PP 2509/8/97

ISSN 0126-5539

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

GEOLOGICAL SOCIETY OF MALAYSIA

Jilid 24
No. 6

Volume 24
No. 6

Nov– Dec
1998

KANDUNGAN (Contents)

DIKELUARKAN DWIBULANAN
ISSUED BIMONTHLY

PERSATUAN GEOLOGI MALAYSIA
Geological Society of Malaysia

About the Society

The Society was founded in 1967 with the aim of promoting the advancement of earth sciences particularly in Malaysia and the Southeast Asian region.

The Society has a membership of about 600 earth scientists interested in Malaysia and other Southeast Asian regions. The membership is worldwide in distribution.

Published by the Geological Society of Malaysia,
Department of Geology, University of Malaya, 50603 Kuala Lumpur.
Tel: 603-757 7036 Fax: 603-756 3900 E-mail: geologi@po.jaring.my

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

CATATAN GEOLOGI
Geological Notes

Preliminary geochemistry and characterisation of alluvial gold from the Jeli and Sokor areas, Kelantan

G.H. TEH AND ANISALIMAHWATI BT SULAIMAN
Geology Department
University of Malaya
50603 Kuala Lumpur

Abstract: The study on the geochemistry and characterisation of alluvial gold in Kelantan was concentrated in 2 main areas, namely the Jeli and Sokor areas.

The main purpose of the study is the characterisation of the gold deposits from these 2 areas with emphasis on their physical and chemical characteristics. The physical characteristics covered include morphology, shape and grain size, whereas, the chemical characteristics include types of inclusions and the quantity of gold and silver in the gold grains from EPMA and microscopic studies.

The morphology and shapes of the gold grains of the study area as a whole range from subrounded to rounded, and therefore strongly suggest that the gold samples are alluvial gold in character except for the gold samples from Sg. Ketubong which are sub-angular. This is because the gold particles collected at Sungai Ketubong are very near the area of the mineralized gold veins. The sphericity of the samples collected in the Jeli area is classified as prismoidal, which is the dominating sphericity in this area, and this differs from the samples in the Sokor area which have sphericity ranging from subdiscoidal to discoidal.

Gold grain size studies show that the samples from the Sokor area are fine grained ranging from 0.3–0.5 mm for the lengths and widths of the samples collected from Sg. Tui and Sg. Sokor, whereas the grain size of the samples from Jeli are bigger with an average length of 0.7 mm for samples from Sg. Pergau. For samples from Sg. Tadoh, the average particle size is 0.8 mm long and 0.4 mm wide while those from Sg. Ketubong average 0.88 mm and 0.48 mm respectively. As a whole, the samples from the Jeli area comprise grain sizes that are larger when compared to the samples from the Sokor area.

EPMA analyses show that the geochemistry of the gold grains are different for the 2 main areas. In the Jeli area, the 3 areas sampled in Sg. Pergau show average fineness values of 941.435, 922.624 and 911.224 respectively, while the 2 areas in Sg. Tadoh average 916.015 and 943.912 respectively. In the Sokor area, the fineness values are less than 900.000 and the average fineness values show a larger spread; the 2 areas in Sg. Tui average 810.069 and 892.330 respectively, whereas the areas in Sg. Sokor average 849.088. The Sg. Ketubong area recorded an average fineness value of 971.958.

INTRODUCTION

The geochemical and characterisation study of alluvial gold from Kelantan was concentrated in 2 main areas, namely, Sungai Tadoh and Sungai Pergau in the Jeli area and Sungai Tui, Sungai Sokor and Sungai Ketubong in the Sokor area (Fig. 1).

The characterisation of the gold from the two areas include their physical and chemical characteristics. The physical characteristics covered include morphology, shape and grain size. On the other hand the chemical characteristics include the contents of gold and silver in the gold grains. Similar studies have previously carried out in the Raub-Tersang-

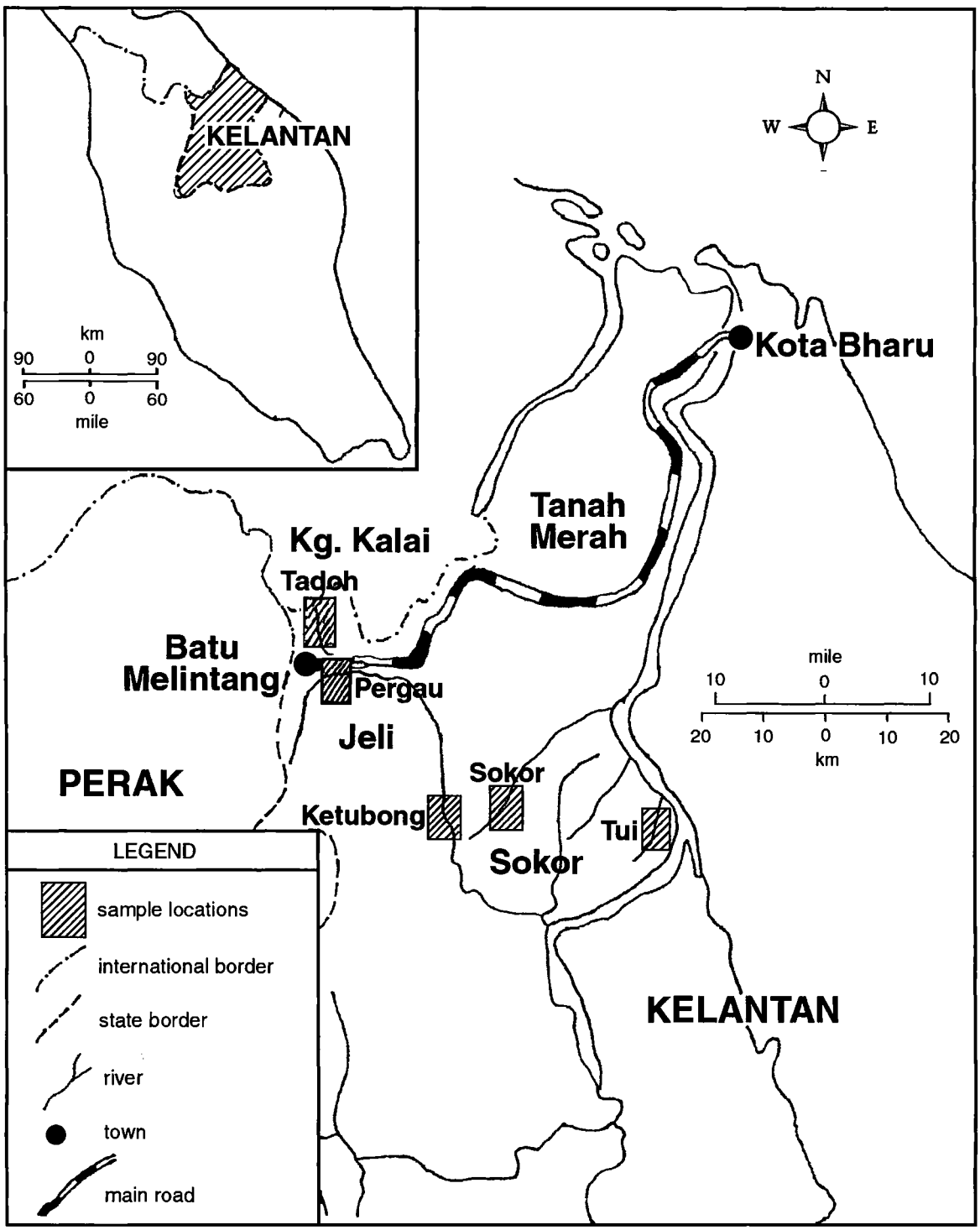


Figure 1. Map showing the location of the Jeli and Sokor areas.

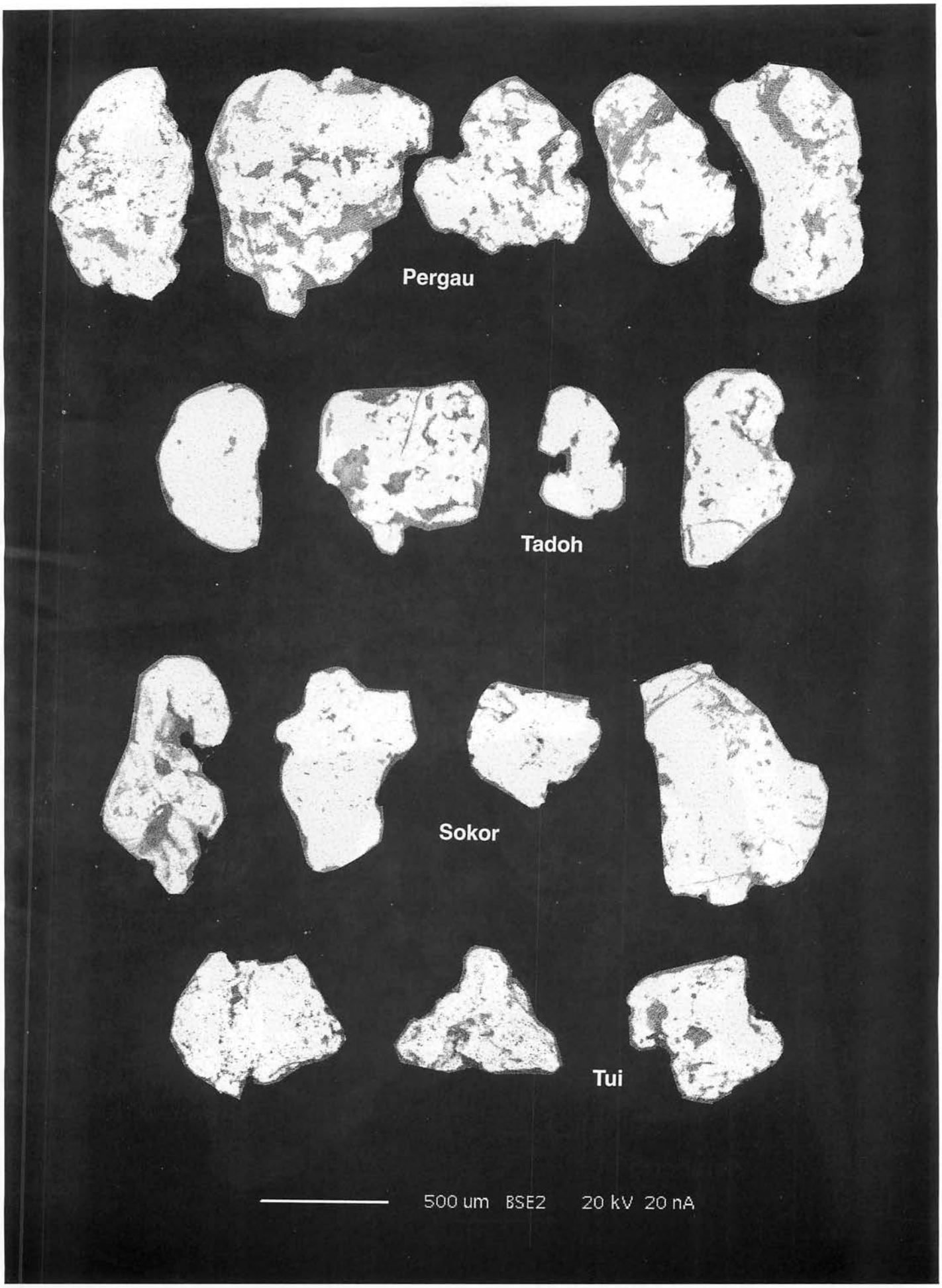


Figure 2. Scanning Electron Microscope (SEM) photomicrographs of smaller alluvial gold grains from the Pergau, Tadoh, Sokor and Tui areas.

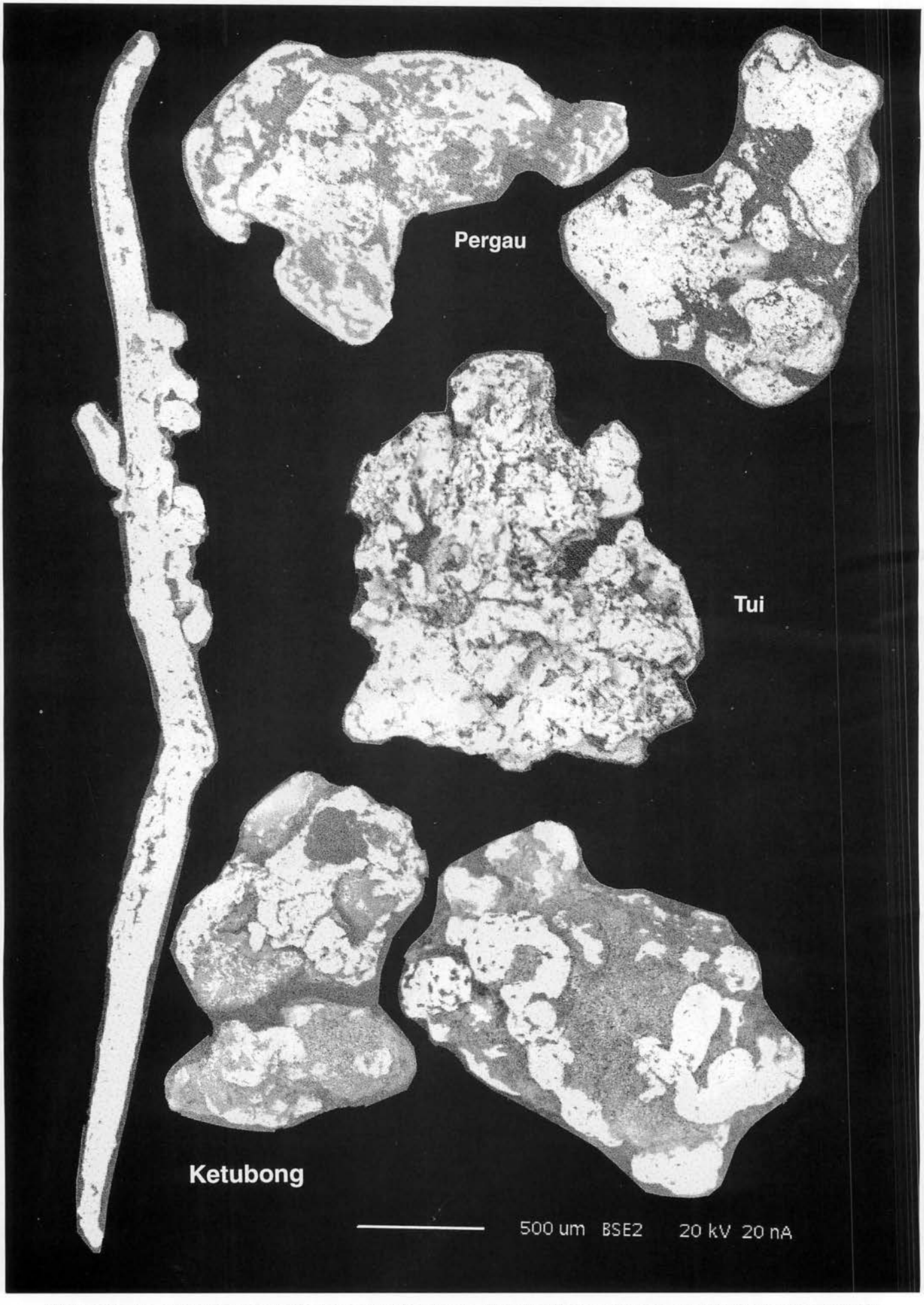


Figure 3. Scanning Electron Microscope (SEM) photomicrographs of larger alluvial gold grains from the Pergau, Tui and Ketubong areas.

