iron-manganese oxides and massive sulphides mineralization is stratiform and hosted by metavolcano-sedimentary rocks. Field observations, coupled with hand specimen and thin section studies support the view that mineralization is volcanogenic in character. There is also the progressive lateral and vertical spatial distribution in the mineralization which resulted from variation in Eh and pH conditions so typical of volcanogenic deposits and so useful in exploration geochemistry.

Structurally the present mine pit is located in a faulted syncline with the fold axis striking in the N-S direction. Massive hematite layers are interbedded with rhyolite meta-tuff and massive white, pink, brown, dark-brown, grey crystalline barite as well as banded barite. Massive sulphide, mainly pyrite with chalcopyrite and covellite is exposed in the northern slopes of Bukit Ketaya at stratigraphically lower horizons.

Geochemical analyses was performed on various ore and host rock samples and they revealed interesting contents of Ba, Fe, Mn, Si, Al, Ca, Ti, K, Na, P, Mg and S.

THE BILUT VALLEY OF PAHANG STATE AND THE CENOZOIC OF PENINSULAR MALAYSIA

J.K. RAJ, IDRIS B. MOHAMED, S.P. SIVAM

Dept. of Geology, Universiti Malaya, Kuala Lumpur
and

S. PARAMANANTHAN

Dept. of Soil Science, Universiti Pertanian Malaysia
Serdang

The NNW-SSE trending Bilut Valley consists for the most part of narrow to broad, stretches of flat to gently sloping ground separated by shallow, flat bottomed valleys. In the north and central sectors of the Valley, the stretches of flat to gently sloping ground are mostly depositional surfaces for they are underlain by unconsolidated, silty to gravelly sediments that were deposited by debris flows and reworked in part by meandering rivers. In the south, however, the stretches of flat to gently sloping ground are underlain by weathered Triassic strata and are erosional surfaces that developed through pedimentation. To its immediate west, the Bilut Valley abuts against a NNW-SSE trending belt of fluvially dissected, hilly terrain developed over Devonian (and Carbo-Permian?) strata, while to the east, it is bordered by a similarly trending belt of undulating to hilly, fluvially dissected terrain developed over Triassic strata. The hilly terrain to the west is se-

parated from the Valley by well-developed, though discontinuous, fault scraps, that show reliefs of up to 300 m. The undulating to hilly terrain to the east is also separated from the Valley by somewhat continuous fault scarps, though here reliefs are only up to about 100 m. Steep slopes, indicative of fault scraps also border a few narrow ridges present within the Valley. Towards the northwest end of the Valley, the Sg. Bilut has eroded a steep sided gorge that cuts across the belt of fluvially dissected, hilly terrain in the west. Arising from these geomorphological features, it is concluded that the Bilut Valley is located within a graben structure that developed as a result of the uplift and formation of horsts in the belts of undulating to hilly terrain in the west and east. Uplift occurred along NNW-SEE trending normal faults that were off-set in places by ENE-WSW to E-W trending cross faults. Accelerated fluvial erosion (under drier climatic conditions than present in the opinion of Raj) of the hilly terrain to the west then led to deposition of unconsolidated silty to gravelly, sediments in the north and central sectors of the Valley, while pedimentation occurred in the south. This was followed by a phase of re-working of the unconsolidated sediments by meandering rivers resulting in the formation of fluvial terraces. No definite age can be assigned to the development of the graben structure, though the unconsolidated sediments and the well developed fault scarps present indicate that it occurred in Late Cenozoic times. It is also considered that the NNW-SEE trending fault, that borders the west side of the graben, is a pre-existing one that experienced earlier reactivation during the Early to Middle Cenozoic.

The geomorphical development of the Bilut Valley thus leads to our contention that normal faulting occurred during the Cenozoic of Peninsular Malaysia. The Older Alluvium of Johore and Singapore, as well as the Boulder Beds of the Kinta Valley and Batu Arang are thus considered to be related to the formation of fault scraps and/or horsts and grabens that developed in the Late Cenozoic through normal faulting. Normal faulting during the Late Cenozoic is also considered responsible for the extrusion of the Kuantan Basalts as well as for the siting of a number of hot springs in the Peninsula. The Tertiary basins of the Peninsula are also considered to be related to graben structures that developed through normal faulting, while the dolerite dykes of the East Coast are considered to be associated with normal faults that developed sometime during the Cenozoic. Underformed acid volcanics present in the Cerating and Mersing areas are also considered to be related to normal faults that developed sometime during the Cenozoic, as are the Segamat Volcanics. Several other present-day geomorphological features of the Peninsula including river captures, knick points and raised fluvial terraces are finally considered to be related to normal faulting during the Quaternary.

Geological Society of Malaysia -- Annual Geological Conference 1989

K-Ar DATING OF MICAS FROM GRANITOIDS IN THE KUALA LUMPUR - SEREMBAN AREA

KWAN TAI SEONG
Geological Survey of Malaysia
Alor Setar

The granitoids in the area represent the southern component of the N-S trending Main Range Batholith, with the Kuala Lumpur pluton predominating in the western half of the area. This pluton consists mainly of a medium to coarse-grained megacrystic muscovite-biotite granite. It is an important source of tin deposits in the vicinity of Kuala Lumpur and Seremban, and is commonly genetically related to pegmatites. Cobbing and Mallick (1987) divided the other granitoids present based on their textural and mineralogical characteristics. These granitoids include the Tampin, Chembong, Jelebu, Kuala Kelawang, Genting Sempah, Bukit Tinggi and Manchis plutons. Besides these, small satellite ultrabasic intrusives occur in the northeast. They are believed to predate the granitoids.

Metasedimentary rocks, Silurian to Carboniferous in age, are the dominant country rocks. The presence of Permian to Triassic sequences is restricted to the northeast.

The major faults in the area strike SE and show left-lateral displacements. They are commonly filled with vein quartz to form occasional topographically prominent features such as the Klang Gates ridge. Gobbett and Tjia (1973) and Hutchison (1986) suggested a post-early Cretaceous age for these faults.

K-Ar dates of biotites from the granitoids varied between 82 ± 3 Ma and 214 ± 6 Ma. Muscovites from the Kuala Lumpur pluton gave apparent ages ranging from 160 ± 5 Ma to 212 ± 6 Ma while those from their associated pegmatites yielded values varying between 164 ± 5 Ma and 218 ± 7 Ma. The older mica dates for the Kuala Lumpur pluton are considered to represent its emplacement age. The U-Pb zircon ages of 211 ± 5 Ma and 215 ± 2 Ma established by T.C. Liew (1983) support this. Resetting of K-Ar ages is evident in the rest of the micas and their patterns of distribution indicated relatively higher retentivity of radiogenic argon for samples in the northwestern part of this pluton. Muscovites from the pegmatites displayed a somewhat similar pattern that is interpreted to be a result of a superimposed thermal effect on their cooling trend.

The U-Pb age of 219 ± 5 Ma for the Genting Sempah pluton (T.C. Liew, 1983) is concordant with a K-Ar biotite age of Bignell and Snelling (1977) and their Rb-Sr isochron age for the Jelevu pluton, thus suggesting the probability that these granitoids were emplaced during a single episode. However, their K-Ar biotite ages indicated a greater influence of the Cretaceous event known further southeast.

Geological Society of Malaysia - Annual Geological Conference 1989

ENVIRONMENT OF PLACER GOLD DEPOSITS IN NORTHERN PAHANG

TAN TEONG HING and LIM KIN LEONG

Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi

Deposition of placer gold in northern Pahang began contemporaneously with the deposition of the Tertiary Bed within subsiding basins. The Tertiary Bed is characterized by subbituminous coal seams in which some fine gold are present as mineral matter. Further downwarping, solution of limestone bedrock, and rising of sea-level, the subsiding basins were aggraded by Old Alluvium. The disposition of the basins, on a relatively flat terrain adjacent to the towering Gunung Berentin in which the host rocks of gold occur, provides the necessary topographic contrast which is essential for the separation and deposition of gold, other heavy minerals, and gravels and cobbles from the stream load. The gravel-cobble layer of the Old Alluvium contains pay streaks of gold. The Young Alluvium has only traces of gold.

**FORMATION OF PULAU BATU HAIRAN AND OTHER ISLANDS
AROUND PULAU BANGGI, NORTHERN SABAH**

DAVID LEE
Geological Survey Malaysia
Kota Kinabalu
Sabah

An island 100 m in diameter, emerged from the sea east of Pulau Banggi in northern Sabah on the 6th May 1988. The appearance was accompanied by rumbling sounds but there were no outbursts of natural gas or water. The material forming the island consists of grey mud, grey and red mudstone, blocks of sandstone, igneous rocks and life corals. The rock fragments are similar to those of the Chert-Spilite, Kudat and Crocker Formations. Radial fractures are the prominent features on the dome-shaped island.

Diapiric action was the likely mechanism for the formation of the island. Many of the more than forty small islands on the east and southeast of Pulau Banggi were probably also similarly formed along major fracture zones of shallow depths.

**PERSATUAN GEOLOGI MALAYSIA
Geological Society of Malaysia**

JABATAN PENYIASATAN KAJIBUMI MALAYSIA
Geological Survey Malaysia

**PERSIDANGAN TAHUNAN GEOLOGI '89
Annual Geological Conference '89**

Merlin Inn Resort
Cameron Highlands
14th-15th January 1989

CERAMAH TEKNIK (TECHNICAL TALKS)

Elio Poggiagliolmi: An integrated approach to reservoir petrophysical parameters evaluation

Laporan (Report)

Dr. Poggiagliolmi of Entec Energy Consultants Ltd., gave the above talk on the 25 January 1989 at the Geology Department, University of Malaya. It proved to be a very interesting and informative talk to the 20 odd members who were present.

Abstrak (Abstract)

Petrophysical parameters, such as porosity, mineralogy and type of pore fluid, required for reservoir characterisation, are normally derived from well logs, well test and core data. These measurements can be very accurate in the depth direction, but their lateral penetration is very shallow. Consequently, extrapolation away from the borehole presents considerable problems even under the assumption of lithostratigraphic continuity.

Surface seismic measurement (seismics) on the other hand have inherently low vertical resolution but are laterally continuous. Provided that seismics are properly integrated with well bore information, reservoir petrophysical parameters such as porosity and mineralogy can be mapped away from the well bore. Moreover, for certain lithological conditions, the fluid type in the pores and permeability of the reservoir rock can be inferred from calibrated seismics. This calibration must be statistically consistent and must take into account the errors inherent within both the borehole data and the seismics.

In this presentation the relationship between seismics and petrophysical properties will be addressed. Furthermore, it will be demonstrated how such relationships can be used to obtain quantitative volumetric information on the reservoir porosity and mineralogy.

A number of case histories showing the application of this approach to obtain volumetric maps, including net oil and gas-in-place, will be discussed.



Elio Poggiagliolmi posing with members at tea.

Ismail Mohd. Noor: Development and sediment load - A case of Langat Basin

Laporan (Report)

Assoc. Prof. Ismail Mohd. Noor of Universiti Kebangsaan Malaysia gave the above talk on the 24 February 1989 at the Department of Geology, University of Malaya. The talk was attended by about 15 people.

Abstract

This talk focuses on the problem of hydrological changes in the Langat Basin with respect to the development of Kajang-Bangi area. It is a preliminary assessment. Physical development of the Langat Basin has resulted in the increase of the sediment load of the Langat River. The intensification of development started in 1975 when the Universiti Kebangsaan Malaysia main campus began its initial phase of construction followed by the development of New Bangi Town. The increase in the sediment load of the river is related to the phases and the tempo of the development of the area. The yearly increase or decrease of the sediment load has been detected by plotting the river discharge against sediment load of the river for a specified month of the year. The values of the slope of the graphs were plotted against time and by using the method of moving averages the background noise of the resulting graph was filtered off. The final graph shows a distinct pattern of sediment concentration changes with time in relation to the development of the Kajang-Bangi area.

Development of Bandar Baru Bangi has resulted in the deterioration of the quality of the environment of the area and caused changes in the hydrological process of the Langat River.



ISMAIL MOHD. NOOR

BERITA - BERITA PERSATUAN
(NEWS OF THE SOCIETY)

GEOSEA V PROCEEDINGS VOLUME II

The long overdue second volume of the GEOSEA V Proceedings should be available around the time of the Society's AGM 1989.

Two volumes of about 500 pages each were envisaged for the GEOSEA V Proceedings but due to the overwhelming support and very extensive contents of some of the later papers, Volume I recorded 652 pages while Volume II finally totalled 881 pages.

Due to the large sum of money spent on such voluminous publications, the Council decided to charge members a token sum of M\$50.00 only for the 2 volumes (totalling 1533 pages). On checking the orders received so far it is most unenviable to report that only 52 orders out of 328 have been received from local members and the majority are orders from overseas, companies, organisations and libraries.

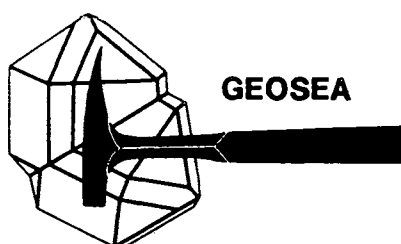
The Editors appreciate the help of the proof readers (especially Lili Sulastri) and others who have helped in one way or another. The Council and members are thanked for their understanding and patience.

G.H. Teh

**FIFTH REGIONAL CONGRESS ON
GEOLOGY, MINERAL AND ENERGY RESOURCES
OF SOUTHEAST ASIA**

GEOSEA V PROCEEDINGS

VOLUME II



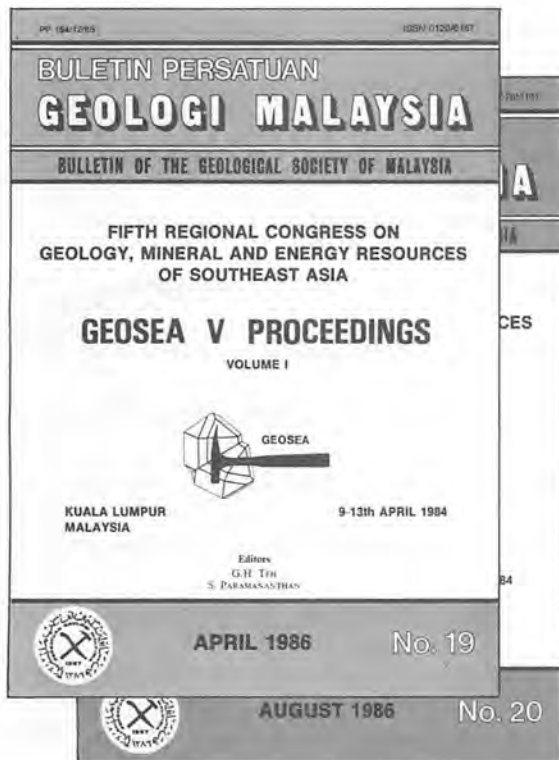
**KUALA LUMPUR
MALAYSIA**

9-13th APRIL 1984

GEOLOGICAL SOCIETY OF MALAYSIA

GEOSEA V PROCEEDINGS

VOLUMES I & II
(Bulletin Geological Society of Malaysia Nos. 19 & 20)



Some of the articles appearing include:-

Massive sulphide deposits and their possible significance to other ores — R.W. Hutchinson; Palaeogeographic development of west Sarawak — Denis N.K. Tan; Geological evolution of the Southern Philippines — C.K. Burton; Southeast Asia as a part of an early Palaeozoic Australian Gondwanaland — C. Burrett & B. Sturt; Tertiary basins of S.E. Asia — their disparate tectonic origins and eastward stratigraphical similarities — C.S. Hutchison; Late Palaeozoic palaeogeography of Southeast Asia: some stratigraphical, palaeontological and palaeomagnetic constraints — I. Metcalfe; The REE geochemistry of Lingshan W-Sn-bearing granites and their applications to petrogenesis of the granites — Yuan Zhongxiong *et al.*; Chromite deposits of Papua New Guinea — P.M. Afonyu; Recent advances in exploration modelling for tin deposits and their application to the SE Asian environment — R.G. Taylor & P.J. Pollard; Some thoughts on the development of the alluvial tinfields of the Malay-Thai Peninsula — D. Taylor; Base metal exploration in Sabah — David T.C. Lee & H.S. Weber; The nature and potential of gold mineralisation in Kelantan — L.H. Chu & D. Santokh Singh; Quaternary deposits of Thailand — P. Dheeradiok & W. Kaewyana; Soil landscapes in Peninsular Malaysia — S. Paramanathan & S. Zaayah; Aspects of the geochemistry of Malaysian cassiterites — W. Fuad Hassan; Geological evolution of the Indonesian Archipelago — H.M.S. Hartono & S. Tjokrosapoetro; The nature, distribution and genesis of certain authigenic minerals in the stanniferous alluvial deposits of S.E. Asia — K.F.G. Hosking; Global tectonics and resources — W.S. Fyfe; Tin/tungsten-bearing granites in S. China and their metallogenic relations — Xu Keqin & Zhu Jinchu; Hydrogeological activities in Peninsular Malaysia and Sarawak — F.S. Chong & Denis N.K. Tan; Status of uranium exploration in Peninsular Malaysia — L.H. Chu & F. Chand; Directions of geologic transport in Peninsular Malaysia — H.D. Tjia; Cathaysia, Gondwanaland and the Palaeotethys in the evolution of Continental S.E. Asia — Y.G. Gatsinsky & C.S. Hutchison; Marginal sea formation by rifting of the Chinese and Australian Continental Margins and implications for Borneo — C.S. Hutchison; Mesozoic and Cenozoic regional tectonics and metallogenesis in Mainland S.E. Asia — A.H.G. Mitchell; Coal potential and exploration in Sarawak — S.P. Chen; The succession of vertebrate faunas in the continental Mesozoic of Thailand — E. Buffetant & R. Ingavat; Regional controls of hydrothermal ore localization in northern Thailand — P. Asnachinda & S. Chantaramee; Late Palaeozoic glacial marine facies in S.E. Asia and its implications — P.H. Stauffer & C.P. Lee; Cretaceous melange in West Kalimantan and its tectonic implications — P.R. Williams *et al.*; Recent advances in the knowledge of geology, mineral and energy resources of Singapore since 1981 — Ansafor Rahman & P.P. Wong; The integration of remote sensing, terrain evaluation and engineering geology in Southeast Asia — Besumont, T.E. & Hunt, T.; Recent advances in the knowledge of geology and mineral resources of Vietnam since 1981 — Le Thai Xinh & Nguyen Xuan An.