Selinsing-Penjom and Rusila areas (Teh *et al.*, 1997).

METHOD OF STUDY

The gold grains were placed on carbon tapes for the study of their physical characteristics. Selected grains were then moulded in 1-inch diameter pellets and polished for both microscopic and EPMA (electronprobe microanalyzer) studies.

The EPMA available at the Geology Department, University of Malaya, is a highly automated Cameca SX100 which is workstation-based, with full instrument control and quantitative, qualitative software via windows and multi-task user environment. It has a kV range of 0–50 kV, 4 wavelength dispersive spectrometers (3 vertical and 1 horizontal) and a total of 12 diffracting crystals for detection of elements from Be to U. The Rowland circle of 160 mm warrants better X-ray spatial resolution. The PGT energy dispersive spectrometer has a Si (Li) X-ray detector. Up to 40 elements can be analysed in any WDS and EDS combination.

RESULTS

Alluvial gold grain studies show that the grains are larger in the Jeli area compared to the samples from the Sokor area (Fig. 2). The samples from Sg. Pergau average 1.1 mm in length and 0.7 mm in width, whereas those from Sg. Tadoh average 0.8 mm in length and 0.4 mm in width. From the Sokor area, the samples from Sg. Sokor average 0.4 mm in length and 0.3 mm in width, samples from Sg. Tui average 0.5 in length and 0.3 mm in width while those from Sg. Ketubong average 0.88 mm and 0.48 mm respectively.

The morphology and shapes of the gold grains of the study area as a whole range from subrounded to rounded, strongly suggesting that the gold samples are alluvial gold in character except for the gold samples from Sg. Ketubong which are sub-angular, a reflection of the closeness of the sample area to the source gold veins. An unusual needle- or "kris"-shaped alluvial gold sample from Sg. Ketubong confirms this (Fig. 3).

The dominating sphericity in the Jeli area is prismoidal, whereas the alluvial gold samples in the Sokor area have sphericity ranging from subdiscoidal to discoidal.

EPMA studies also show that the geochemistry of the gold grains are also different for the Jeli and Sokor areas. In the Jeli area, the 3 areas sampled in Sg. Pergau show average fineness values of 941.435, 922.624 and 911.224 respectively, while the 2 areas in Sg. Tadoh average 915.015 and 943.912 respectively.

In the Sokor area, the fineness values are generally less than 900.000 and the average fineness values show a larger spread. The 2 areas in Sg. Tui average 810.069 and 892.330 respectively, whereas the 2 areas in Sg. Sokor average 849.088.

The Sg. Ketubong area, which is between the Jeli and Sokor areas recorded an average fineness value of 971.958.

ACKNOWLEDGEMENTS

The authors express their gratitude to the various mining companies for the permission to pan for gold in their areas. Funding from University of Malaya research vote PJP 192/98 is greatly appreciated.

REFERENCES

G.H. TEH, HELMI MOHD LATIB AND ZULPAKAR MOHAMMAD JUSUH, 1997. Preliminary Electronprobe Microanalyzer (EPMA) characterisation of gold deposits of the Raub-Rersang-Selinsing-Penjom and Rusila area. *Warta Geologi, 23(6)*, 341–344.

Manuscript received 30 December 1998

NEW

Geological Evolution of South-East Asia

CHARLES S. HUTCHISON

GEOLOGICAL SOCIETY OF MALAYSIA

PERTEMUAN PERSATUAN
Meetings of the Society

Ceramah Teknik (Technical Talk)

Outcrop analogues of subsurface reservoirs in NW Borneo

JOSEPH J. LAMBIASE

Laporan (Report)

Prof. Joseph J. Lambiase of the Department of Petroleum Geoscience, Universiti Brunei Darussalam, Tungku 2028, Brunei Darussalam gave the above talk on 18 November 1998 at the Geology Department, University of Malaya.

Abstrak (Abstract)

Neogene strata that outcrop in NW Borneo represent the same successions that occur in the subsurface where they include important petroleum reservoirs. By integrating sedimentology, ichnology and microfossil analysis, nine sedimentary environments that contribute to the stratigraphic architecture have been characterised. They consist of fluvial channels, distributary channel fill, tidal flats, tidal channels and embayment mudstones plus upper shoreface, lower shoreface, and shelf deposits. Of these, upper shoreface sandstones and tidal sand complexes that include both tidal channel and tidal flat sandstones are the best reservoir facies based on their abundance and sedimentary characteristics; the other facies are either too muddy or uncommon. The sand body geometry and reservoir properties of tidal sands are considerably different from those of upper shoreface sands.

Three depositional settings with radically different hydrodynamic regimes are recognised within which the various sedimentary environments occurred. Interpretation of depositional setting was based on outcropping facies associations and was greatly assisted by observations of comparable modern environments and settings on the NW Borneo margin. There is not a one-to-one relationship between depositional setting and sedimentary environment; some facies occur in more than one setting whilst others are restricted to one setting only. Two of the settings, open marine shorelines and tidal embayments, account for nearly all of the outcropping strata. The third setting, large deltas based on the modern Baram Delta, has been widely used as a model for much of the Miocene strata. However, the results of this study suggest that similar systems may not have contributed significantly to the depositional Miocene sands.

The ideal stratigraphic succession for a progradational parasequence in a tidal embayment differs from that on an open marine shoreline. Generally, the shelf and lower shoreface strata that form the basal part of the shoreline succession appear similar to the embayment mudstones that are their tidal embayment equivalents. The main differences appear in the shallow water to coastal facies where upper shoreface and beach deposits occur on open marine shorelines whilst tidal flat and tidal channels occur in tidal embayments. Therefore, the two most important reservoir facies, upper shoreface and tidal sandstones, are stratigraphic equivalents in different depositional settings.

Origin of bornhardts

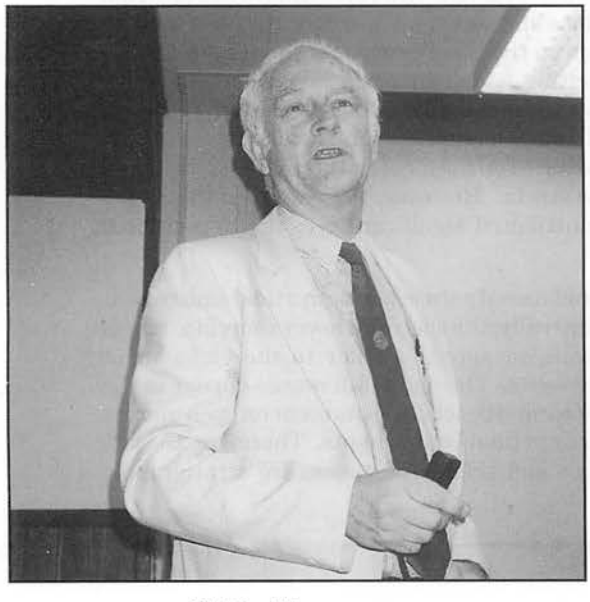
C.R. TWIDALE

Laporan (Report)

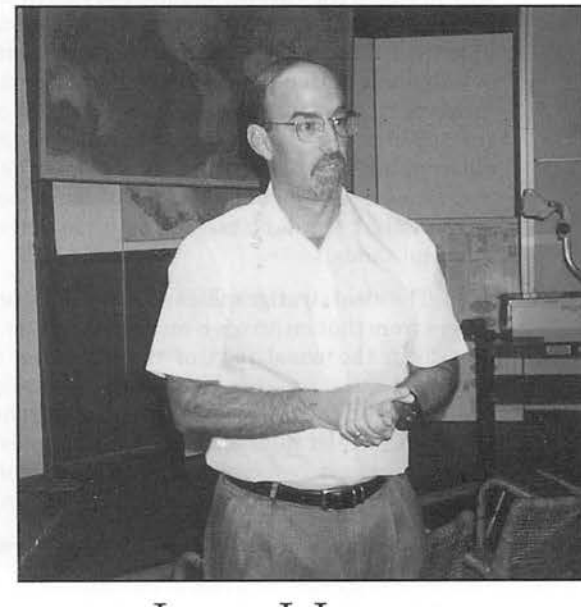
Dr. C.R. Twidale of the Dept. of Geology and Geophysics, University of Adelaide, South Australia gave the interesting talk on bornhardts on Monday 23 November 1999 at the Geology Department, University of Malaya to a crowd of about 35.

In his well-illustrated talk, Dr. Twidale dealt with the origin, age and occurrences of bornhardts besides discussing the manner they were formed.

> Bornhardts are bald domical hills either standing in isolation as inselbergs ("island mountains"), or forming components of massifs. Though especially well represented in granitic terrains, they are also developed in a range of plutonic rocks, in old volcanic uplands, in massive arenaceous and rudaceous strata and limestone. Their plan form is determined by systems of steeply inclined fractures. Their profiles are associated with convex upward fractures (sheet fractures, "offloading joints"). They meet the adjacent plains or valleys in a sharp break of slope known as the piedmont angle or nick. They are climatically azonal. They occur in various topographic settings and consistently in multicyclic landscapes. Epigene forms as old as Cretaceous are known, and exhumed forms ranging from Late Pleistocene to late Archaean in age have been recognised. Bornhardts have been explained in various ways: as literal and littoral inselbergs, as climatic (savanna) forms, as minor horsts, and so on. Some are upstanding because they are shaped in rock that is compositionally different from, and implicitly, more resistant to weathering and erosion than, that which underlies the adjacent plains and valleys. Some are exposed stocks. But though such explanations have local or partial validity, most bornhardts are evidently of the same rock type as that beneath the plains, are not defined by active faults, have never been near the sea, and are found in a range of climatic conditions. For these, the majority of bornhardts, two hypotheses have been suggested as general explanations.
>
> First, it has been argued that bornhardt inselbergs are the last remnants surviving after long distance scarp retreat: they are remnants of circumdenudation or monadnocks de position. Although the concept has been vigorously propounded by Lester King (Geogrl, 1949) and widely accepted, the field evidence is incompatible with several of the deducible consequences of the hypothesis, and it also fails to explain much of the field evidence.



C.R. TWIDALE



JOSEPH J. LAMBIASE

Second, Falconer (Geology and Geography of Northern Nigeria, 1911, pp. 245-248) envisaged bornhardts developed in two stages. They originated at the weathering front as resistant masses due either to low fracture density or to (tough) rock type and projected into the base of the regolith. Second, they became landforms as a result of the stripping of the regolith and the exposure of the topographically differentiated weathering front, satisfies much of the field evidence. In particular it is compatible with the occurrence of nascent bornhardts located just beneath the land surface but exposed in artificial excavations, and with the varied topographic settings and climatic azonality of the forms. The demonstrably great age of some bornhardts merely demonstrates that the processes responsible (groundwater weathering and erosion) have operated through time, and the remarkable isolated residuals of shield inselberg landscapes are readily construed as the last remnants of resistant compartments which have survived even long-continued subsurface weathering.

Note: "bornhardts" are large hills or mountains, usually of granite or gneiss, surrounded by plains. They have resisted denudation. A well known example is Ayers Rock in Australia and there are many in Africa.

1) Public Lecture — The wandering poles: earth history in new perspective
2) Research Seminar — Research methods in global wrench tectonics
3) An alternative evolutionary model for the earth

KARSTEN M. STORETVEDT

Sinopsis (Synopsis)

In its early history the Earth had a pan-global granitic-granulitic crust, which has been viriably assimilated by basic magmas from the mantle during geological time, but some undigested remains of continental crust still exists in the ocean basins (This is the oceanization concept of V. Beloussov). Due to continual mantle diapirism throughout time and the resulting internal reorganization of mass which changes the Earth's moment of inertia, the Earth has undergone systematic changes in its spatial orientation (relative to the celestial axis) and changes in its rate of rotation. The planet's changes of spatial rotation constitute polar wander, and this phenomena can be demonstrated with paleoclimate and paleomagnetic data.

In Storetvedt's model, global tectonics is strongly linked to Earth's rotation (a parameter that plate tectonics does not even recognize). There seems to have been an overall retardation of the rotation rate throughout time with progressive oceanization. This is consistent with palaeontological data such as fossil shell growth rings, which indicate that the number of days per year has dropped from about 425 in the Lower Paleozoic to 365 today. Further, in a rotating planet experiencing upwelling of material from the deep interior, the outward mantle currents, chemically eroding the sialic crust, should be expected to have certain concentration along the equator (due to the greatest centrifugal forces acting there). This explains the existence of geosynclines along the time-equivalent (paleo-) equators.

The concept of geosynclines has been discredited by plate tectonics, but the Alpine-Himalayan fold belt, for example, has developed along the Upper Cretaceous-Lower Tertiary equator, and the geosynclinal, pre-orogenic stage of fold belts is a natural consequence of mantle diapirism within a rotating body. Other major fold belts such as the Caledonian and Hercynian also formed at the time-equivalent equators, and it is remarkable that these fold belts are becoming progressively younger southwards following the paleoequator which was itself changing (It was as late as the uppermost Eocene-Early Oligocene that the equator has moved to its present position).

Global wrench tectonics: new model of Earth evolution

K.M. STORETVEDT

Abstrak (Extended Abstract)

The plate tectonic revolution during the late 1960s has, in the aftermath of that transformation, been nearly unanimously acclaimed as a "quantum leap" in our understanding of the Earth. The basis for this conceptual framework is a series of rigid lithospheric plates which, driven by mantle convection, is assumed to perform slow relative creep motions on an underlying more "plastic" asthenosphere. This mode of operation is offered not only as an explanation of the instantaneous tectonomagmatic picture, but is regarded also as a general basis for inferring past lithospheric history. The admiration and affection for plate tectonics have become so strong that a plethora of emotional terminology is frequently used (the model is often described as beautiful, excellent, nice, wonderful, perfect etc.). This strange glorification of a very tentative scientific model, for which all fundamental tenets have remained unverified, signifies that the Earth sciences are in a state of theoretical crisis. Critical observations have not conformed to expectations, and basic assumptions have been allowed "indefinite" mutability. Because of the invocation of an ever increasing flora of new parametres and considerable special pleading, the originally promising plate tectonic model has gradually turned the solid Earth into a heap of unrelated special cases, and therefore the alleged unifying global system is no longer in sight. As a consequence of all the "rescue operations" the state-of-the-art is now so loaded with ad hoc modifications, idiosyncratic complexity, and observational paradoxes that the model at this stage can hardly be called scientific. The chaotic situation has recently been discussed by Prof. C.-F. Wezel (Urbino, Italy) who states that "a radical change of approach is necessary in order to overcome the fragmentation that is characteristic of geology today".

In my recent seminars in Malaysia a number of fundamental problems facing plate tectonics were discussed. It was concluded that all central tenets of the model (e.g. transform fault, seafloor spreading, subduction etc.) are highly problematical and should therefore be abandoned. The Earth is a system and this would suggest more or less close interrelationships between its various phenomena. In other words, an hypothesized solution of one global phenomenon should, if relevant, automatically lead to the prediction of other well-known phenomena. Further successful solutions and predictions should then build up a coherent chain of interconnected phenomena and observations. The theoretical framework thus constructed must be simple and straightforward, and escape routes through localism and ad hoc explanations would be signs of erroneous turnings. Only if a tight and logical system can be established is there a real chance that we are facing a substantive Earth model. Most of the geological record is contained by the continents, so we must first of all turn to them to unravel the long-term dynamic processes of the Earth. Some of the most outstanding structural features are posed by the trans-continental northern hemisphere foldbelts, which display systematically decreasing ages southward, and by the circum-Pacific deformation belts that have been the sites of superimposed events of tectonomagmatic activity during Phanerozoic time. These structural systems have never been given a realistic explanation by plate tectonics despite frequent assertions to the opposite. Foldbelts have been dealt with on an individual basis only, and they have never been treated as a system that requires holistic understanding. Another major problem, unanswered by plate tectonics, is the first order pattern of global climatic change, including the fact that the climate of the present Arctic and Antarctic regions have turned from tropical to polar while that of Africa simultaneously has changed from polar to tropical. Also, the history of sea water on the continents, i.e. the overall progressive draining of the land masses since the Lower Palaeozoic and the superimposed transgression-regression cycles, have remained enigmatic in the context of plate tectonics.

A new theoretical framework, Global Wrench Tectonics, is advanced as a replacement model for plate tectonics. From the overall global palaeoclimate pattern, from Palaeozoic to Tertiary times, there are good reasons for believing that the Earth has undergone systematic changes in its spatial orientation (relative to the celestial axis). This process of Polar Wander is naturally linked to changes in the planetary moments of inertia, which in turn must be caused by internal reorganization of mass. The observed mantle heterogeneity, as revealed

by seismic tomography, including the evidence for deep mantle roots beneath continents, is most likely associated with the observed strong crustal inhomogeneity. It may be hypothesized that in its early history the Earth had a pan-global granitic-granulitic crust that became chemically unstable during subsequent cooling of the planet. In this process, provided by intermittent mantle upwelling, the virgin crust has been variably thinned/assimilated. Major parts of it has then been replaced by the thin basaltic crust of the oceans, but "undigested" remains of continental material are widely scattered throughout most of the oceanic domain. It appears that we should be talking about CONTINENTAL DESTRUCTION RATHER THAN CONTINENTAL ACCRETION. In fact, with such a starting point a novel dynamical system of the Earth, built on simple physical principles, can be developed, and a long range of previously unrelated phenomena are now automatically connected. Global tectonics appears to be strongly associated with planetary rotation. Foldbelts have developed along the time-equivalent (palaeo-) equators, and their geosynclinal precursor stage follows as a natural consequence of mantle upwelling within a rotating planetary body. By Alpine time the loss of continental crust to the mantle had reached an advanced stage, and as a consequence of planetary rotation the lithosphere turned into a stage of mobility, during which the continents underwent variable azimuthal changes. These mostly minor continental rotations were the result of a certain westward wrenching of the entire global lithosphere, governed by inertia forces. The new mobilistic system explains the observed discrepancies of palaeomagnetically based Apparent Polar Wander Paths, yet the continents have remained fairly stationary with respect to their mantle roots. Wegenerian-type drift, which has caused numerous fitting problems and an endless number of other inconsistencies, is no longer needed. As would be the situation in any case of major paradigm change the whole range of landscapes and seascapes of the past can now be looked at with new eyes and given new meanings.

Laporan (Report)

The Geophysics Working Group of the Geological Society of Malaysia, in collaboration with the local hosts at the School of Physics, Universiti Sains Malaysia, the Department of Geology, Universiti Malaya, and PETRONAS, KLCC, held an exposition on a new model of Earth evolution through a series of 3 seminars/lectures recently. Participation was good with about 90 members, friends and affiliates turning up for the last seminar!

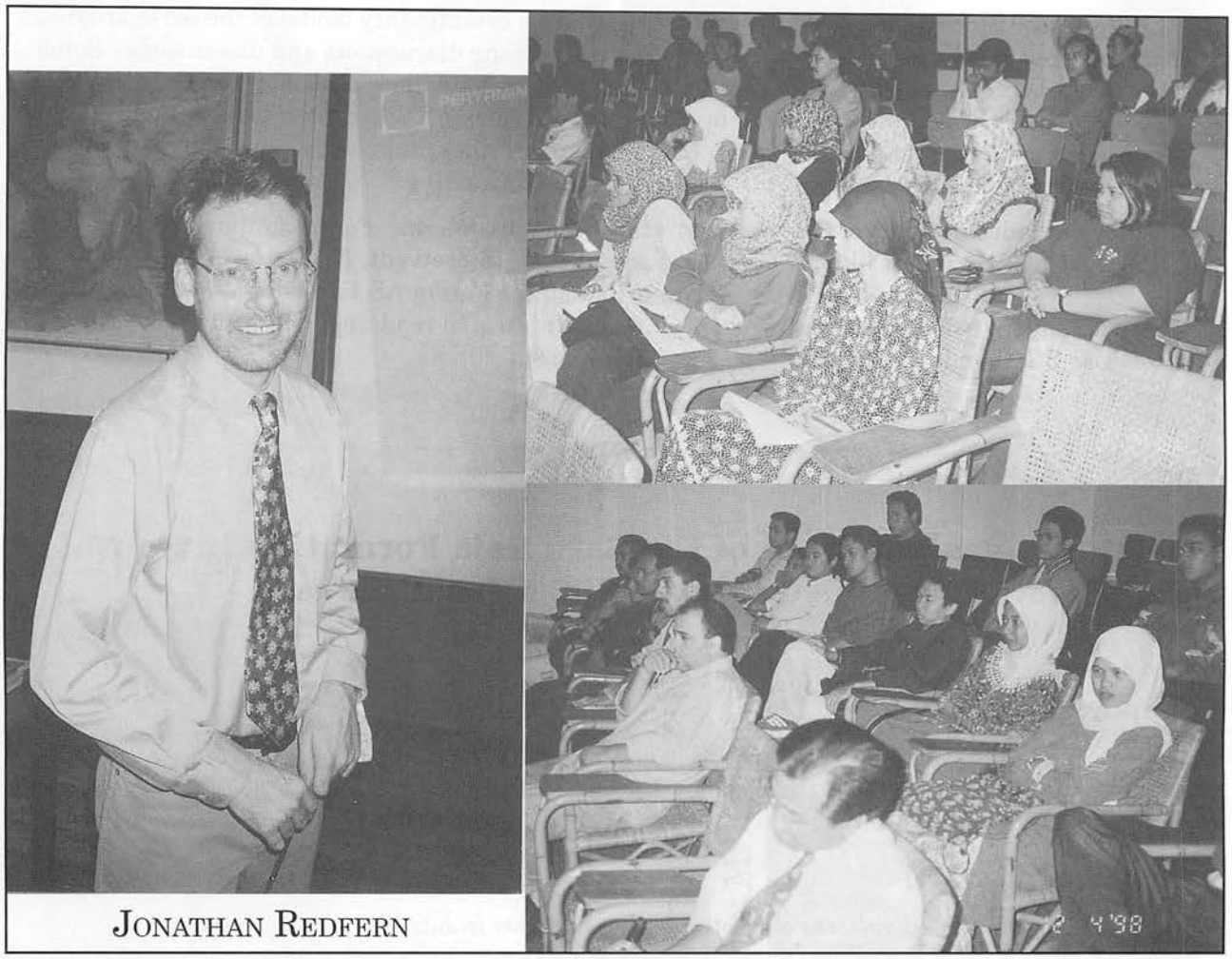
The speaker was Professor Karsten M. Storetvedt, Research Professor from the Institute of Geophysics, University of Bergen, Norway. A distinguished European paleomagnetists, Professor Storetvedt in the mid-seventies brought about a consciousness of remagnetization problems in paleomagnetism, and, the concept a few years ago that the well known diverging APW paths can be fully explained by *in situ* continental rotations. Today, after many plate tectonics based contributions in reputed scientific journals in the earlier years, he is one of the few diehards who completely dismiss plate tectonics.

Professor Storetvedt very kindly presented the following lectures:

Date: Saturday, 28th November, 1998
Time: 10.00 am – 12.30 pm
Venue: School of Physics Conference Room, Universiti Sains Malaysia, Penang
Title: i) Public Lecture — The Wandering Poles: Earth History in New Perspective
ii) Research Seminar — Research methods in Global Wrench Tectonics

Date: Monday, 30th November 1998
Time: 5.00–6.30 pm
Venue: Department of Geology, Lecture Hall, Universiti Malaya, Kuala Lumpur
Title: An Alternative Evolutionary Model for The Earth — Part 1

Date: Tuesday, 1st December, 1998
Time: 10.00 am – 12.00 noon
Venue: Tower 1, Level 41, Petronas Twin Towers, KLCC, Kuala Lumpur
Title: An Alternative Evolutionary Model for The Earth — Part 2



JONATHAN REDFERN

Practical use of wireline formation pressure data — estimating fluid content, hydrocarbon contacts, and reservoir connectivity

JIM HOWES

Laporan (Report)

Jim Howes of ARCO Indonesia, gave the above talk at Windows KL1, 30th Floor, K.L. Hilton on Wednesday 9 December 1998. The talk was organised by the Formation-Evaluation Working Group and lunch was sponsored by Baker Atlas.

Description of Talk

His presentation illustrated some of the fundamental principles and applications of formation pressure analysis in exploration, delineation and production. The talk focused on the practical use of wirelines pressure data that is gathered by such tools as the RFT, FMT and MDT. It was shown how these data can be integrated with geology, geophysics, petrophysics, theoretical fluid properties and DST data for an integrated evaluation of the geometry of oil and gas fields. Specific applications of wireline formation pressure data were discussed including interpretation of reservoir fluid content, estimation of hydrocarbon contacts, investigation of reservoir connectivity and quantification of excess pressure, overpressure and depletion.

by seismic tomography, including the evidence for deep mantle roots beneath continents, is most likely associated with the observed strong crustal inhomogeneity. It may be hypothesized that in its early history the Earth had a pan-global granitic-granulitic crust that became chemically unstable during subsequent cooling of the planet. In this process, provided by intermittent mantle upwelling, the virgin crust has been variably thinned/assimilated. Major parts of it has then been replaced by the thin basaltic crust of the oceans, but "undigested" remains of continental material are widely scattered throughout most of the oceanic domain. It appears that we should be talking about CONTINENTAL DESTRUCTION RATHER THAN CONTINENTAL ACCRETION. In fact, with such a starting point a novel dynamical system of the Earth, built on simple physical principles, can be developed, and a long range of previously unrelated phenomena are now automatically connected. Global tectonics appears to be strongly associated with planetary rotation. Foldbelts have developed along the time-equivalent (palaeo-) equators, and their geosynclinal precursor stage follows as a natural consequence of mantle upwelling within a rotating planetary body. By Alpine time the loss of continental crust to the mantle had reached an advanced stage, and as a consequence of planetary rotation the lithosphere turned into a stage of mobility, during which the continents underwent variable azimuthal changes. These mostly minor continental rotations were the result of a certain westward wrenching of the entire global lithosphere, governed by inertia forces. The new mobilistic system explains the observed discrepancies of palaeomagnetically based Apparent Polar Wander Paths, yet the continents have remained fairly stationary with respect to their mantle roots. Wegenerian-type drift, which has caused numerous fitting problems and an endless number of other inconsistencies, is no longer needed. As would be the situation in any case of major paradigm change the whole range of landscapes and seascapes of the past can now be looked at with new eyes and given new meanings.

Laporan (Report)

The Geophysics Working Group of the Geological Society of Malaysia, in collaboration with the local hosts at the School of Physics, Universiti Sains Malaysia, the Department of Geology, Universiti Malaya, and PETRONAS, KLCC, held an exposition on a new model of Earth evolution through a series of 3 seminars/lectures recently. Participation was good with about 90 members, friends and affiliates turning up for the last seminar!

The speaker was Professor Karsten M. Storetvedt, Research Professor from the Institute of Geophysics, University of Bergen, Norway. A distinguished European paleomagnetists, Professor Storetvedt in the mid-seventies brought about a consciousness of remagnetization problems in paleomagnetism, and, the concept a few years ago that the well known diverging APW paths can be fully explained by *in situ* continental rotations. Today, after many plate tectonics based contributions in reputed scientific journals in the earlier years, he is one of the few diehards who completely dismiss plate tectonics.