This 2-volume GEOSEA V PROCEEDINGS of about 500 pages each contains 95 articles presented at the Fifth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia held in Kuala Lumpur, April 1984.

To: Hon. Assist. Secretary
Geological Society of Malaysia,
c/o Department of Geology,
University of Malaya,
59100 Kuala Lumpur, MALAYSIA.

Date:

Order for GEOSEA V PROCEEDINGS

I wish to place an order for set(s) of the GEOSEA V PROCEEDINGS which will be in 2 volumes of about 500 pages each. Volume I will be available in April/May 1986 and Volume II in July/August 1986.

Both Volumes	Price
Members	M\$50.00 (US\$21.90)
Non-members	M\$125.00 (US\$53.20)

Name/Company/Institution

Address

Enclosed cheque/money order/bank draft for M\$/US\$

Prices include surface mail. For airmail please call 03-7577036 or telex UNIMAL MA37453.

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

1. Mazman Abu Bakar, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
2. Lili Sulastri Zainal Abidin, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
3. Sunny Aaron Amarpal Singh, Intergraph Systems, 302 Orchard Road, #04-01 Tong Building, Singapore 0923.
4. Zulkipli Che Kasim, Geological Survey Malaysia, P.O. Box 1015, 30820 Ipoh, Perak.
5. Uzaymee Mohd. Yusof, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
6. Mohd. Faisal Abdullah, Geological Survey Malaysia, P.O. Box 560, 93712 Kuching, Sarawak.
7. David T.C. Lee, Geological Survey Malaysia, Locked Bag 2042, 88999 Kota Kinabalu, Sabah.
8. Mahather Abdullah, Petronas Carigali, P.O. Box 12407, 50776 Kuala Lumpur.
9. John C. van Wagner, Amoco, 435 Orchard Road, 12-03, Wisma Atria, Singapore 0923.
10. Askury Abd. Kadir, Geological Survey Malaysia, P.O. Box 1015, 30820 Ipoh, Perak.
11. Joanes Muda, Geological Survey Malaysia, Locked Bag 2042, 88999 Kota Kinabalu, Sabah.
12. Ab. Nizar Embi, Geological Survey Malaysia, P.O. Box 11110, 50736 Kuala Lumpur.
13. Wong Ting Woon, Geological Survey Malaysia, P.O. Box 1015, 30820 Ipoh, Perak.
14. Zainol Hj. Hussin, Pej. Kajibumi, Jalan Putra, Alor Setar, Kedah.
15. Abdul Rahman Mohd. Yusoff, Pej. Kajibumi, Wisma Persekutuan, 20200 Kuala Terengganu, Terengganu.

Student Members

1. Badrul Hashim Ibrahim, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
2. Norazlam Norbi, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
3. Zainudin Hashim, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
4. Shamsul Shaari, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
5. Mahat Isa, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
6. Teng Mee Kee, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
7. Tan Han Meng, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
8. Wong Vui Chung, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
9. Abdul Mutalip Yassin, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
10. Jaithish John, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
11. Lim Kin Leong, K3J-409, Komsis AII, 43600 Universiti Kebangsaan Malaysia, Bangi.
12. Sidibe Yaya Tiemoko, Jabatan Geologi, Universiti Kebangsaan Malaysia, 43600 Bangi.

13. Asiah Mohd. Salih, c/o IPT, Universiti Malaya, 59100 Kuala Lumpur.
14. Abdul Mubin Hj. Abdul Rahim, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
15. Fatimah Mokhtar, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
16. Mohd. Raji Mat Yaacob, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
17. Bakhtiar Azam Md. Khalid, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
18. Devanan Velayutham, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
19. Anne Gostelow, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
20. Mohd. Tajudin Abdul Ghani, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
21. Sia Say Gee, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
22. Ab. Basir Ali, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.

Institutional Member

1. Conoco Indonesia Inc., P.O. Box 367, Jakarta 10002, Indonesia.
Attn: Mr. John D.E. Hughes.

PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following members have informed the Society of their new addresses:

1. Abd. Rashid B. Abd. Rahman, Library, International Islamic University, Jalan Universiti, 46400 Petaling Jaya, Selangor D. Ehsan.
2. Wan Zurusdi B. Wan Muhammad, Batu 21, Jalan Kuala Berang Ajil, Hulu Terengganu, P.O. Box 159, 20710 Kuala Terengganu, Terengganu.
3. Rudy A. Vooy, c/o Dominion Mining Ltd., P.O. Box 37321, Winnellie NT 5789, Australia.
4. Husein Bin Aman, Woodside Offshore Pet. Pty. Ltd., No. 1 Adelaide Terrace, Perth, Western Australia 6000.
5. Kho Chin Heng, No. 145, Green Road, Off Cloud Estate, 91350 Kuching, Sarawak.
6. M.C. Friederich, A3, Charoon Court, 428/5 Paholyothin Rd., SO1 10, Phayathai, Bangkok 10400, Thailand.
7. Malaysia Baram Oil Development Co. Ltd. (Japan), Box No. 14, Lot 7.02A, Wisma Equity, No. 150 Jalan Ampang, 50450 Kuala Lumpur.
8. Jagroop Singh, 22486, Indian Settlement, 31000 Batu Gajah, Perak.
9. Elf Aquitaine Malaysia, 19th Floor Wisma Sime Darby, Jalan Raja Laut, 50350 Kuala Lumpur.
10. S. Senathi Rajah, Kompleks Raja Perempuan, 326A Jalan Hospital Universiti, Kubang Kerian, 16150 Kota Bharu, Kelantan.
11. Lee Fook Weng, 55-A Jalan Perang, Taman Pelangi, 80400 Johor Bahru.
12. Nik Ramli Nik Hassan, No. 27, Lorong Burharuddin Helmi 7, Taman Tun Dr. Ismail, 60000 Kuala Lumpur.

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The Society has received the following publications:

1. U.S. Geological Survey Bulletin, 1987: 1727-A.
2. U.S. Geological Survey Bulletin, 1988: 1594, 1720-B, 1685, 1590-F, 1738-B, 1591, 1742-A, 1751-C, 1671, 1746-B, 1763, 1833, 1758, 1771, 1850, 1744-A, 1625, 1718-B, 1829, 1576, 1683-A, 1701-C, 1702-A, 1773, 1766, 1677, 1724-D, 1741-B, 1743-A, 1746-D, 1715-C, 1840, 1570, 1777, 1800, 1714-B, 1787-D, 1795, 1828, 1836, 1718-C, 1735-D, 1711-E, 1603, 1719-H, 1707-E, 1746-C, 1767, 1710-D, 1686, 1855 (vols I & II), 1676, 1756-C, 1756-B, 1736-C, 1722-D, 1740-E, 1738-C, 1747-A, 1740-C, 1675, 1718-D, 1739-A.
3. U.S. Geological Survey Professional Paper, 1987: 1444.
4. U.S. Geological Survey Professional Paper, 1988: 1400-A, 1448, 1400-E, 1403-A, 1386-B, 1351, 1330, 1402-A, 1446, 1398, 1228-D, 1481.
5. U.S. Geological Survey Circular, 1988: 996, 997, 1016, 1017, 1004, 1018.
6. Institution of Mining & Metallurgy, Bulletin no. 982, 1988.
7. AAPG Explorer, Sep, Oct & Dec 1988.
8. Episodes, vol. 11, no. 3 & no. 4, 1988.
9. Bulletin of Science & Technology Malaysia, vol. 7, no. 1, 1988.
10. The National Gazetteer of the United States of America, Indiana 1988.
11. Seatrad Bulletin, vol. IX, nos. 3 & 4, 1988.
12. IMM Bulletin no. 983, 984 & 985, 1988.
13. IMM Transactions, vol. 97 (Section A), Oct. 1988.
14. Commonwealth Science Council, Sept-Oct & Nov-Dec 1988.
15. Geophysical Research Bulletin, vol. 26, no. 3, 1988.
16. Bulletin of the Geological Research & Development Centre, no. 11, 1985 & no. 12, 1986.
17. Chronique de la recherche miniere, nos. 492 & 493, 1988.
18. International seminar super-deep continental drilling & deep geophysical research, Aug. 23-29, 1988, yaroslavli abstracts.
19. The fuming process & its application to complex tin ores in Southeast Asia by Jorge Campuzano V and others, 1988.
20. Pulp density measurement at gravel pump mines on Belitung Island by Vichit Boonrasri, 1988.
21. Geological Society of Korea, vol. 22, nos 1-4, 1986; and vol. 23, nos. 1-4, 1987.
22. Southeast Asia Tin Research & Development Centre, Annual Report 1987.
23. The University of Kansas, Palaeontological contributions, Paper 120, 1988.
24. Bulletin of the National Science Museum, vol. 14, no. 3 & no. 4, 1988.
25. Late Miocene floras in Northeast Honshu, Japan, by Kazuhiko Uemura, 1988.
26. Acta Micropalaeontologica Sinica, vol. 5, nos. 2 & 3, 1988.
27. Journal of stratigraphy, vol. 12, no. 2, 1988.
28. Acta Palaeontologica Sinica, vol. 27, nos. 3, 4 & 5, 1988.
29. Earthquakes & Volcanoes, vol. 19, nos 5 & 6, 1987 & vol. 20, no. 1, 1988.
30. SOPAC News, vol. 6, no. 2, 1988.
31. Proceedings of the Geological Society of China, vol. 31, nos. 1 & 2, 1988.
32. Memoir of the Geological Society of China, no. 9, 1987.
33. Annual Report - Chinese Academy of Geological Sciences 1985 & 1986.
34. Coalfields of India edited by C.S. Raja Rao, 1987.
35. Bulletin, Expl-Prod. Elf-Aquitaine, vol. 12, no. 2, 1988.
36. Oklahoma Geology Notes, vol. 48, nos. 4-6, 1988.