Professor Storetvedt very kindly presented the following lectures:

Date: Saturday, 28th November, 1998
Time: 10.00 am – 12.30 pm
Venue: School of Physics Conference Room, Universiti Sains Malaysia, Penang
Title: i) Public Lecture — The Wandering Poles: Earth History in New Perspective
ii) Research Seminar — Research methods in Global Wrench Tectonics

Date: Monday, 30th November 1998
Time: 5.00–6.30 pm
Venue: Department of Geology, Lecture Hall, Universiti Malaya, Kuala Lumpur
Title: An Alternative Evolutionary Model for The Earth — Part 1

Date: Tuesday, 1st December, 1998
Time: 10.00 am – 12.00 noon
Venue: Tower 1, Level 41, Petronas Twin Towers, KLCC, Kuala Lumpur
Title: An Alternative Evolutionary Model for The Earth — Part 2


KARSTEN M. STORETVEDT
12 '98
12 '98

Professor Storetvedt's exposition on an alternative evolutionary model of the earth created great interest among our members. It has provoked strong discussions and dissensions. Some members have requested whether we could organise an extended workshop in the very near future. Others would like to meet up again with Professor Storetvedt to iron out certain discrepancies that might have arisen! In summary he has impressed, motivated, shocked, provoked and enchanted us with his 'alternative' lucid thinking.

An extended abstract of Professor Storetvedt's lecture follows. For background information interested readers might like to refer to his recent book [Storetvedt, K.M., 1997. Our Evolving Planet: Earth History in New Perspective. Alma Mater Forlag AS Publishers, P.O. Box 4215, Nygardstangen, N-5028 Bergen, Norway. 456 pp]. Interested readers might also like to contact Professor Storetvedt directly via e-mail at: karsten@gfi.uib.no

Leong Lap Sau

The deep gas potential of the Batu Raja Formation in South Sumatra. A case history: the Singa gas discovery

JONATHAN REDFERN

Laporan (Report)

Dr. Jonathan Redfern of Oxford Brookes University, United Kingdom gave the above talk on the 4th December 1998 at the Geology Lecture Hall, Department of Geology, University of Malaya, 50603 Kuala Lumpur.

Abstrak (Abstract)

The Singa-1 well was completed as a gas discovery in July 1997, proving up the deep potential of the Batu Raja Formation in South Sumatra.

The lead had been identified over 10 years earlier and offered to the industry for farm-in on many occasions. Over the years there were a number of alternative interpretations of the data. The structure may have been just a seismic artefact, or possibly a volcanic feature, but it was also recognised that the feature could be a Batu Raja play. However, the potential for preserved porosity within a Batu Raja carbonate at that depth was generally thought to be low. Added to this, the structural setting, within the Lematang Trough depocenter, also suggested a high risk that the Batu Raja would not be within a reservoir facies.

Reprocessing of the 1990 seismic data showed a marked improvement in resolution and supported the interpretation of a Batu Raja build-up at depth. Although high risk, a wildcat well was eventually proposed to test the concept, with a depth to target of around 12,000 feet. High temperatures and pressures were anticipated, together with overpressured shales in the Gumai Formation, all of which made the well technically challenging.

The results confirmed the model, and the Singa-1 well encountered reservoir quality reefal facies within a Batu Raja limestone buildup, testing gas at 30.7 MMSCFD from a 258 feet gross interval.

Singa-1 tested gas some 3,000 feet deeper than any wells previously drilled in the area, extending the Batu Raja play to new depths within South Sumatra.

JONATHAN REDFERN

Practical use of wireline formation pressure data — estimating fluid content, hydrocarbon contacts, and reservoir connectivity

JIM HOWES

Laporan (Report)

Jim Howes of ARCO Indonesia, gave the above talk at Windows KL1, 30th Floor, K.L. Hilton on Wednesday 9 December 1998. The talk was organised by the Formation-Evaluation Working Group and lunch was sponsored by Baker Atlas.

Description of Talk

His presentation illustrated some of the fundamental principles and applications of formation pressure analysis in exploration, delineation and production. The talk focused on the practical use of wirelines pressure data that is gathered by such tools as the RFT, FMT and MDT. It was shown how these data can be integrated with geology, geophysics, petrophysics, theoretical fluid properties and DST data for an integrated evaluation of the geometry of oil and gas fields. Specific applications of wireline formation pressure data were discussed including interpretation of reservoir fluid content, estimation of hydrocarbon contacts, investigation of reservoir connectivity and quantification of excess pressure, overpressure and depletion.

He indicated that the standard analytical method for interpreting wireline formation pressure data is pressure profile analysis, usually accomplished by means of a simple pressure-depth plot (PD plot). Other ways of manipulating the data are possible, including depth-normalized pressure plots and fluid-potential plots. These three techniques were briefly discussed that pressure gauge accuracy, precision and resolution be understood and appropriate error bars known or estimated. This is particularly important where multiple data sets from different vintages and tools are integrated. These parameters were discussed with examples from an extensive ARCO database.

Finally, pressure profiles from ARCO is offshore NW Java PSC Indonesia will be presented that include subtle overpressure effects related (a) hydrocarbon columns, (b) compaction disequilibria, (c) kerogen to petroleum transformation, and (d) possible onshore hydraulic heads. Over seven billion in subsurface barrels of fluids have been removed through production form this contract area, so original normal and excess pressures have been modified by variable but significant amounts of deficit pressure related to regional aquifer depletion. This has resulted in complex pressure profiles with many subtle discontinuities, and it will be shown that pressure gauge accuracy and gauge precision can become very important in these types of settings.

About The Author

Jim Howes is a geological specialist in Jakarta with Atlantic Richfield Company (ARCO), working on their Offshore NW Java PSC. He has 25 years of experience in oil and gas exploration worldwide, including Europe-Africa, SE Asia-Australasia, and the USA.

He is active in the Indonesian Petroleum Association and is the chairman of the IPA Professional Division in Jakarta. He has presented and published papers on discovery process analysis, petroleum systems and formation pressure analysis.

"Malam WWW: Weather, Weathering & Water"

Laporan (Report)

The "Malam WWW: Weather, Weathering & Water" with 3 different topics was held on 18 December 1998 at Department of Geology, University of Malaya.

The "Malam" series of talks was reactivated partly to attract more members to the Society's technical talks. Hopefully, with 3 speakers talking on various topics, more members would attend.

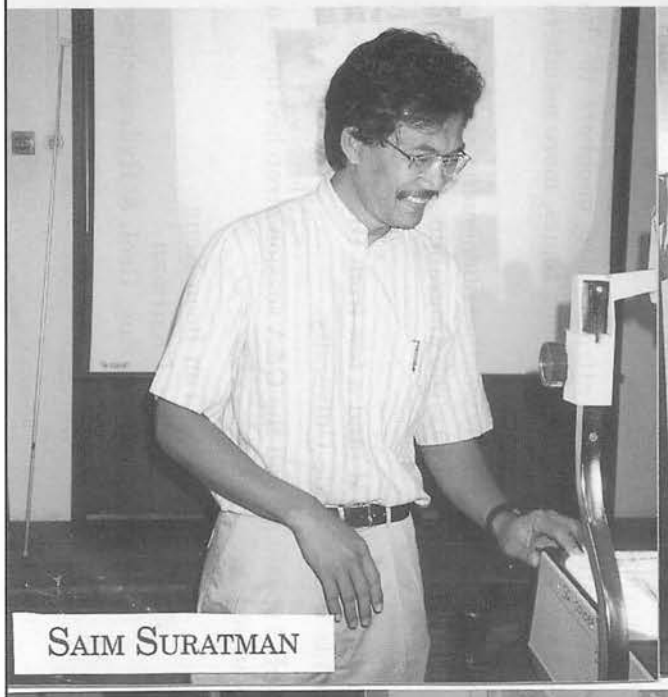
The 3 speakers touched on topics of general interest, namely weather phenomena, weathering of rocks, and recent groundwater studies in the Lelang Valley. The programme and synopsis of the talks are listed below.

Though the attendees were mostly student from UM (and a few from UKM), these was a slight increase in the number of participants from outside University.

Numerous questions were posted to all 3 speakers, and the Q&A session stretched up to a 40 minutes before the gathering was adjourned.

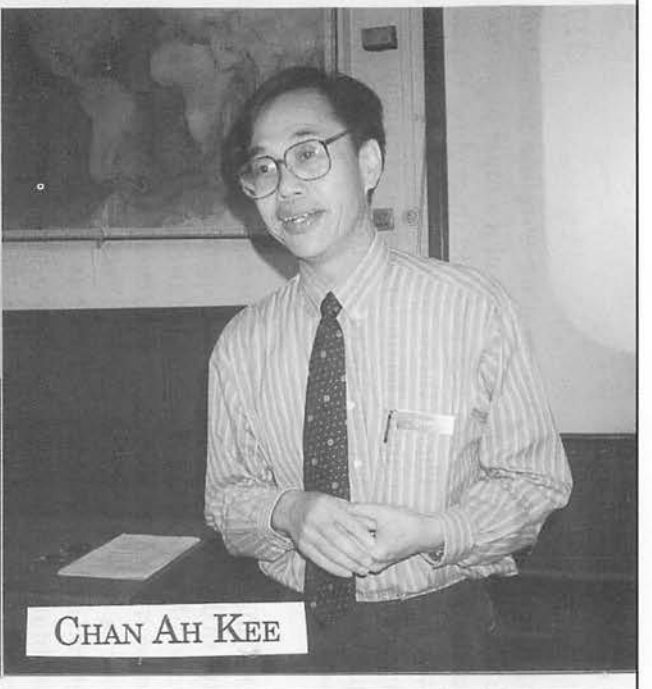
Tan Boon Kong
Chairman
Working Group on Eng. Geol. & Hydrogeology

"Malam WWW: Weather, Weathering & Water"



SAIM SURATMAN

JOHN K. RAJ



CHAN AH KEE

The El Nino & La Nina phenomena

CHAN AH KEE

Abstrak (Abstract)

El Nino/La Nina are extreme cases of a naturally occurring climate cycle controlled by the atmospheric and oceanic conditions over the tropical Pacific Ocean. The heat at the tropical Pacific Ocean interacts with the atmospheric circulation, influencing the distribution of precipitation. The warmer parts of the ocean stimulate convection (rising of air) leading to cloud formation and rainfall. Therefore, any changes in the distribution pattern of the temperature of the ocean surface will affect the distribution rainfall in the tropical Pacific. On the other hand, changes in the atmospheric circulation will also have an impact on the ocean water temperatures and currents. As the ocean surface of the Pacific adjusts to the seasonal movement of the sun and ocean currents, this interaction between the ocean and the atmosphere results in an oscillation of the climate system between what is now termed the El Nino (warm) phase and the La Nina (cold) phase. El Nino occurs when there is a weakening of the trade winds and a dramatic rise in temperature at the central and eastern part of the tropical Pacific Ocean. La Nina occurs when the trade winds strengthen in the tropical Pacific and substantial upwelling of cold water at the south American coast happens, causing a dramatic drop in the sea surface temperature at the eastern Pacific Ocean. The effects of these phases are opposite to each other.

Weathering of granitic rocks

JOHN K. RAJ

Kesimpulan (Summary)

In the Glossary of Geology of the American Geological Institute, weathering is defined as being "the destructive process or group of processes by which earthy and rocky materials on exposure to atmospheric agents at or near the earth's surface are changed in colour, texture, composition, firmness or form, with little or no transport of the loosened or altered material". More specifically, weathering is considered to be "the physical disintegration and chemical decomposition of rock that produce an *in-situ* mantle of waste and prepare sediments for transportation. Most weathering takes place at the surface, but it may take place at considerable depths, as in well-jointed rocks that permit easy penetration of atmospheric oxygen and circulating surface waters. Some authors restrict weathering to the destructive processes of surface waters occurring below 100°C and 1 kb; others broaden the term to include biologic changes and the corrosive action of wind, water and ice" (Bates and Jackson, 1987).

Basically, if artificially, processes of weathering can be subdivided into two broad groups, i.e. Mechanical (or Physical) Weathering, and Chemical Weathering, though sometimes a third group of Biological Weathering can also be distinguished.

Mechanical or Physical Weathering involves the disintegration of rock into smaller fragments with little or no change of the chemical composition.

Chemical Weathering, however, involves decomposition of rock with a change in its' chemical composition. The chemical reactions involved are usually exothermic ones with the new compounds formed being of greater volume and lower density than the original minerals. Water and air are agents involved in processes of chemical weathering.

As weathering occurs *in situ*, the weathered materials gradually accumulate at the site of formation and eventually give rise to a mantle of weathered materials over bedrock. This mantle or cover of weathered materials shows variable patterns and thicknesses that are dependent upon several factors, including lithology (bedrock type) and geological structures (bedding, joints, faults etc.), as well as the past and present climatic settings, biological factors and geomorphic processes operative at the site.

For geological and soil science as well as other agricultural purposes, the morphological zonation is an end-all for this serves the purpose for which it was originally designed, i.e.

defining zones or layers of different features.

In the case of engineering projects in general, and civil engineering in particular, however, the morphological zonation needs more quantification, in particular the need for generalization of physical and mechanical properties. In civil engineering furthermore, there is a need to identify the scale of discussion for definitions of earth materials can be considerably different. For instance in civil engineering, rock material would be material that on the scale of the hand specimen would not disaggregate when agitated in water, whereas soil material would be disaggregated. This is perhaps the most commonly used definition to distinguish between soil and rock materials on the scale of the hand specimen, i.e. as Material. The uniaxial compressive strength, however, has also been proposed to distinguished between soil and rock material (0.25 MPa).

On the other hand, however, when large bodies of earth materials are considered, then different definitions are involved. The terms Rock Excavation and Soil Excavation are normally used in civil engineering projects and need to be properly defined in contract documents as economic costs are involved, Soil Excavation being some RM10 per cubic metre, whereas Rock Excavation is some RM35 per cubic metre. Various ways opfg definitions, as Rock excavation will need explosives (blasting) for economical excavation and so on. However, will dependent upon contract documents and specifications listed.

Here it must be pointed out the importance of the scale of investigation or scale of definition, a feature not often considered in geology.

Furthermore, homogenous and heterogenous rock masses come into play and this therefore influences the description of weathering profiles.

In view of the need for quantification, it therefore becomes necessary in civil engineering works to define more clearly what is implied or meant by the term rock as well as soil, as well as the scale of definition.

To look at weathering from the point of view of hand specimens or samples i.e. material scale, it is best to identify the mineralogical changes that occur with progress of weathering.

These mineralogical changes are in reality very gradual, though for ease of reference may be termed Stages of Weathering.

Stages of weathering also reflected by differences in various physical and mechanical properties, including bulk, dry and saturated densities and porosity.

When the distribution of the stages of weathering of rock material within the weathering profile is determined, a pattern emerges which coincides with the morphological zones.

These morphological zones can then be assigned Grades of Weathering which have mainly connotations that are of use for excavation purposes.

Morphological Zone I (or Rock Mass Weathering Grade 6) is up to some 12 m thick and consists of completely weathered bedrock material that indistinctly preserves the textures, but not the structures, of the original bedrock.

Morphological Zone II (comprising Rock Mass Weathering Grades 5, 4 and 3) is up to 30 m thick and consists of slightly to highly weathered bedrock materials that indistinctly to distinctly preserve the minerals, textures and structures of the original bedrock; the degree of preservation increasing with depth.

Morphological Zone III (comprising Rock Mass Weathering Grades 2 and 1) is separated by a distinct boundary from Zone II and consists of continuous bedrock that shows effects of weathering along, and between, structural discontinuity planes.

There are, however, variations to this generalized weathering profile and result from differences in the textures, structures and mineralogical compositions of the original bedrock mass as well as geomorphological histories.

Recent groundwater studies in the Klang Valley

SAIM SURATMAN AND NAZAN AWANG

Abstrak (Abstract)

Public water supply shortage in the Klang Valley, which was known as the Selangor Water Crisis, has sparked an initiative to find alternative or additional sources by the Selangor state government. Surface water (river and reservoir) dependency has seriously affected the treated water supply system in certain parts of Klang and Langat Valleys during the crisis as resulted from low rainfall in the catchment area of Sg. Klang (Klang Gate area), Sg. Langat and Sg. Semenyih.

To alleviate the problem of water shortages, the alternative source such as groundwater, lake water and water from the former mining ponds were used. Groundwater has played quite significantly towards relieving the crisis and will also help in future water supply, as areas with substantial groundwater reserves have been located.

Like many other resources, groundwater needs protection. Geological Survey Act 1974, Selangor Water Supply Enactment 1997 and Environmental Quality Act 1974 are the existing legislation protecting the resources.

Souvenirs For Sale

In Response to requests by members, the Society has now prepared several souvenir items for sale as follows:

		Unit Price (RM)
1.	Key Chain (brass with epoxy coating and Society Logo)	6.00
2.	Tie Clip (with Society Logo)	7.00
3.	Cap (dark blue, with Society Logo)	9.00
4.	Hat (dark blue, with Society Logo)	10.00
5.	Tie (dark blue with Society Logo)	30.00

Members can purchase/order these souvenir items by contacting:

Anna Lim
Geological Society of Malaysia
c/o Geology Department
University of Malaya
50603 Kuala Lumpur

Fax: (603) 7563900
Tel: (603) 7577036

BERITA-BERITA PERSATUAN
News of the Society

PERTAMBAHAN BAHARU PERPUSTAKAAN
(New Library Additions)

The Society has received the following publications:

1. Bathurst Geological Sheet S1/55-8: 1:250,000, 1998.
2. Geology of NSW — Synthesis. Vol. 2: Geological evolution, 1998.
3. Map: Bathurst: sheet S1/55-8, 1998.
4. Stratotectonic map of NSW: 1:1,000,000, 1997 (4 sheets).
5. Booligal: 1:250,000: Sheet S1/55-5, 1997.
6. Annual Report: Chinese Academy of Geological Sciences, 1996.
7. Acta Geoscientia Sinica, vol. 19, no. 2 & 3, 1998.
8. Journal of Shijiazhuang University of Economics, vol. 20, no. 6, 1997.
9. AAPG Explorer, Nov. 1998.
10. American Museum Novitates, nos. 3236, 3235, 3240, 3242, 3244–3247, 1998.
11. Acta Micropalaeontologica Sinica, vol. 15, nos. 2 & 3, 1998.
12. Palaeontological abstracts, vol. 13, nos. 2–3, 1998.
13. Acta Palaeontologica Sinica, vol. 37, nos. 2 & 3, 1998.
14. Tin International, vol. 71, no. 11, 1998.
15. Mining Statistic, Jan–Mar and Apr–Jun, 1998.
16. AGID, no. 4/5, 1996/97.
17. AAPG Bulletin, vol. 82/10 & 82/11, 1998.
18. Journal of Geosciences, Osaka City University, vol. 41, 1998.

NEW

MALAYSIAN STRATIGRAPHIC GUIDE

Prepared by

Malaysian Stratigraphic Nomenclature Committee

Geological Society of Malaysia

December 1997

BERITA-BERITA LAIN
Other News

Local News

Shiny mineral find is Fool's Gold known as pyrite

The shiny yellow mineral found in Kampung Bakam, a village some 20 km from Miri town, is not gold, Assistant Minister for Resource Planning and Management Datuk Awang Tengah Ali Hasan said today.

"The shiny mineral turned out to be pyrite — commonly called Fool's Gold because it looks like gold," he told a Press conference in his office at Wisma Sumber Alam.

Several weeks ago, a few villagers of Kampung Bakam stumbled upon the shiny mineral while working near the village.

Thinking that it was gold, at least 40 to 50 people could be seen each day digging around the area.

Awang Tengah said he had kept mum over the matter as he wanted the experts to verify the find first.

"Microscopic and chemical analysis of the samples collected by the State's Geological Department found them to be pyrite.'

"As such, I advise the people in Kampung Bakam to stop wasting their time and stop digging."

"I am concerned for their safety because if they keep digging with the bad weather looming, something untoward may happen", he said.

Also present were permanent secretary for Resource Planning and Management Zaidi Zainie and State Geological Department director Alexander Unya.

Awang Tengah said pyrite was commonly used to make sulphur.

"Otherwise it has no real value other than for aesthetic purposes."

NST., 4.11.1998

MMC associate Ashton gets 100% of diamond mine

The Malaysian-controlled Ashton Mining has obtained 100% of the Merlin diamond mine in the Northern Territory with the purchase of the outstanding 22% for A$6.2mil.

Majority shareholder Malaysian Mining Corp (MMC) has a 46.88% stake in Ashton. Ashton purchased the development project from Western Metals ltd.

Ashton chief operating officer Doug Bailey was quoted in *The Australian Financial Review* as saying the acquisition of 100% was important with the first diamonds expected before the end of the year.

He also said the main focus of the Australian Diamond Exploration, acquired from Aberfoyle Ltd., was to explore the region surrounding Merlin as results to date suggest the presence of more diamond bearing structure.

Merlin was first acquired by Western Metals through its recent takeover of Aberfoyle.

Western metals recently started an aggressive sales of unwanted assets.

The Merlin diamond mines is nearing completion with commissioning of stage one in December.

Stage one at Merlin, costing A$28mil, involves mining diamonds from four of the 12 major pipes which has so far produced up to 300,000 carats a year.

The valuation for stones from the first four pipes have produced returns of between US$41 and US$140 a carat.

Bailey told *Star Business* that Ashton would announce its marketing plans for Merlin diamonds soon.

He said the Merlin stones were of higher quality than average Argyle output, adding that they were considering selling them through the De Beers-controlled Central Selling Organisation.

Star., 4.11.1998

Perlis cave crystal under threat

Illegal prospectors have been stealing crystal stones from limestones caves in the Chuping Hills, about 20 km from here, over the past two months.

They come in cars during weekends and hack away the crystal, stalagmite and stalactite formations which take thousands of years to form, mostly in the Bukit Serendang and Panggas caves.

They then extract the crystals, embedded in the stalagmites and stalactites, and sell them for between RM200 and RM500 each.

While some buy the crystals for decorative purposes, others believe they possessed supernatural powers.

A resident in Kampung Air Timbul, near Bukit Serendang, who declined to be named, said visitors to the caves used to take back small pieces of crystals, stalagmites and stalactites as souvenirs.

"But over the past two months, a group of people come during weekends and cart away the crystals for sale in Alor star," she said.

Perlis-based World Wide Fund For Nature Malaysia (WWF) senior scientific officer Hymeir Kamarudin said the formations had taken thousands of years to take shape.

"It takes between 90 years and 100 years for the growth of an inch of a straw, a secondary formation on a stalactite."

"Imagine how long it would take for the formation of a stalagmite or a stalactite," he said.

State Land and Mines committee chairman Datuk Yazid Mat said the land and mines department would investigate the matter.

He said it was illegal to hack out the crystal formations from the caves for commercial purposes.

He said the culprits could be penalised under the National Land Code 1965.

"We do not know the extent of the damage but the matter will be addressed immediately," he said.

Star., 14.11.1998

Petronas and Esso to develop 22 gas fields

Petroliam Nasional Bhd. (Petronas) and Esso Production Malaysia Inc. (EPMI) will jointly invest RM16 bil to develop 22 gas fields offshore peninsular Malaysia under a new production sharing contract (PSC).

The investment will be made in stages over a period of 10 to 12 years and the 22 fields have estimated gas reserves of approximately 12.6 trillion standard cubic feet.

The PSC signed between Petronas, EPMI and Petronas Carigali Sdn. Bhd. yesterday in Kuala Lumpur formalised the agreement reached last year.

Petronas and EPMI will hold equal stakes in the PSC and funding for the development will be sourced internally by both companies.

"The two contractors will supply 1.3 billion standard cubic feet per day of gas to the peninsular gas utilisation (PGU) project until the year 2027," Petronas president and chief executive Tan Sri Mohd Hassan Marican said after the signing ceremony.

Hassan said the new PSC marked another important milestone in the development of local gas resources to supply the power generation and industrial needs of the country through the PGU project.

The first gas supply from the project is scheduled for year 2002. Gas supply from the new PSC gas fields will add to the volume already committed to the PGU project from the existing EPMI-operated fields.

Your Partner in Microscopy & Microanalysis

LEO VP SEM

LEO FE SEM

KSI SAM

LEO EF TEM

MICRION FIB

MICRION IN-LINE FIB

CAMECA TOF SIMS

CAMECA EPMA

CAMECA IMS SIMS

- Research Optical Microscopy
- High Frequency Scanning Acoustic Microscopy (SAM)
- Infrared Microscopy
- XYZ Measuring Microscopy
- Confocal Laser Scanning Microscopy (CLSM)
- Scanning Electron Microscopy (SEM, VP SEM, FE SEM)
- Energy Filtered Transmission Electron Microscopy (EF TEM)
- X-Ray Microanalysis System (EDX, WDX)
- Focused Ion Beam System (FIB)
- Secondary Ion Mass Spectrometry (SIMS)
- Electron Probe Microanalysis (EPMA)
- Vacuum Technology (Pumps, Leak Detectors, Components)
- Thin Film and CD Measurement
- Imaging Processing and Analysis (IA)

HI-TECH INSTRUMENTS SDN BHD

Head Office: 9A Jalan USJ 11/3, 47620 UEP Subang Jaya, Selangor Darul Ehsan, Malaysia.
Tel : 603-737 0980 Fax : 603-737 0950

Penang Branch: 29, Lorong Helang Dua, Desa Permai Indah, 11900 Pulau Pinang.
Tel : 604-659 9152/153 Fax : 604-659 9154
E-mail: Sales@htimail.com.my
Service@htimail.com.my

Schlumberger's New Fullbore Formation MicroImager Doubles Your Coverage With Core-Like Clarity

The FMI* fullbore electrical imaging tool makes evaluation of complex reservoirs simpler and quicker than ever before. Its 192 microelectrical sensors give you twice the coverage of previous tools and improved spatial resolution, to 0.2 inches.

The fullbore images enable direct structural analysis and characterization of sedimentary bodies even in extremely complex sequences. The fine detail provided by FMI images allows determination of paleocurrents and rock anisotropy, including the recognition of permeability barriers and paths. And determination of net-to-gross ratio in thin bed sand/shale sequences is automatic.

Understanding the internal structure of the rock can confirm hypotheses regarding its geological evolution and can provide valuable clues to geologists and engineers regarding local porosity and permeability changes. This is possible with the enhanced textural analysis from the new high-resolution sensors, as well as detailed evaluation of fracture networks and other secondary porosity.