B E R I T A - B E R I T A L A I N
(O T H E R N E W S)

INVITATION TO MEMBERSHIP IN THE NEW IGCP PROJECT No. 276
("PALEOZOIC GEODYNAMIC DOMAINS AND THEIR ALPIDIC EVOLUTION
IN THE TETHYS")

Duration: 1988-1992

Aims of project

This project aims to study the Paleozoic sequences within the Tethyan Belt from a geodynamic viewpoint and to establish their evolution during the Mesozoic and Cenozoic by tracing Paleozoic trends beneath the Alpidic trends and readjusting them to their Pre-Tethyan configuration. Comparison of the plate movements during the Paleozoic with those during the Mesozoic has to be carried out to understand the outline of the ancient continental margins and the accretion of continental blocks. Knowledge of Tethyan Paleozoic development and the effects of the Alpine processes may contribute towards the understanding of the genesis and distribution of economic mineral deposits. Research groups working on paleomagnetic and palinspastic studies of the Tethyan belt are active in many countries involved in the project, which covers a wide geographic area from the Mediterranean region up to Indian subcontinent. The first formal meeting of the project with associated field trips is projected to take place in 1988 in Athens. It is recommended that the leaders of project 276 contact the leader of project 270 to ensure as much interaction as possible.

For further information:

Prof. Dr. D. Papanikolaou,
Department of Geology,
University of Athens,
Panepistimiopoli Zografou,
ATHENS 157 84, GREECE.



CORE LABORATORIES

Due to growth within the company we are pleased to announce that Core Laboratories Malaysia Sdn Bhd has the following positions open :-

1. Senior Geologist

Minimum two years experience in Sedimentary Petrology with preferably a M. Sc. in Sedimentology/Sedimentary Petrology.

2. a. Calcareous Nannofossil Specialist

b. Micropaleontologist

c. Palynologist

Experience with Neogene floras/faunas required.

3. Geochemical Laboratory Supervisor

Requires 1 - 2 years supervisory experience with background in Gas Chromatography.

4. General Technicians for sample preparation in Micropaleontology and Geochemistry.

5. Petroleum Chemist

The incumbent will eventually be responsible for assisting the Laboratory Manager in the running of the Laboratory, analysis of crude oils, petroleum products and other analytical chemistry related analyses, liaising with clients, preparation of reports and on-site chemistry projects.

Requirements:

- Degree in Chemistry or equivalent recognised by the Malaysian Institute of Chemistry.
- 3 years' relevant working experience.
- Ability to work independently and at irregular hours where necessary.
- Prepared to travel within Asia at short notice if required.

Remuneration will commensurate with qualifications and experience. Interested candidates are invited to write, with full particulars, attaching current resume, a passport size photo, contact number, current and expected salary to:-

CORE LABORATORIES MALAYSIA SDN BHD
LOT 10B JALAN 51A/223
46100 PETALING JAYA
ATTENTION : DR TON ROMEIN

INTERNATIONAL GEOLOGICAL CORRELATION PROGRAMME
APPLICATION FORM / FORMULAIRE D'ADHESION
for
IGCP PROJECT 274
"Coastal evolution in the Quaternary"

At the inaugural meeting in Amsterdam, 22 September 1988 it was agreed that two primary objectives of the Project be:

- (i) to document coastal evolution of various regional types leading to a better understanding of interactive forces and products responsible for past, present and future changes to coasts of the world; and
- (ii) to promote specific thematic studies which are necessary to solve problems of coastal change affecting human occupation of the coastal zone.

If you wish to take part in and contribute to Project 274 please complete and sign this form*. As the requested information will be entered into a computerized database and circulated widely you are urged to use a typewriter or write in block capitals in black ink. Once completed, please send the form to: Dr. O. van de Plassche, Institute of Earth Sciences, Free University, P.O. Box 7161, 1007 MC AMSTERDAM, the Netherlands.

1. Title, initial(s), family name:
First and/or second name:
Position:

2. Address (please be complete):

3. tel.:
telex:
telefax:
bitnet:

4. Subject of my research pertinent to the aims of Project 274 (short title):
Regional:
Thematic:

p.t.o.

5. Keywords (for use in a database index):

a) Geographical areas of investigation	b) Techniques or methods used	c) Timescale(s) of study
--	-------------------------------	--------------------------

6. Are you aware of the name of your National Representative or National Correspondent for Project 274? Yes [], No []

Declaration: I am willing for this information to be stored in the IGCP Project 274 database, and for this information to be used in any Directory or address list produced from the database. I agree to inform my National Representative or Correspondent and the international leader of IGCP 274 of any results of my activities which may be of interest to other participants in the project.

Signature :

Date :

* If you know of other persons who might or would like to participate in the activities of the Project, please photocopy the form prior to completion.

4. (continued)

Objective(s) of my research (brief explanation):

7. Suggestions, remarks

Publications

The IGCP Executive Board strongly recommends that contributions to the Project (papers, reports, guides, special issues, books, maps) are distinguished by a clearly visible IGCP emblem. Please, acknowledge it to be a contribution to IGCP Project 274.

The IGCP Secretariat requires 2 copies of each of your contributions. Please send these via the Project Leader (name and address in the introduction to this form). After bibliographic processing these will be mailed to the IGCP Secretariat.

THIRD INTERNATIONAL ARCHAEOAN SYMPOSIUM

The University of Western Australia, Perth.
17-21 September, 1990.

Symposium programme

The papers and posters will be arranged in a single sequence of sessions which will be grouped into major topics covering different aspects of the Archaean. This programme was decided in consultation with active Archaean research workers around the world. Review papers will introduce and link sessions, highlight progress in relevant Archaean research over the past decade, and will identify major unresolved problems.

The Symposium will emphasise current knowledge of Archaean mineralisation, magmatism, volcanism, sedimentation and metamorphism, and will also focus on the evolution of the Archaean atmosphere, hydrosphere and biosphere. This will provide a basis for improved understanding of the nature and relationships between Archaean geodynamics, tectonics, crust-lithosphere evolution and metallogeny.

Sessions

Major topics to be covered are:

1. Models for the early Earth (in a joint session with the Meteoritical Society Conference).
2. The nature and distribution of Archaean terrains.
3. Archaean magmatism, volcanism and metamorphism.
4. Archaean sedimentation.
5. Archaean atmosphere and hydrosphere.
6. Evolution of life in the Archaean.
7. Archaean mineralisation
8. Geodynamics, tectonics, crust-lithosphere evolution and metallogeny.
9. The end of the Archaean.

Oran and poster presentations

Contributed papers on any of the above topics relevant to understanding the Archaean are invited. Such papers must be original contributions to science which include data or ideas that have not been published elsewhere.

Poster displays will be an important component of the Symposium, and time will be programmed for brief presentations by persons contributing poster, core or map displays. All displays will be open for inspection throughout the Symposium week.

Contributions

Authors wishing to present papers or posters should return the Notice of Interest incorporated in this Circular as soon as possible.

No contribution can be considered unless a descriptive abstract, no longer than 500 words, has been received before 31 December, 1989. Authors should nominate whether they prefer an oral or poster presentation and in which session they prefer their contribution to be placed.

Acceptances will be advised in March, 1990, together with instructions for the preparation of an extended abstract for publication before the Symposium.

Excursions

(a) Pre-conference

No. 1. NARRYER GNEISS COMPLEX

To examine geology of the 3.7-3.3 Ga granites, gneisses and meta-sedimentary rocks including the localities of 4.3-4.1 Ga detrital zircons at Mt. Narryer and in the Jack Hills.

No. 2. MURCHISON GRANITE-GREENSTONE TERRAIN

To examine the regional geology and gold deposits of 3.0-2.5 Ga terrain.

No. 3. EASTERN GOLDFIELDS MINERAL DEPOSITS

To examine the gold and nicket deposits in the Kalgoorlie-Kambalda region.

(b) Post-conference

No. 4. TOODYAY-CHITTERING

To examine the high-grade metamorphic rocks of the western Yilgarn.

No. 5. PILBARA AND HAMERSLEY BASIN

To examine the regional geology and mineral deposits ranging from 3.6-3.0 Ga granite-greenstone terrain to a little-deformed cover of 2.7 Ga Fortescue Volcanics and 2.5 Ga Hamersley Iron Formation.

No. 6. KALGOORLIE GRANITE-GREENSTONE TERRAIN

To examine the stratigraphy, structure and regional setting of gold and base-metal deposits in 2.8-2.5 Ga. rocks.

No. 7. SOUTH-WEST YILGARN

To examine gneiss complexes, granite-greenstone terrain, shear zones and tin-tantalite-bearing pegmatite.

Costs.