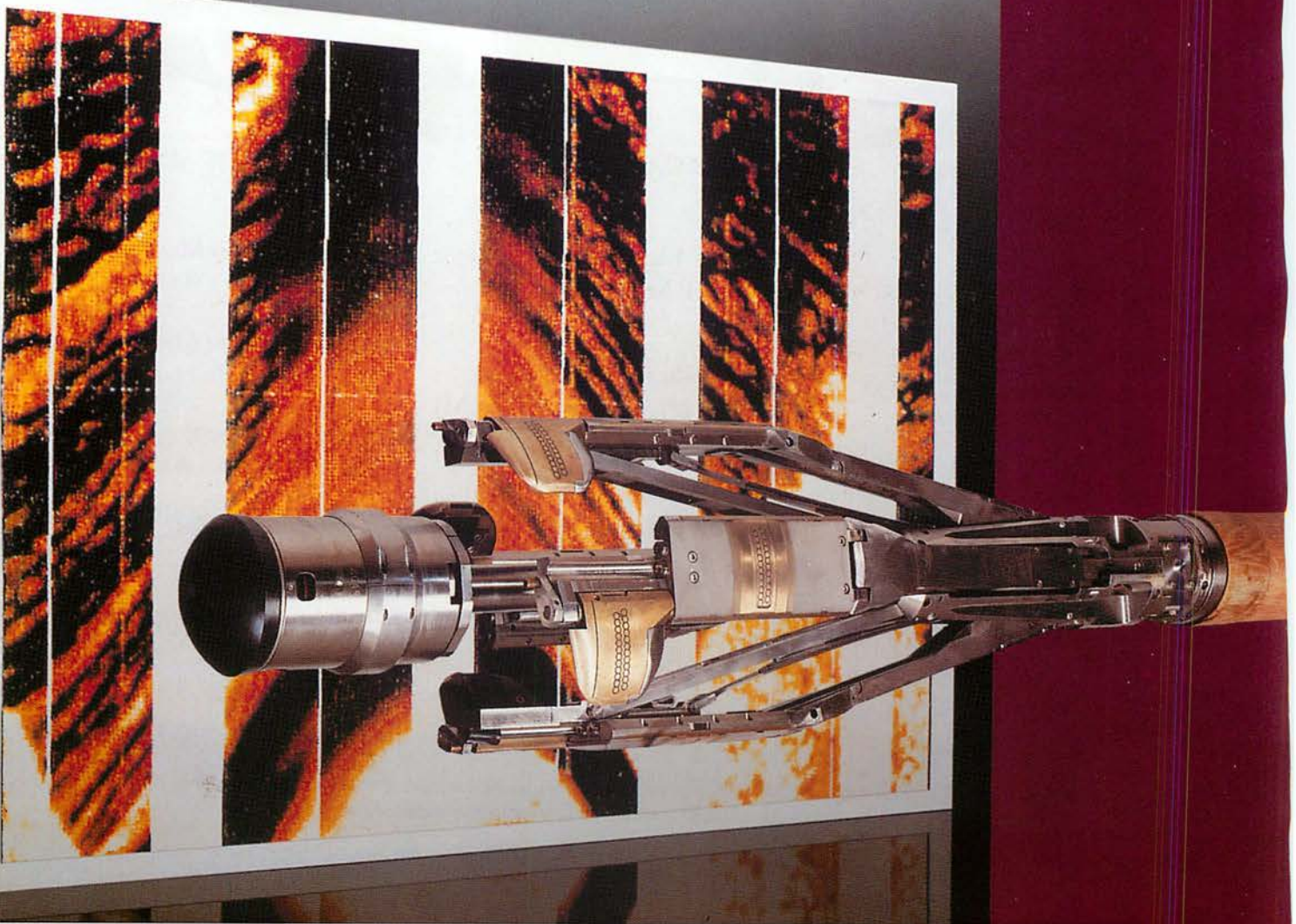
Ask to see an example of the new FMI log. You'll be looking at the clearest, most complete picture of the rock available today.

Schlumberger (Malaysia) Sdn Bhd., 7th & 8th Floor, Rohas Perkasa No. 8, Jalan Perak, 50450 Kuala Lumpur.
Tel: (03) 2667788. Fax: (03) 2667800.

Schlumberger

Value is the difference.

Mark of Schlumberger–the FMI tool is a MAXIS 500 tool



The Schlumberger Ultrasonic Borehole Imager Detects Openhole Problems and Fractures, Even in Oil-Base Muds.

Accurate, high-resolution, acoustic measurements by the UBI* Ultrasonic Borehole Imager let you examine an openhole for stability problems, deformation and fractures when nonconductive, oil-base muds prevent resistivity measurements. On the same trip, the UBI rotating transducer can check for corrosion and mechanical wear of the internal surface of the casing as the tool is pulled out of the hole.

No other borehole measurement gives you the thin-bed resolution you get with the UBI tool. The images, cross-section plots and pseudo-3D "spiral" plots generated from UBI measurements also reveal keyseats, breakouts, shear sliding and shale alteration to help you avoid the added drilling costs that result from stuck pipe and lost time or equipment. In addition, you get horizontal stress information for mechanical properties evaluations to predict breakouts and perforation stability in unconsolidated sands.

Talk to your Schlumberger representative about detecting openhole problems and fractures acoustically, even in oil-base muds. What UBI images show you could save you time, expense or possibly your well.

Schlumberger

Value is the difference.

Mark of Schlumberger–the UBI tool is a MAXIS 500 tool

Schlumberger (Malaysia) Sdn Bhd., 7th & 8th Floor, Rohas Perkasa
No. 8, Jalan Perak, 50450 Kuala Lumpur.
Tel: (03) 2667788. Fax: (03) 2667800.

Common Rocks of Malaysia

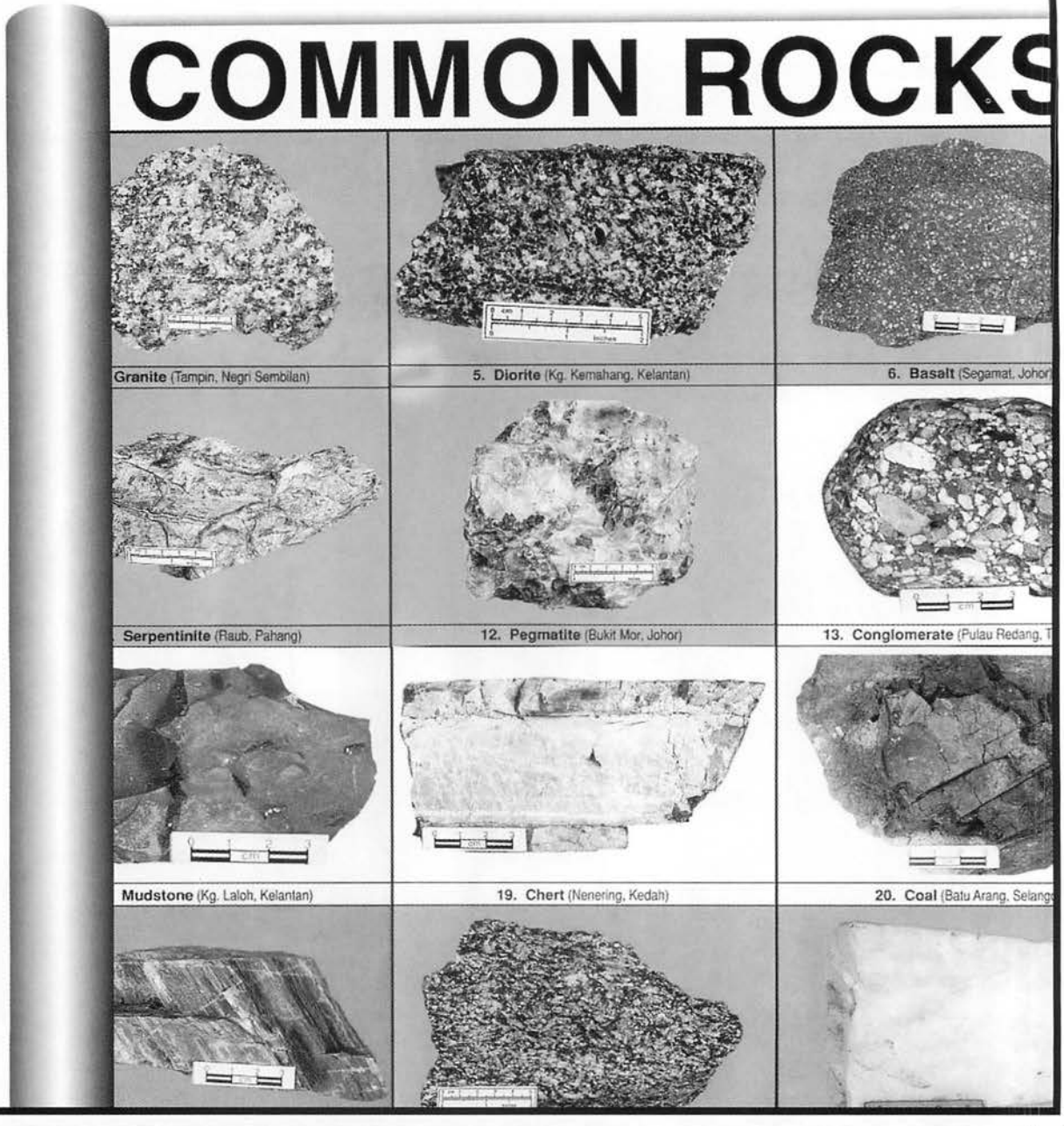
A full colour poster illustrating 28 common rocks of Malaysia. With concise description of the features and characteristics of each rock type including common textures of igneous, sedimentary and metamorphic rocks.

Laminated

Size: 94 cm x 66 cm (42" x 26")

Price:

Student members	RM7.00 (one copy per member, subsequent copies RM10.00 each)
Members	RM8.00 (one copy per member, subsequent copies RM10.00 each)
Non-members	RM10.00 per copy



Cheques, Money Orders or Bank Drafts must accompany all orders. Orders will be invoiced for postage and bank charges. Orders should be addressed to:

ORDERS

The Hon. Assistant Secretary
GEOLOGICAL SOCIETY OF MALAYSIA
c/o Dept. of Geology, University of Malaya
50603 Kuala Lumpur, MALAYSIA

This will be sufficient to meet about two-thirds of the projected gas demand in the Peninsular Malaysia for the next 25 years. Other PSC contractors are expected to cater to the remaining demand.

EPMI will operate the fields around its existing production hubs of *Jernih* and *Lawit*, while Petronas will operate the new *Angsi* field and nearby facilities.

A 160 km gas pipeline will be installed from *Angsi* to the Petronas gas processing plants in Kertih, Terengganu.

"With this PSC agreement, EPMI has agreed to relinquish to Petronas the remaining undeveloped gas fields it had discovered under the 1976 PSC," Esso Malaysia chairman and chief executive Datuk Philip J. Dingle said.

EPMI is a unit of the Esso group of companies in Malaysia.

Dingle said 13 of the relinquished fields, together with nine Petronas gas-cap fields from the PM-9 and 1995 PSCs, would then be included in the new PSC.

Dingle said about 40% of the total RM16 bil would be invested in the first three years, after which 30% would be invested over the next three to five years and the remainder in the following years. The first platform will be ready by year 2000.

Star., 18.11.1998

50% drop in EIA reports to DOE

The number of Environmental Impact Assessment (EIA) reports submitted to the Department of Environment this year has dropped significantly from previous years, most likely because of the economic slowdown.

The department's EIA director Lee Heng Keng said that as of three days ago, only 203 reports had been submitted for approval compared with last year's total of 414 reports.

"This constitutes a drop of about 50% from last year's corresponding period," he said in an interview.

According to the 1997 Environmental Quality Report, the DOE received a record number of EIA reports last year, the highest since the EIA Order was enforced in 1988 (see Chart).

The most significant drop in the number of EIA reports submitted this year compared with last year was in housing, infrastructure development, quarrying, and resort and recreation development activities.

"The most likely reason for the decrease is the country's economic situation,", Lee said, noting that the constant increase in the number of submitted EIA reports since 1988 indicated a growing awareness and commitment by developers to conduct EIAs.

However, he said there was an increase in the number of EIA reports submitted for agricultural, fisheries and water supply activities.

He said the DOE was concentrating on post-EIA monitoring work to ensure compliance with EIA conditions now that it had more time on its hands.

To a question, he said the quality of some of the EIA reports submitted this year still lacked in professionalism and expertise.

Star., 25.11.1998

Proposal to channel water from Hulu Perak to Kedah

A private company in Kedah has proposed the construction of a tunnel to channel water from a river at Hulu Perak to Sungai Muda in Kedah to overcome the future water shortage problem in Penang and Kedah.

Mentri Besar Tan Sri Ramli Ngah Talib said the company made the proposal to the Economic Planning Unit (EPU) in the Prime Minister's Department.

He said EPU is studying the project in detail while the Perak Government was carrying out a feasibility study on it.

Ramli said in principle the Perak Government had agreed on the project, but added

that a proper study must first be conducted.

"We have to ensure there is adequate water supply for consumers here and also to the 12 ha of padi fields in the area."

"Besides that, we also have to ensure that the channelling of water from the river in Hulu Perak would not affect the water level at the Temenggor and Kenering dams which are used to generate electricity."

He was speaking to reporters after opening an international conference on Hydrology and Water Resources in the Humid Tropics here yesterday.

Ramli said the untreated water from the river in Hulu Perak would be supplied to Sungai Muda in Kedah, which would later be treated and supplied to consumers in Penang and Kedah by the private company.

He said Perak, which had a surplus in water supply, would be able to help both the states to help offset an anticipated shortage of water during the dry spell.

In March this year, Ramli had said that Penang had asked Perak for water and the state government had been considering the request.

Star., 26.11.1998

Tell-tale signs of danger evident 'two years ago'

Tell-tale signs of the danger from the landslide that occurred in Paya Terubong yesterday afternoon have been evident for more than two years.

"These tell-tale signs were in the form of small rocks falling and the sprouting of six or seven 'waterfalls' from the face of the hill after heavy rain," Bayan Baru Member of Parliament Wong Kam Hoong said today.

"The falling rocks, although small, were an indication that the soil had become loose while the sprouting of the waterfalls should have been taken as an indication that something was not right with the drainage," he said.

Saying he had received complaints from residents since 1995, Wong added that he believed the cause of the landslide was overdevelopment of the hillslope and poor drainage.

He was speaking to reporters after visiting the scene of the landslide this morning with Chief Minister Tan Sri Dr. Koh Tsu Koon and Paya Terubong State Assemblyman Dr. Loh Hock Hun.

The landslide which occurred about 3.30 pm near the Sun Moon City flats along Lorong Bukit Kukus yesterday, sent waves of fear among the more than 5,000 families living in the housing estate, especially those living in Block 8, barely 10 metres from the scene of the incident.

It brought down a giant boulder and three huge rocks weighing no less than 150 tonnes and more than 1,000 tonnes of mud.

As an immediate safety measure, Fire and Rescue Department personnel are flushing down other remaining rocks on the hillslope with water from a Morita Skylift.

Plans are under way for police and Public Works Department personnel to blow up some of the big boulders perched precariously on the hill to prevent them from crashing down.

NST., 30.11.1998

Landslide blamed on 'too much development'

Too much development along the Paya Terubong hillslopes and poor drainage have been cited as likely causes of Saturday's landslide, reportedly the state's worst in recent years.

Bayan Baru MP Wong Kam Hong said each time it rained, four "waterfalls" appeared on the Bukit Awana slope where the landslide occurred.

"Better drainage is needed for the area to prevent another landslide."

"Rockfalls are also common in Jalan Bukit Kukus since the Sun Moon City, Saujana and Awana apartment blocks, which house about 7,000 residents, were completed," he said.

Wong said complaints had been forwarded to the state government some time ago.

"A Paya Terubong Hillslope Development Committee headed by Datuk Dr. Hilmi Yahya was set up following these complaints."