The symposium enrolment fee is estimated to be about \$300 and will include Symposium Volume, Abstracts Volume, welcoming function, morning and afternoon teas/coffee, lunches and Symposium Dinner, bus for hotel participants, etc.

EARTH SCIENCE STUDY AND TRAINING OPPORTUNITIES

Since the 1940s more than 4,000 international Earth scientists have participated in training, research, and study at the U.S. Geological Survey (USGS) or in programs arranged at other institutions in the United States. The USGS efforts in these programs attest to its high regard for study and training in Earth-science disciplines as a means to strengthen and develop counterpart institutions in other countries. The following summaries describe opportunities at the USGS currently available to international Earth scientists and colleagues in related fields.

For details about the programs described in this publication, please mark the appropriate box and provide a mailing address to which further information may be sent.

- International Remote-Sensing Workshop
- Advanced Remote Sensing
- Mineral-Resource Assessment Workshop
- Techniques of Hydrologic Investigations
- Postgraduate Study at USGS - Geology
- Postgraduate Study at USGS - Hydrology

Mail to: U.S. Geological Survey,
917 National Center,
Training Section,
Reston, VA 22092,
U.S.A.

Telex No. 248418

Tel. No. (703) 648-6064; 6065; or 6047

International remote-sensing workshop

The EROS Data Center offers a 5-week workshop annually during September. The workshop is intended for non-U.S. natural scientists, engineers, resource managers, and land use planners.

Participants in the course will learn the characteristics and applications of a variety of remote-sensing systems, and will be provided experience in interpreting remotely sensed data for a wide variety of uses such as resource assessment, inventory, management, or land-use planning. The analysis of satellite data is emphasized although study does include the interpretation of aerial photographs. The workshop concentrates on the practical applications of remotely sensed data, including both manual and digital image analysis. Instruction consists of a combination of classroom lectures, hands-on exercises, homework, and fieldwork, all of which draw on the Data Center's years of international leadership in research, use, and distribution of Landsat and other remotely sensed data.

Tentative Workshop Schedule;

- First Week: Review of fundamentals of remote sensing, image formation, satellite sensor and camera systems, and image analysis and interpretation.
- Second Week: Application of remote sensing to various science disciplines.
- Third Week: Field trip to sites studied in first and second weeks.
- Fourth Week: Introduction to uses of digital image analysis and enhancement, environmental data base preparation, and Geographic Information Systems (GIS).
- Fifth Week: Hands-on exercises using digital processing equipment.

Advanced remote sensing for international geoscientists

The USGS and the Colorado School of Mines (CSM) are presenting a training course in advanced techniques in remote sensing. The course is intended for scientists and engineers who are active in remote-sensing applications or research, and who wish to gain additional working exposure to techniques used by USGA personnel. This is not an introductory course, but an advanced-level, intensive course in current techniques and future directions.

This 3-week course, presented in July, will include instruction in the following:

- Techniques - Digital-image processing, spectral properties and spectral analysis of geologic materials, lineament analysis, alteration mapping.
- Mineral-Resource Assessments - Remote sensing in multidisciplinary mineral-resource studies, case study of multidisciplinary mineral-resource assessment in Southern California, exercise in use of remote sensing in mineral-resource assessment of the Southern Colorado Front Range.
- Current and Future Directions - Remote-sensing-image spectrometry, thermal infrared remote sensing, geophysical data bases.

Mineral-resource assessments workshop

The USGS is presenting a workshop in October 1989, to address mineral-resource assessment needs of the international community. The workshop will concentrate on the assessment of undiscovered resources from regional-scale data. Studies will range from small-scale assessments of millions of square miles to large-scale assessments in regions of a few tens or hundreds of square miles.

The following will be considered:

- Problems involved with assessments of undiscovered resources.
- How an assessment should be constructed by identifying the questions intended to be answered.

- Review of questions that proposed methods can answer.
- Concept of disaggregating the resource assessment in order that an assessment can respond to changing questions.

Participants who successfully complete the workshop will have the expertise to answer the following questions:

- What is a mineral-resource assessment?
- What can it be used for?
- What information should it contain?
- How can one use this knowledge to assess resources?

Techniques of hydrologic investigations for international participants

The USGS offers an 8-week course in hydrologic data collection and interpretation to prepare participants to evaluate the water resources of an area or region. Data-collection techniques include field practice in measuring and recording data and office procedures for data processing and analysis. Interpretive techniques include graphical, analytical, and computer methods of analyzing data to achieve an interdisciplinary study of water resources within a basin or area.

Nominees are limited to practicing hydrologists or water-resources engineers with direct responsibilities for planning and performing hydrologic investigations. The course is presented annually from mid-June to mid-August.

Postgraduate study at USGS

Postgraduate, on-the-job training provides an opportunity to learn the most up-to-date geoscience methods. International participants work with the USGS hydrologists, geologists, geochemists, geophysicists, and other scientists, to learn current technologies and theories. Participants are expected to be contributing members of the science team, thereby utilizing and reinforcing newly acquired skills and theoretical methods. The objective of this program is to help scientists from overseas become better qualified to assist their countries in establishing or improving their own Earth-science programs. Possible follow-ups are assistance programs comprised of international teams of scientists cooperating in the collection and interpretation of data, report writing, data exchange, and mutual pursuit of research interests.

These program opportunities are designed for the international community of scientists working in Earth-science applications and research, as well as executives in decision-making and policy-formulation positions involving the geoscience disciplines.

Discipline topics for which practical training can be arranged:

Geologic Division - petroleum geology, sedimentary processes, coal geology, paleontology and stratigraphy, resource analysis, geochemistry, geophysics, seismology and geomagnetism, geologic risk assessment, and igneous and geothermal processes.

Water Resources Division - hydrologic studies including assessment of quantity and quality of surface and ground water, data analysis, and interpretive techniques.

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

1989

September - 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.

September - October, 1989

REMOTE SENSING AND DIGITAL IMAGE ANALYSIS (Sioux Falls, South Dakota, U.S.A.). U.S. Geological Survey training course for non-U.S. natural scientists on manual interpretation and digital analysis of remotely sensed data. For Information: Training Section, Office of International Geology, U.S. Geological Survey, 917 National Center, Reston, VA 20092, U.S.A.

September 1989 - July 1990

PETROLEUM EXPLORATION GEOLOGY (Headington, Oxford, U.K.). 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, Dept. of Geology and Physical Sciences, Oxford Polytechnic, Headington, Oxford OX3 0BP, U.K.

September 1989 - August 1990

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

October 1989 - August 1990

HYDROLOGY AND HYDROGEOLOGY (Belgium). Language: French. For Information: Professeur Dr. ir. A. Monjoie, Directeur des Laboratoires de Géologie de l'Ingénieur, d'Hydrogéologie et de Prospection géophysique - Batiment B19, Faculté des Sciences Appliquées, Université de Liège - SART TIILMAN, B-4000 Liege, Belgium.

October 1989 - July 1990

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 1989 - September 1991

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.

November 1989 - December 1989

REMOTE SENSING APPLICATIONS FOR EARTH SCIENCES (Enschede, The Netherlands). Annual short course organized by International Institute for Aerospace Survey and Earth Sciences (ITC), with Unesco. Language: English. For Information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

1990

January - July, 1990

GENERAL AND APPLIED HYDROLOGY (Madrid, Spain). An annual, 6-month course sponsored by Unesco. Language: Spanish. For Information: Centro de Estudios y Experimentacion de Obras Publicas y Urbanismo, Alfonso XII, Num. 3, Madrid 7, Spain.

January - July, 1990

GROUNDWATER HYDROLOGY (Barcelona, Spain). An annual 6-month, post-graduate course sponsored by Unesco. Language: Spanish. For Information: Curso Internacional de Hidrologia Subterranea, Calle Beethoven, 15, 3^o, 08021 Barcelona, Spain.

February 1990

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 - March 1990

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

February - July, 1990

HYDROLOGY (Budapest, Hungary). An annual six-month, post-graduate course organized by the Research Centre for Water Resources Development (Budapest) and sponsored by Unesco. Language: English. For Information: VITUKI International Post-Graduate Course on Hydrology, 11-1453 Budapest, Pf. 227 Hungary.

February - August, 1990

HYDROLOGY (Padova, Italy). An annual, 6-month, postgraduate course sponsored by Unesco. Language: English. For Information: Professor A. Ghetti, Centro Internazionale di Idrologia "Dino Tonini," via sette Chiese, 35043 Monselice, Italy.

February - November, 1990

PHOTOINTERPRETATION APPLIED TO GEOLOGY AND GEOTECHNICS (Bogota, Colombia). Forty-week course organized by the Government of Colombia, the Interamerican Centre of Photointerpretation (CIAF), International Institute for Aerial Survey and Earth Sciences (The Netherlands) and Unesco. Language: Spanish. For Information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

March - April, 1990

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. K.D. Khan, Ecole des Mines, 35 rue St. Honoré, 77305 Fontainebleau Cedex, France.

March - November, 1990

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.

June - August, 1990.

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

July - August, 1990

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: Departamento de Geologia y Geoquímica, Facultad de Ciencias, Universidad Autonoma de Madrid, Canto Blanco, Madrid 34, Spain.

October 1990 - September 1992

GEOLOGICAL EXPLORATION METHODS (Nottingham, U.K.). Two-year MSc 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.