"Among the actions taken by the committee were to stop hillside development, review hillside housing plans and strengthen the area's slopes," he said.

Chief Minister Tan Sri Dr. Koh Tsu Koon said he would direct the relevant authorities to conduct a specific geo-technical study on the Paya Terubong slopes.

The results of the study would be then used to curb further landslides.

He said the state government had also to rely on developers' consultant engineers to certify that structures and the buildings were safe before occupancy.

Star., 30.11.1998

Petronas signs production sharing deal

Petronas yesterday signed a production sharing contract (PSC) with YPF Malaysia Ltd., Mitsubishi Corp and Petronas Carigali Sdn. Bhd. for Block SK301 offshore Sarawak.

The minimum financial commitment to the block is US$13 mil.

YPF Malaysia is a subsidiary of YPF International Ltd., whose parent company is YPF SA or Argentina.

It will hold a 63.75% interest in the block, Mitsubishi Corporation 21.25% and Petronas Carigali 15%.

YPF Malaysia will operate the block, Petronas said in a statement in Kuala Lumpur yesterday.

The signing of the PSC marks YPF's debut in the Malaysian upstream sector, making it the third new foreign player to have entered the sector this year.

The PSC is the 10th signed under the revenue-over-cost-scheme introduced by Petronas since 1997 to promote and attract investments in the country's exploration and production activities.

Block SK301, located about 270 km offshore Sarawak, covers an area of 8,200 sq km and comprises the relinquished part of Block SK-1, which had previously been explored by Sarawak Shell Bhd. and Idemitsu Sarawak Oil Corp.

Under the PSC signed today, the contractors will acquire and process a 3,000 line-km new 2D seismic data and reprocess a 1,500 line-km existing 2D seismic data.

The contractors will also drill two wildcat wells and conduct a series of geological and geophysical studies.

YPF Malaysia is actively engaged in the oil and gas upstream and downstream activities both on the domestic and international fronts.

Its international operations, via subsidiary YPF International, include ventures in Bolivia, Ecuador, Indonesia, the United States and Venezuela.

Mitsubishi Corp., on the other hand, has been Petronas's partner in a number of projects since the 80s.

NST., 1.12.1998

Nuke test monitoring station at Dengkil

The station to monitor nuclear tests in the region for the Comprehensive Nuclear Test Ban Treaty will be located in Dengkil, Sepang.

The site is about two kilometres from the Malaysian Institute of Nuclear Technology Research (MINT) which will build and operate the 322nd monitoring station.

MINT director-general Dr. Ahmad Sobri Hashim said the site was most suitable for the detection of signs of radiation in the atmosphere.

The Comprehensive Nuclear Test Ban Treaty Organisation's preparatory commission executive secretary Dr. Wolfgang Hoffman had visited the site recently.

The station is expected to be ready in the year 2000 and the cost will be borne by the Vienna-based organisation.

Two officers from MINT will be in charge of the station. They will undergo further training soon.

Ahmad Sobri said the station would detect airborne radionuclide resulting from nuclear tests.

"With the technology available, we will know immediately if there is a nuclear test. We will know exactly who has exploded the device and where it happened," he said.

The country will be able to gain access to the latest seismic, hydroacoustic and infrasound technology from the arrangement.

While a radionuclide station picks up signs of radiotion in the atmosphere, the infrasound technology measures low-frequency sound waves in the air.

Seismic equipment measures shockwaves in the earth and hydroacoustic devices are used to measure soundwaves in water.

Ahmad Sobri said the station would put Malaysia at the forefront of international efforts to monitor the test ban.

"By next year, we will be actively involved in the CTBT which is in line with our international stand," he said.

Malaysia is committed to the goals of complete nuclear disarmament and supports all international efforts on non-proliferation of nuclear weapons.

Malaysia signed the CTBT on July 23. Ahmad Sobri said the country would be ratifying the treaty next year.

MINT will act as the national agency for overseeing the implementation of the requirements of the treaty.

Since the CTBT was open for signature on Sept 24, 1996, 151 countries have signed it.

For the treaty to be enforced, all the 44 countries which have nuclear research reactors in their territory must ratify it. Up to July, only 15 countries have ratified the treaty.

The CTBT bans all nuclear weapon test explosions and any other nuclear explosion. It has established the International Monitoring System to provide a verification regime that consists of consultation, clarification and on-site inspections.

The IMS provides timely data on events at nuclear site.

NST., 3.12.1998

Three departments which deal with minerals to merge

Three departments under the Ministry of Primary Industries which deal with minerals will be merged next year to provide a uniform and co-ordinated approach to the development of the nation's mineral resources.

The affected bodies are the Geological Survey Department, Minerals Department and the Minerals Research Institute of Malaysia.

Primary Industries Minister Datuk Seri Dr. Lim Keng Yaik said the Cabinet had given the greenlight for the proposed merger two weeks ago.

He said the new department, which would be headed by a director-general, would be called Minerals and Geosciences Department.

It would still be under the purview of the Primary Industries Ministry.

"I have given them (the three departments) six months to work things out."

"In fact, we are already many years late (in this merger)," he told reporters after commissioning a pilot coal research plant at the Geological Survey Department in Kuching yesterday.

Dr. Lim explained that the proposed merger would create a uniform national policy on the development of mineral resources and, among others, would make life easier for potential investors in this sector.

Among those present at the function were Assistant Resource Planning and Management Minister Datuk Awang Tengah Ali Hasan, Geological Survey Department director-general Chen Shick Pei and its State director Alex Unya, and Dr. W.G. Wunder, a representative from the German Embassy in Malaysia.

Dr. Lim also urged all State governments to adopt the State Mineral Enactment as soon as possible to ensure that the National Mineral Policy could be effectively implemented.

"When we first brought up this subject two years ago, all the States agreed to the idea but so far they have not adopted it."

"This enactment is necessary because land is a State function and we have to respect the rights of the various States," he said.

Asked on the imposition of a five per cent sales tax on sale of palm oil and palm kernel oil

by Sarawak from Oct 1 as provided for under the Sales Tax Ordinance 1998, Dr. Lim said he had discussed the matter with Chief Minister Tan Sri Abdul Taib Mahmud yesterday.

At present, the sales tax would be lifted when the price of this commodity falls below RM1,500 per tonne.

The current price is RM2,300 per tonne.

"I have requested the State Government to continuously hold dialogues with oil palm investors in the State on this matter and not to make the quantum of the sales tax or the RM1,500 limit a dead figure but one which can be adjusted according to market conditions to ensure fairness to all those involved," Dr. Lim said.

NST., 9.12.1998

Private sector told to develop local coal resources

Primary Industries Minister Datuk Seri Dr. Lim Keng Yaik yesterday urged the private sector to take advantage of the vast opportunity to develop local coal resources on a large scale.

He said such ventures were not only good for business but would also help reduce the outflow of foreign exchange.

Speaking at the commissioning of a pilot coal research plant at the Geological Survey Department in Kuching, Dr. lim said Malaysia currently required about 2.5 million tonnes of coal annually and this amount was almost entirely imported although the country's coal reserve presently stood at 980 million tonnes.

The import bill for coal last year exceeded RM350 million and it was used for the Sultan Sallahuddin Abdul Aziz power station at Kapar, Selangor, the Sejingkat station in Kuching, and also for the manufacture of cement.

Over the next few years, demand for coal is expected to increase dramatically with the proposed addition of 3,100 megawatt of power generation capacity.

"It is estimated that the coal requirement for this country will rise to 6.1 million tonnes by the year 2000 and 11.5 million tonnes by the year 2005."

"If this amount of coal was to be imported, it would represent a hefty increase in our import bill, amounting to more than RM1 billion by the year 2005," he said.

Among those present at the function were Assistant Resource Planning and Management Minister Datuk Awang Tengah Ali Hasan, Geological Survey Department director general Chen Shick Pei and its State director Alex Unya, and Dr. W.G. Wunder, a representative from the German Embassy in Malaysia.

On the pilot coal research project which cost RM1.7 million, Dr. Lim said it represented the culmination of 15 years of cooperation between the Institute of Geosciences and Resources of Germany and the Geological Survey Department. He thanked the German Government for the project.

NST., 9.12.1998

M'sia becomes Asian home for Blue Circle

Malaysia will be home to one of the biggest cement investments of Britain's Blue Circle group after the completion of its acquisition of two other local cement companies, Associated Pan Malaysia Cement Sdn. Bhd. (APMC) and Kedah Cement Holdings Bhd.

The two acquisitions, valued at a total of RM1.56 bil, are being made via Blue Circle plc's 57.8% owned Malaysian subsidiary Malayan Cement Bhd. (MCB), which is buying the remaining 50% of APMC and 65% of Kedah Cement.

"Blue Circle's investment in Malaysia is by far the largest in the region and is one of the largest event in the global context if seen in terms of installed capacity," MCB managing director Alistair Cox said, referring to the 12 million-tonne production capacity which will come under the control of the company.

In Britain, Blue Circle has been and a half million tonnes of installed capacity while in North America, it owns about 10 million tonnes.

Cox was speaking to reporters in Kuala Lumpur yesterday after MCB's EGM at which

resolutions pertaining to the company's proposed acquisitions were approved by shareholders.

"We expect to complete the acquisition of APMC by year's end and of Kedah Cement by April next year ..... The rights issue and the general offer for the remaining Kedah Cement shares should be completed by June 1999," Cox said.

He said MCB was not looking to purchase any other cement interests in the country currently.

"It would be difficult to justify to the Government the feasibility of another significant investment on our part after the completion of these two large investments," he explained.

MCB would end up with close to 50% of Peninsular Malaysia's total cement market and about 22% of Singapore's on completion of its acquisitions.

Cox said the integration of APMC and Kedah Cement to derive benefits such as cost-savings would start in March and not when MCB had acquired a 100% stake in Kedah Cement.

"Kedah Cement's Langkawi plant has a direct port facility and deepwater access and it will be used to export our cement and clinker to our Singapore facility because of its lower freight rates," he said.

The move was also necessary because the Singapore government would not be renewing licences of existing cement manufacturers in the republic on expiry of their factory leases.

Most of Kedah Cement's products would also be redirected to other markets such as Sabah and Sarawak and countries where Blue Circle had a presence such as Bangladesh and Sri Lanka, Cox said.

He said there were no plans to de-list Kedah Cement should MCB end up with more than a 75% stake in it after completion of the general offer.

"We will look at various options to ensure that the holding company retains its listed status," he said.

On the outlook for the local cement industry, Cox said it would take about five years for demand to return to the high levels last seen in 1997.

Star., 16.12.1998

Petronas-operated field commences production

Prime Minister Datuk Seri Dr. Mahathir Mohamad yesterday officially launched the commercial production of crude oil from an offshore Vietnamese oil field operated by Petroliam Nasional Bhd. (Petronas).

Located about 155 km off the coastal city of Vung Tau, *Ruby Field* is the first overseas exploration and production project undertaken by Petronas as an operator.

Production at the field, at an initial rate of 8,000 barrels per day (bpd), had begun on Oct 22, 10 days ahead of the original schedule.

*"The commencement of the **Ruby Field** production is a major milestone for Petronas in its quest to augment its petroleum reserves through global exploration ventures,"* the national oil company said in a statement released in Kuala Lumpur yesterday.

"The successful implementation of the project will also add value to the Petronas group's business and contribute towards achieving its goal of deriving 30% of its revenue from international operations," it said.

The crude produced from the drilling platform Ruby A is piped to and processed at the nearby floating production storage and offloading facility (FPSO) *Ruby Princess*. The field is planned to produce 20,000 bpd in 1999, peaking at 25,000 bpd by the year 2000.

Petronas is operating the field under a production sharing contract (PSC) signed on Sept 9, 1991, with PetroVietnam, the state oil company of Vietnam.

Petronas has an 85% equity in both Blocks 01 and 02 within which *Ruby Field* is located. The balance 15% is owned by PetroVietnam unit PetroVietnam Exploration & Production Co.

During the 25-year contractual period, Petronas and PetroVietnam, as joint contractors, have petroleum exploration, development and production rights in the Mekong Basin, Con Son High and Nam Con Son Basin in Blocks 01 and 02.

Exploration work in the blocks started on Aug 31, 1992, and the *Ruby Field* was discovered in June 1994 and declared commercially viable

on Aug 25 the following year.

The development of the field is being carried out in two phases. Phase One, which is the pilot production phase, includes the construction of the drilling platform and the FPSO.

Phase Two, or the full field development phase, conceptually comprises three additional platforms and a floating storage and offloading vessel to develop the remaining reserves of *Ruby Field* and adjacent discoveries in Blocks 01 and 02.

Apart from *Ruby*, Petronas also operates the Dai Hung oil field in Vietnam. Downstream, the company is involved in a liquefied petroleum gas terminalling, bottling and distribution joint venture in Hai Phong as well as a polyvynyl chloride project in Vung Tau.

To support its operations in Vietnam, Petronas has set up offices and facilities in Vung Tau, Hanoi and Ho Chi Minh City.

Star., 18.12.1998

Esso completes fifth offshore platform

Esso Production Malaysia Inc., an affiliate of Exxon Corp, has completed the installation of a fifth satellite platform, *Tapis E*, for its ongoing *Tapis Field* development programme.

The company said in a statement yesterday that the new platform would help sustain Malaysia's production capacity and continued oil and gas development.

Tapis E is 200 km off the Terengganu coast, in an area covered by the 1995 production sharing agreement between Esso and Petronas Carigali Sdn. Bhd.

*"**Tapis E** will extend the development to the western and southwestern areas of the field. The field was first discovered in 1969 and its development commenced with the initial production from the **Tapis A** platform in 1978."*

*"Ultimately, recovery from the **Tapis Field** is expected to exceed 400 million barrels of oil,"* the statement said.

The platform was designed and constructed entirely by Malaysian companies.

It was designed by Protek Consultant Sdn. Bhd. as an integrated deck facility with a four-legged jacket.

According to Esso, fabrication work on the jacket and topsides began in July 1997 at Promet's yard in Teluk Ramunia, Johor and was completed in one year.

*"Offshore installation was carried out successfully by Nippon Steel Corp (M) Sdn. Bhd. in August this year using the derrick barrage **Kuroshio 1**,"* it added.