December 1990 - January 1991

METHODS AND TECHNIQUES IN EXPLORATION GEOPHYSICS (Hyderabad, India). Diploma course organized every second year by the National Geophysical Research Institute of the Council of Scientific and Industrial Research, Hyderabad, India, and sponsored by Unesco. Language: English. For Information: The Director, International Training Course on Methods and Techniques in Geophysical Exploration, National Geophysical Research Institute, Hyderabad, 500 007 (A.P.) India.

1991

February - March, 1991

STRUCTURAL GEOLOGY (Dehra Dun, India). A six weeks training course organized every second year by the Wadia Institute of Himalayan Geology, sponsored by the Government of India and Unesco. Language: English. For Information: The Organizer of the Regional Training Course in Structural Geology, Wadia Institute of Himalayan Geology, 33 General Mahadev Singh Road, Dehra Dun 24 8001, India.

May - November 1991

GENERAL HYDROLOGY with emphasis on groundwater (Buenos Aires, Argentina). A six-month post-graduate diploma course organized every other year and sponsored by Unesco. Language: Spanish. For Information: Comité Nacional para el Programa Hidrológico Internacional de la Republica Argentina, Av. 9 de Julio 1925 - 15^o piso, 1332 Buenos Aires, Argentina.

August - October, 1991

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, Malostranské nám. 19, 11821 Prague 1, Czechoslovakia.

KALENDAR (CALENDAR)

1989

August 1-3, 1989

PLATINUM (5th International Symposium), Espoo, Finland. Co-sponsored by IAGOD. (Prof. H. Papunen, Department of Geology, University of Turku, SF-20500 Turku, Finland).

August 3-12, 1989

WATER-ROCK INTERACTION (6th IAGC International Symposium), Malvern, England. (Dr. W.M. Edmunds, British Geological Survey, Wallingford, Oxon OX10 8BB, U.K.).

August 13-18, 1989

SOIL MECHANICS AND FOUNDATION ENGINEERING (12th International Conference), Rio de Janeiro, Brazil. (Organizing Committee, XII ICSMFE, Caixa Postal 1559, 2000 Rio de Janeiro, RJ, Brazil).

August 14-17, 1989

PRECAMBRIAN GRANITOIDS: Petrogenesis, Geochemistry, and Metallogeny (IGCP-217 and IGCP-247 Symposium), Helsinki, Finland. (Precambrian Granitoids Symposium, Department of Geology, University of Helsinki, P.O. Box 115, SF-00171 Helsinki, Finland).

August 14-29, 1989

SPELEOLOGY (10th International Congress), Budapest, Hungary. (10th International Congress of Speleology, c/o Magyar Karszt -'es Barlangkutatas Tarsulat, Anker köz 1, H-1061 Budapest, Hungary).

August 22-25, 1989

CLASTIC TIDAL DEPOSITS (2nd International Research Symposium), Calgary, Alberta, Canada. (Ray Rahmani, Canadian Hunter Exploration Ltd., 435 - 4th Avenue SW, Calgary, Alberta, Canada T2P 3A8).

August 28-31, 1989

ROCK AT GREAT DEPTH (Symposium), Pau, France. (Symposium, Elf Aquitaine, CSTCS, Bat. L5, 64018 Pau Cedex, France).

August 28 - September 2, 1989

AIPEA (9th International Clay Conference), Strasbourg. (Y. Tardy, Institut de Géologie, 1 rue Blessig, 67084 Strasbourg, France).

September 3-9, 1989

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

September 4-7, 1989

CHALK (International Symposium), Brighton, U.K. (Dr. R.N. Mortimore, Department of Civil Engineering, Brighton Polytechnic, Moulsecoomb, Brighton BN2 4GJ, U.K.).

September 4-8, 1989

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

September 4-8, 1989

COASTAL EVOLUTION, MANAGEMENT AND EXPLORATION IN SOUTHEAST ASIA (IGCP-274 International Symposium), Ipoh, Malaysia. (Dr. H.D. Tjia, Jabatan Geologi, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia).

September 4-13, 1989

MICROPALAEONTOLOGICAL COLLOQUIUM (26th), Budapest, Hungary. IPA. (Dr. A. Nagymarosy, Department of Geology, "Eötvös L." University, Budapest VIII, Muzeum krt. 4/A H-1088, Hungary).

September 10-14, 1989

QUATERNARY ENGINEERING GEOLOGY (Conference), Edinburgh, U.K. Co-sponsored by IAEG. (Dr. J.A. Little, Dept. of Civil Engineering, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, Scotland, U.K.).

September 10-15, 1989

CRUSTAL GEOCHEMICAL CYCLES (American Chemical Society Division of Geochemistry Meeting), Miami Beach, U.S.A. (James Herring, U.S. Geological Survey, MS 939, Box 25406, Denver, Federal Center, Denver, CO 80225, U.S.A.).

September 11-22, 1989

ARCHEAN - PROTEROZOIC TRANSITION (Field Conference), Harare, Zimbabwe. Co-sponsored by IGCP and IUGS. (Apt. 89, Geological Society of Zimbabwe, P.O. Box 8427, Causeway, Harare, Zimbabwe).

September 12-15, 1989

COAL: Formation, Occurrence and Related Properties (International Meeting), Orléans, France. (P. Bertrand, Unité de Recherche en Pétrologie, Organique, Université d'Orléans, 45067 Orléans Cedex 2, France).

September 12-15, 1989

HYDROTHERMAL REACTIONS (3rd International Symposium), Frunze, U.S.S.R. (Symposium on Hydrothermal Reactions, Vernadsky Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, Kosygin Street 19, Moscow 117 334, U.S.S.R.).

September 14-15, 1989

PETROLEUM MIGRATION (Meeting), London, U.K. (W. England, Exploration and Production Division, BP Research International, Chertsey Road, Sunbury-on-Thames, Middlesex TW16 7LN, U.K.).

September 14-19, 1989

EDITING INTO THE 90's (Joint CBE, EASE, AESE Meeting), Ottawa, Canada. (Conference Office, National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6).

September 17-24, 1989

AGGLUTINATED FORAMINIFERA (3rd International Workshop), Tübingen, F.R.G. (Dr. C.H. Leben, Geologisches Institut der Universität, Sigwartstrasse 10, D-7400 Tübingen, Federal Republic of Germany).

September 17-24, 1989

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

September 18-22, 1989

ORGANIC GEOCHEMISTRY (14th International Congress). Paris, France. (Ms. Yolande Rondot, Institut Francais du Petrole, B.P. 311, 92506 Ruell-Malmaison Cedex, France).

September 24-30, 1989

CARBONIFEROUS STRATIGRAPHY (IUGS Subcommittee Biennial Field and General Meeting), Utah/Nevada, U.S.A. (Walter L. Manger, Department of Geology, University of Arkansas, Fayetteville, AK 72701, U.S.A.).

September 25-28, 1989

MINING LATIN AMERICA (IMM Conference and Exhibition), Rio de Janeiro, Brazil. (The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.).

September 28-30, 1989

GEOENGINEERING (International Congress), Turin, Italy. (Suolosottosuolo, Associazione Mineraria Subalpina, c/o Dipartimento di Georisorse e Territorio del Politecnico, corso Duca degli Abruzzi 24, I-10129 Torino, Italy).

October 1989

MINERAL EXPLORATION PROGRAMMES '89 (International Symposium), Madrid, Spain. (Derek Morris, MEP '89, c/o International Mining, 4 Brandon Road, London N7 9TR, U.K.).

October 1989

GEODESY AND SEISMOLOGY: DEFORMATION AND PROGNOSIS (Meeting), Erevan, Armenian S.S.R., U.S.S.R. (V.A. Sidorov, Soviet Geophysical Committee, Molodezhnaya 3, Moscow 117 296, U.S.S.R.).

October 1-4, 1989

SINKHOLES AND THE ENGINEERING AND ENVIRONMENTAL IMPACTS OF KARST (3rd Multidisciplinary Conference), St. Petersburg, Florida, U.S.A. (Conference, Florida Sinkhole Research Institute, University of Central Florida, Orlando, FL 332816, U.S.A.).

October 1-6, 1989

GEOCHEMICAL EXPLORATION (13th International Symposium) and BRAZILIAN GEOCHEMICAL CONGRESS (2nd), Rio de Janeiro, Brazil. Co-sponsored by AEG. Languages: Symposium - English; Congress - Portuguese. (D.C. Bruni, 13th IGES, P.O. Box 2432, 20010, Rio de Janeiro, R.J., Brazil).

October 2-4, 1989

FLUVIAL SEDIMENTOLOGY (4th International Conference), Barcelona, Spain. (C. Puigdefàbregas, Servei Geologic de Catalunya, carrer Diputacio 92, 08015 Barcelona, Spain).

October 2-5, 1989

BOREHOLE GEOPHYSICS FOR MINERALS, GEOTECHNICAL, AND GROUNDWATER APPLICATIONS (3rd International Symposium), Las Vegas, Nevada. (Mark Mathews, c/o Las Alamos National Laboratory, P.O. Box 1663, MS C335, Las Alamos, NM 87545, U.S.A.).

October 2-5, 1989

GROUNDWATER MANAGEMENT: Quantity and Quality (International Symposium), Benidorm, Alicante, Spain. Language: English. (Secretary General, IAHS, Institute of Hydrology, Wallingford, Oxon, OX10 8BB, U.K.).

October 2-6, 1989

REMOTE SENSING FOR EXPLORATION GEOLOGY (7th Thematic Conference), Calgary, Alberta, Canada. (Robert H. Rogers, ERIM, P.O. Box 8618, Ann Arbor, MI 48107-8618, U.S.A.).

October 13-14, 1989

MINERAL-RESOURCE ASSESSMENT (18th Geochautauqua), Newark, Delaware. Co-sponsored by IAMG. (J.H. Schuenemeyer, Dept. Mathematical Sciences, University of Delaware, Newark, DE 19716, U.S.A.).

October 13-15, 1989

INSTITUTE FOR TERTIARY-QUATERNARY STUDIES (Meeting), Fort Collins, Colorado. (Frank G. Etheridge, Department of Earth Resources, Colorado State University, Fort Collins, CO 80523, U.S.A.).

October 16-20, 1989

MATHEMATICAL METHODS IN GEOLOGY (IAMG Symposium), Pribram, Czechoslovakia. Sekretariat symposia, Hornicka Pribram ve Vede a Technice, post. schr. 41,261 02 Pribram, Czechoslovakia).

October 16-27, 1989

REGIONAL MINERAL RESOURCE ASSESSMENTS (Workshop for international participants), Reston, Virginia. (U.S. Geological Survey, Office of International Geology, 917 National Center, Reston, VA 22092, U.S.A.).

October 18-20, 1989

STRUCTURAL AND TECTONIC MODELLING AND ITS APPLICATION TO PETROLEUM GEOLOGY (Meeting), Stavanger, Norway. (Norwegian Petroleum Society, P.O. Box 1897 - Vika, 0124 Oslo, Norway).

October 22-25, 1989

WORLD GOLD '89 (Meeting), Reno, Nevada, U.S.A. (Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162, U.S.A.),

October 23-27, 1989

COAL SCIENCE (International Conference), Tokyo, Japan. Language: English. (Secretariat for ICCS, Coal Conversion Department, New Energy Development Organization (NEDO), Sunshine 60 Building, 1-1, Higashi-Ikebukuro 3-chome, Toshima-ku, Tokyo 170, Japan).

November 10-13, 1989

RARE METAL GRANITOIDS (IGCP-282 Meeting), Nanjing, P.R. China. (Prof. Zhu Jinchu, Department of Earth Science, Nanjing University, Nanjing 210008, P.R. China).

November 13-15, 1989

MINERAL EXPLORATION PROGRAMME '89 (Symposium), Madrid, Spain. (MEP '89, 4 Brandon Road, London N7 9TR, England, U.K.).

November 14-16, 1989

ASEAN COUNCIL ON PETROLEUM (Meeting), Singapore. (Salk International, 2950 Airway Avenue, Suite D-1, Costa Mesa, CA 92626, U.S.A.).

November 14-16, 1989

WORLD WATER (Conference), Wembley, London, U.K. (World Water '89, Institution of Civil Engineers, 1-7 Great George Street, Westminster, London SW1P 3AA, U.K.).

November 20-21, 1989

MODERN EXPLORATION TECHNIQUES (Symposium), Regina, Saskatchewan. (Bob Troyer, Saskatchewan Geological Survey, P.O. Box 234, Regina, Sask., Canada S4P 2Z6).

November 23-24, 1989

MESOZOIC EUSTACY RECORD ON WESTERN TETHYAN MARGINS (Meeting), Lyon, France. (Prof. P. Cotillon and Dr. S. Ferry, Université Claude Bernard, Institut TOAEE, Centre des Sciences de la Terre, 29-43 Blvd. du 11 novembre, F-69622 Villeurbanne Cédex, France).

December 4-5, 1989

PETROLEUM GEOLOGY SEMINAR '89, Kuala Lumpur, Malaysia (c/o Organizing Chairman, Geological Society of Malaysia, Geology Department, University of Malaya, 59100 Kuala Lumpur, Malaysia).

December 18-20, 1989

GEO THERMOMETRY AND GEOBAROMETRY (Session in Conference, The Stability of Minerals), London, U.K. (Dr. B.W.D. Yardley, Department of Earth Sciences, University of Leeds, Leeds LS2 9JT, U.K.).

1990

January 29-30, 1990

ADVANCES IN RESERVOIR GEOLOGY (Meeting), London, U.K. (Dr. Ashton, Badley, Ashton & Associates Ltd., Winceby House, Winceby, Horncastle, Lincs. LN9 6PB, U.K.).

February 4-9, 1990

GONDWANA, TERRANES AND RESOURCES (10th Australian Geological Convention), Hobart, Australia. (10th AGC, c/o P.O. Box 56, Rosny Park, Tasmania TAS 7018, Australia).

February 5-9, 1990

BRACHIOPODS (2nd International Congress), Dunedin, New Zealand. (J.D. Campbell, Geology Department, University of Otago, P.O. Box 56, Dunedin, New Zealand).

February 12-14, 1990

PNG PETROLEUM CONVENTION (Conference), Port Moresby, Papua New Guinea. (Mr. M. McWalter, First PNG Petroleum Convention, c/o PNG Chamber of Mines and Petroleum, P.O. Box 7059, Boroko, Port Moresby, Papua New Guinea).

March/April 1990

ENGINEERING GEOLOGY PROBLEMS IN RESIDUAL SOILS (International Symposium), Abidjan-Yamassoukro, Ivory Coast. Sponsored by IAEG. English and French. (G. Cougny, Laboratoire du Bâtiment et des Travaux Publics, 04BP3 Abidjan 04, Ivory Coast).

March 14-17, 1990

ASIA/PACIFIC MINING (2nd Conference), Jakarta, Indonesia. (Asia/Pacific Mining Conference Secretariat, c/o Cahners Exposition Group (S) Pte. Ltd., 1 Maritime Square, #13-02 World Trade Centre, Singapore 0409).

April 4-6, 1990

THRUST TECTONICS (International Conference), Egham, U.K. (Dr. K. McClay, Department of Geology, Royal Holloway and Bedford New College, Egham, Surrey TW20 OEX, U.K.).

May 7-8, 1990

ANNUAL CONFERENCE '90, GEOLOGICAL SOCIETY OF MALAYSIA, Ipoh (Organising Chairman, Geological Society of Malaysia; c/o Geology Department, University of Malaya, 59100 Kuala Lumpur, Malaysia).

May 6-12, 1990

PACIFIC RIM 90 (International Congress), Gold Coast, Queensland, Australia. (The AusIMM-Pacrim 90, P.O. Box 731, Toowong, Qld 4066, Australia).

May 14-18, 1990

WORLD MINING (14th Congress), Beijing, P.R. China. (14th World Mining Congress, 54 Sanlihe Road, Beijing, P.R.C.).

June 1990

GEOCHEMISTRY OF WEATHERING (2nd International Symposium), Aix-en-Provence, France. Sponsored by IAGC. (B. Hitchon, Alberta Research Council, Box 8330, Station F. Edmonton, Alberta, Canada T6H 5X2).

June 2-6, 1990

GEOANALYSIS 90 (International Symposium), Muskoka area, Canada. (Dr. A. Vander Voet, Ontario Geological Survey, 77 Grenville Street, Toronto, Ontario, Canada M7A 1W4).

June 28 - July 3, 1990

INTERNATIONAL MINERALOGICAL ASSOCIATION (15th General Assembly), Beijing, P.R. China. (Prof. Huang Yunhui, c/o Institute of Mineral Deposits, Chinese Academy of Geological Sciences, Baiwan-zhuang Road 26, Fuchengmenwai, Beijing, P.R. China).

July 1990

CAMBRIAN SYSTEM (3rd International Symposium), Novosibirsk, U.S.S.R. (Dr. J.W. Cowie, Department of Geology, University of Bristol, Queen's Building, University Walk, Bristol BS8 1RJ, U.K.).

July 2-6, 1990

GEOLOGY AND MINERAL RESOURCES OF CONTINENTAL MARGINS: ANCIENT AND MODERN (23rd Earth Science Conference, Geological Society of South Africa), Cape Town, South Africa. (Dr. P.G. Gresse, Geological Survey, P.O. Box 1739, Bellville, 7530, South Africa).

July 2-6, 1990

MINERALS, MATERIALS & INDUSTRY (IMM 14th Congress), Edinburgh, Scotland, U.K. (Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.).

July 2-6, 1990

BASEMENT TECTONICS (9th International Conference), Canberra, Australia. (91BT ACTS, GPO Box 2200, Canberra, ACT 2601, Australia).

July 9-13, 1990

GROUNDWATER IN LARGE SEDIMENTARY BASINS (International Conference), Perth, Western Australia. (Groundwater Conference, University of Western Australia, Nedlands, Western Australia 6009).

July 19-28, 1990

INTERNATIONAL UNION OF CRYSTALLOGRAPHY (15th Congress), Bordeaux, France. (Stefan S. Hafner, University of Marburg, 3550 Marburg, Federal Republic of Germany).

July 29 - August 3, 1990

CIRCUM-PACIFIC ENERGY AND MINERALS RESOURCES (Conference), Honolulu, Hawaii. (Mary Stewart, Circum-Pacific Council on Energy and Mineral Resources, 5100 Westheimer Road, Houston TX 77056, U.S.A.).

August 6-10, 1990

INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY (6th International Congress), Amsterdam, The Netherlands. English and French. (Dr. L. Primel, L.C.P.C., 58 Blvd. Lefebvre, 75732 Paris Cedex 15, France).

August 12-18, 1990

INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (8th Symposium), Ottawa, Canada. (Dr. L.M. Cumming, 601 Booth Street, Ottawa, Canada K1A 0E8).

August 12-18, 1990

MINERAL DEPOSIT MODELING (International Conference), Ottawa, Canada. Held with 8th IAGOD Symposium. Sponsored by IUGS and Unesco. (R.V. Kirkham, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, Canada K1A 0E8).

August 25-31, 1990

GEOCHEMICAL EXPLORATION (14th International Symposium), Prague, Czechoslovakia. (Geological Survey/UUG, Symposium on Geochemical Prospecting, Malostranske nam. 19, 118 21 Prague 1, Czechoslovakia).

August 26 - September 1, 1990

SEDIMENTOLOGY (13th International IAS Congress), Nottingham, U.K. (I.N. McCave, Dept. Earth Sciences, Cambridge University, Downing Street, Cambridge CB2 3EQ, U.K.).

August 26 - September 8, 1990

LATIN AMERICAN CONODONT SYMPOSIUM, La Paz, Bolivia and San Juan, Argentina. (M. Hunicken, Academia Nacional de Ciencias, Casilla Correo 36, 5000 Cordoba, Argentina).

September - October, 1990

IPA GRAPTOLITE WORKING GROUP (4th International Conference), Nanjing, P.R. China. (Chen Xu, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Chi-Ming-Ssu, Nanjing, P.R. China).

September 17-18, 1990

GEOCHEMISTRY OF CLAY-PORE FLUID INTERACTIONS (meeting), London, U.K. (D. Savage, Fluid Processes Research Group, British Geological Survey, Keyworth, Notts. NG12 5GG, U.K.).

September 17-21, 1990

ARCHEAN (Symposium), Perth, Australia. (D.I. Groves, Department of Geology, University of Western Australia, Nedlands, Western Australia 6009).

September 18-20, 1990

HYDROGEOLOGY: Parameter Identification and Estimation for Aquifer and Reservoir Characterization (5th Canadian-American Conference), Calgary, Alberta. (S. Bachu, Alberta Research Council, Box 8330, Station F, Edmonton, Alberta, Canada T6H 5X2).

September 24-29, 1990

GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPE GEOLOGY (7th International Conference), Canberra, Australia. (Organizing Committee, ICOG 7, Research School of Earth Science, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia).

September 28 - October 2, 1990

BENTHIC FORAMINIFERA (4th International Symposium), Sendai, Japan. (Dr. Yokichi Takayanagi, Institute of Geology and Paleontology, Tohoku University, Sendai, 980 Japan).

1991

March 1991

ECONOMIC EVALUATION OF MINERAL RESOURCES (International Conference), Kosice, Czechoslovakia. Languages: Russian and English. (Intergeoeconomika 1991 CSSR, GEOFOND, Eng. St. Richter, Garbanova 1, 040 11 Kosice, Czechoslovakia).

April 26 - May 1, 1991

ASSOCIATION OF EXPLORATION GEOCHEMISTS (15th International Geochemical Exploration Symposium), Reno, U.S.A. (Richard B. Jones, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada 89557-0088, U.S.A.).

May 1991

QUANTITATIVE METHODS OF INVESTIGATION OF THE STRUCTURE OF SOILS AND ROCKS (IAEG International Symposium), Moscow. (Dr. M. Primel, LCPC, 58 Bd. Lafebvre, 75732 Paris Cedex 15, France).

August 2-9, 1991

QUATERNARY RESEARCH (13th INQUA International Congress), Beijing, P.R. China. (Secretariat, 13th INQUA Congress, Chinese Academy of Sciences, 52 Sanlihe, Beijing 100864, People's Republic of China).

September 16-20, 1991

ROCK MECHANICS (7th International Congress), Aachen, F.R. Germany. (Deutsche Gesellschaft für Erd- und Grundbau, Kronprinzenstrasse 35a, D-4300 Essen 1, F.R.G.).

September 22-27, 1991

CARBONIFEROUS-PERMIAN STRATIGRAPHY AND GEOLOGY (12th International Congress), Buenos Aires, Argentina. Language: English. (Dr. S. Archangelsky, Museo Argentino de Ciencias Naturales, Av. A. Gallardo 470, Buenos Aires 1405, Argentina).

1992

June 1992

WORLD MINING (15th Congress), Seville, Spain. (World Mining Congress, Al Ujazdowskie 1-3, PL-00583, Warsaw, Poland).

June 28 - July 1, 1992

PALEONTOLOGY (5th North American Convention), Chicago, U.S.A. (Dr. Peter R. Crane, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605-2496, U.S.A.).

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

General Information

The Society publishes the *Buletin Geologi Malaysia* (Bulletin of the 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 reconsideration 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.

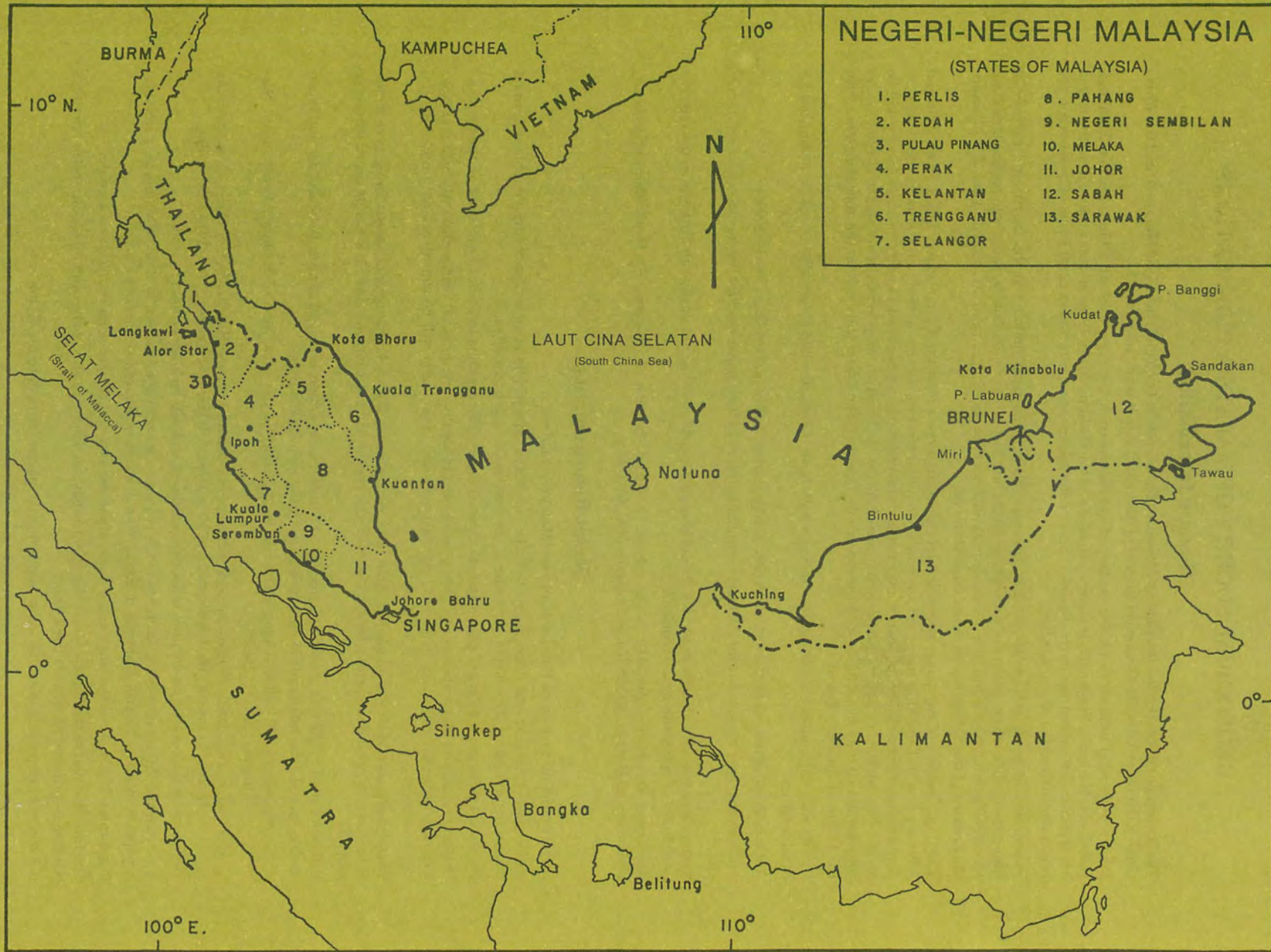
The name of the book or publication must be underlined and will be later printed in italics.

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.



NEGERI-NEGERI MALAYSIA

(STATES OF MALAYSIA)

- | | |
|-----------------|--------------------|
| 1. PERLIS | 8. PAHANG |
| 2. KEDAH | 9. NEGERI SEMBILAN |
| 3. PULAU PINANG | 10. MELAKA |
| 4. PERAK | 11. JOHOR |
| 5. KELANTAN | 12. SABAH |
| 6. TRENGGANU | 13. SARAWAK |
| 7. SELANGOR | |