Star., 19.12.1998

Esso to resume exploratory drilling off Malaysian shores

After a hiatus of over two years, Esso Production Malaysia Inc. will resume exploratory drilling in the oil company's acreage offshore Peninsular Malaysia and Sarawak.

In an article in its in-house publication *Esso in Malaysia*, the company said the first well would be drilled at the Sepat structure, a gas appraisal well under the new Gas Production Sharing contract.

This would be followed by another gas appraisal well at the Inas Field before moving to the PM-5 and PM-8 acreage where several wildcat and appraisal wells are planned.

Esso's first exploratory well offshore Sarawak was also planned under this campaign.

The Sarawak well is in the company's recently acquired SK-B deepwater block.

Esso exploration manager Rocky Becker said in the article: *"We have invested considerable technical effort over the past two years to mature our prospect inventory."*

"We are confident that this drilling campaing will add additional hydro-carbon resources for the company as well as help commercialise part of our discovered resource base."

Becker said through the application of its best technology and knowledge of the area from past technical studies, *"we anticipate a successful drilling campaign"*.

NST., 25.12.1998

Third International Conference on Environmental Chemistry and Geochemistry in the Tropics — GEOTROP '99

November 24–27, 1999

Second Announcement

Organizers

- Institute for Natural Resources and Waste Management, hong Kong Baptist University
- The British Council
- Society for Environmental Geochemistry and Health (SEGH)

Sponsors

The Croucher Foundation

Background

The Society for Environmental Geochemistry and Health (SEGH) holds regular conferences related to environmental chemistry and geochemistry in the tropics. The first and second meetings were held in Jamaica and Malaysia in 1995 and 1997 respectively. The third meeting will be organized at Hong Kong Baptist University from November 24 to 26, 1999 in Hong Kong. An optional 2-day field visit to Guangzhou Province will be organized from November 26 to 27, 1999.

Objective

There is a growing awareness of the effects of human activity on the environment, especially in the tropics and subtropics. The Conference seeks to provide a forum for experts in various areas of specialization to explore freely and exchange ideas in understanding our physical surrounding and its relationship to our activities.

Themes

The major themes include:

- Pollutant transport in tropical soils
- Exposure and health
- Risk assessment and management
- Remediation of contaminated areas
- Management strategies for contaminated areas
- A special session devoted to tropical and subtropical soils
- A special session on environmental problems in China

Date and Venue

The Conference will be held at the Lam Woo International Conference Center, Hong Kong Baptist University from November 24 to 26, 1999. The optional 2-day field visit to Guangzhou Province will be organized from November 26 to 27, 1999.

Extension of Deadline

The deadline for abstract submission has been extended to August 15, 1999.

Submission of Papers

The Conference will consist of invited keynote lectures, oral presentations and poster displays. Participants intending to contribute papers or posters should submit an abstract of no more than 300 words in English to the Organizing Committee. The abstract should be typed on A4-size paper with abstract title, names of authors and their affiliations clearly shown.

Preprints/Proceedings

Conference abstract preprints will be distributed on-site upon registration. Selected papers (oral and poster presentations) will be published in "Environmental Geochemistry and Health" (Kluwers) as a special issue after they have been peer-reviewed.

Optional Field Visit to Guangzhou Province

A 2-day optional field visit to Guangzhou Province for studying recent environmental changes due to the rapid economic development of the South China Region will be arranged for the participants of the Conference from November 26 to 27, 1999. The participants will stay one night at a hotel in Guangzhou.

Selected Papers

- McLaughlin (Australia)
  Measuring long-term reactions of metals in soils
- S.P. Bl (China)
  Investigation of the effect of aluminum on the acid-neutralizing capacity in natural water
- C. Tu (China)
  Effect of heavy metals on phosphorous sorption by red earth
- N. Raman (India)
  Remediation of tannery polluted soils in India
- N. Vasudevan (India)
  Biotreatment of petroleum oil sludge contaminated soil
- D. Nacapricha (Thailand)
  An index for evaluation of metal stabilization ability of adsorbent
- J. Shiowatana (Thailand)
  A flow system for metal speciation in soil by sequential extraction
- B. Shutes (UK)
  Wastewater treatment at Paya Indah, Malaysian wetland sanctuary
- T.P. Charakupa-Chingono (Zimbabwe)
  The geology, soils landuse and human health in the Kwekwe district of Zimbabwe

Enquiries

The Conference Secretariat
GEOTROP '99
Institute for Natural Resources and Waste Management
Hong Kong Baptist University
Kowloon Tong, Hong Kong
Telephone : 852-23397054
Facsimile : 852-23395995
Email : Geotrop@hkbu.edu.hk
Website : Geotrop://www.hkbu.edu.hk/~biol/

INTERNATIONAL CONFERENCE ON
PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY 2000 (PUSAT 2000)

"Bringing Science & Technology To The Public"

APRIL 24–27, 2000
MINGCOURT VISTA HOTEL
KUALA LUMPUR

FIRST ANNOUNCEMENT,
CALL FOR PAPERS & PRELIMINARY PROGRAMME

organised by
Malaysian Scientific Association (MSA)
in collaboration with
Academy of Sciences Malaysia (ASM)
Confederation of Scientific and Technological Associations in Malaysia (COSTAM)

Preamble

Science and technology play a major role in our everyday life, be it at home or at work, in school or even entertainment. It is thus obvious that everyone needs some understanding of science and technology to make decisions in his or her everyday life.

Politicians require a proper understanding of science and technology for them to make the decisions on science policy and development. Entrepreneurs require the scientific and technological information for them to decide on types of industries and investments. The Society, at large, would require a proper understanding of science and technology for them to decide on matters related on their everyday lives, the types of industries and the environment.

Objectives

The objectives of PUSAT 2000 are:

- To promote better public understanding of science and technology.
- To review existing initiatives and methods of promoting public understanding of science and technology.
- To encourage greater public involvement in scientific and technological decisions and developments.

Theme

The Theme of PUSAT 2000 is

"Bringing Science and Technology to the Public"

Technical Programme

PUSAT 2000 will comprise four modules with the following titles:

- **Science and Technology: Achievements, Opportunities and Challenges**
- **Public Understanding of Science and Technology: Issues and Strategies**
- **Science, the Environment and Society**
- **Public Understanding of Science and Technology: Agenda for the New Millennium**

Within each module, specific topics within the framework of the title will be discussed.

◆ **SCIENCE AND TECHNOLOGY: ACHIEVEMENTS, OPPORTUNITIES AND CHALLENGES**

- Science and Technology for Wealth Creation
- Science and Technology for Better Quality of Life: Transportation, Information, Communications, Health Care and Disease Control
- Education and New Frontiers of Knowledge
- Science and Technology: Shortcomings and Drawbacks

◆ **PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY: ISSUES AND STRATEGIES**

- PUSAT : Issues at Hand
- PUSAT : New strategies — the Roles of the Government and the Public, scientists, and the Science and Technology Organisations
- PUSAT : Science Centres and Museums
- PUSAT : The Role of the Mass Media and Information Technology
- PUSAT : Ethics in Science and Technology
- PUSAT : Local Issues

◆ **SCIENCE, THE ENVIRONMENT AND SOCIETY**

- Science, Culture, Religion and Society
- Science, Education and Gender
- Science, Environment and Global Changes
- Science, Prosperity and Peace

◆ **PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY: AGENDA FOR NEW MILLENNIUM**

- Commitments of the Scientists — For a Better World
- Commitments of Scientific and Technological Organisations
- Commitments of the Industry and the Private Sector
- Commitments of the Government and the Public Sector
- Commitments of Civil Society

Special IFAAST Session

A special session will be held for member associations of IFAAST to present their reports on promoting public understanding of science and technology in their respective countries.

Special FASAS Session

A special session will be organised for members of FASAS to discuss international cooperation in public understanding of science and technology.

Concluding Session

A concluding session will be held to prepare a report on PUSAT 2000 for submission to governments and relevant authorities for promoting better public understanding of science and technology.

Registration Fees

Registration fees for PUSAT 2000 are as shown below:

Local	
Members of MSA/ASM/COSTAM	RM200
Others	RM250
Full-time Students/Teachers	RM150
Overseas	
Members of FASAS/IIFAAST	USD100/GBP60
Others	USD120/GBP70

Registration fees cover the following:

- Attendance at all Technical Sessions
- Attendance at Opening and Concluding Sessions
- PUSAT 2000 Conference Materials
- Lunches and Refreshments during PUSAT 2000
- PUSAT 2000 Banquet

Call For Papers

Those interested to present papers for PUSAT 2000 are requested to submit an abstract in the attached Abstract Form and submit it to the PUSAT 2000 Secretariat before December 31, 1999. Authors whose papers are accepted for presentations (oral/poster) will be notified before January 31, 2000. Format of full papers would be sent to those whose papers are accepted together with the notification letters. Full papers must be submitted to the PUSAT 2000 Secretariat before March 15, 2000 and they will be published in the PUSAT 2000 proceedings without any editing. Therefor it is the responsibilities of the authors to ensure the accuracy of the papers submitted. Please observe the following deadlines for submission:

Submission of abstract	:	December 31, 1999
Submission of full paper	:	March 15, 2000

Further Info

PUSAT 2000 Secretariat
Room 1, Second Floor
Bangunan Sultan Salahuddin Abdul Aziz Shah
16 Jalan Utara, P.O. Box 48
46700 Petaling Jaya, Malaysia
Tel: 603-757 8930; Fax: 603-754 1644 / 755 0576
E-mail: malsci@tm.net.my

before the closing date of **March 15, 2000**

KALENDAR (CALENDAR)

1999

January 18–24
SUBDUCTION TO STRIKE-SLIP TRANSITIONS ON PLATE BOUNDARIES (Penrose Conference of Geological Society of America), Puerto Plata, Dominican Republic. (Contact: P. Mann, Institute for Geophysics, University of Texas at Austin, Texas 78759-8500, USA. Fax: +1 512 471 8844; Website: http://www/ig.utexas.edu)

January 19–21
THE APPLICATION OF REMOTE SENSING AND GIS FOR DISASTER MANAGEMENT, Washington, D.C., USA. Sponsored by NASA, FEMA and the GW University. (Contact: Dr. Greg Shaw, Tel: (703) 729-8271; Fax: (703) 729-8271; E-mail: glshaw@gwu.edu; Website: http://www.gwu.edu/~cms/gis)

February 1–5
SHALLOW TETHYS (International Symposium), Chiang Mai, Thailand. (Contact: Shallow Tethys 5 Symposium Secretary, Dept. of Geological Sciences, Chiang Mai University, Chiang Mai 50200, Thailand. Fax: 66 53 89 2261)

February 13–18
GLACIAL-INTERGLACIAL SEA LEVEL CHANGES IN FOUR DIMENSIONS: QUATERNARY SEA LEVELS, CLIMATE CHANGE & CRUSTAL DYNAMICS (International Conference), Algarve, Portugal. (Contact: Josip Hendekovic, European Science Foundation, 1 quai Lezay-Marnesia, 67080 Strasbourg Cedex, France. Tel: +33 3 88 76 71; Fax: +33 3 88 36 69 87; E-mail: euresco@esf.org; Website: http://www.esf.org/euresco)

February 14–17
SOCIETY OF PETROLEUM ENGINEERS 15TH RESERVOIR SIMULATION SYMPOSIUM, Houston, Texas, USA. (Contact: SPE, 222 Palisades Creek Drive, Richardson, TX 75080, USA. Fax: 1 972 952-9435; E-mail: tech-prog@spelink.spe.org)

February 20–23
MEOS '99, Society of Petroleum Engineers' Middle East International Oil show and Conference, Bahrain. (Contact: Arabian Exhibition Management, P.O. Box 20200, Manama, Bahrain. Tel: 973 550-033; Fax: 973 553-288; E-mail: aeminfo@batelco.com.bh)

February 21–26
THIRD SOUTH ASIA GEOLOGICAL CONGRESS (GEOSAS-III), Lahore, Pakistan. Organized by Pakistan Academy of Geological Sciences in association with Institute of Geology, Punjab University, Lahore, Pakistan. (Contact: Punjab University, Lahore, Pakistan. (Contact: Prof. Dr. F.A. Shams, Institute of Geology, Punjab University, Lahore 54590, Pakistan. Tel: (+92-42) 5866809; Fax: (+92-42) 6312233; E-mail: geology1@paknet1.ptc.pk)

March 1–2
ORGANISM-ENVIRONMENT FEEDBACKS IN CARBONATE PLATFORMS AND REEFS (1999 Lyell International Meeting), Longon, UK (Contact: Enzo Insalaco, School of Earth Sciences, The University of Birmingham, Edgbaston, B15 2TT, UK. E-mail: e.insalaco@bham.ac.uk)

March 1–3
THIRTEENTH INTERNATIONAL CONFERENCE AND WORKSHOPS ON APPLIED GEOLOGIC REMOTE SENSING: Integrated Solutions for Real-World Problems. Hotel Vancouver, Vancouver, British Columbia, Canada. Organized by ERIM with sponsors that include NASA, U.S. DOE Nevada Operations Office and Remote Sensing Lab, and USGS. (Contact: ERIM Geologic Conferences, Box 134008, Ann Arbor, MI 48113-4008 USA. Tel: +1 734 994 1200, ext. 3234; Fax: +1 734 994 5123; E-mail: wallman@erim.int.com; Website: http://www.erim-int-com/CONF/conf.html)

March 1–4
SOCIETY FOR MINING, METALLURGY, AND EXPLORATION (Annual Meeting), Denver, Colorado, USA. (Contact: SME, 8307 Shaffer Parkway, P.O. Box 625002, Littleton, CO 80162-5002, USA. Tel: 1 303 973 9550; E-mail: smenet@aol.com; Website: http://www.smenet.org/annual_meeting/index.html)

June 15–17
ERES 99 (Second International Symposium on Earthquake Resistant Engineering Structures), Catania, Italy. Organized by: University of Catania, Italy and Wessex Institute of Technology, UK. (Contact: Liz Kerr, Symposium Secretariat, ERES 99, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton S040 7AA UK. Tel: +44 (0) 1703 293223; Fax: +44 (0) 1703 292853; E-mail: Liz@wessex.ac.uk)

June 17–19
SEMINAR ON COASTAL ZONE OF THE ALENTEJO, Porto, Portugal. (Contact: ASSOCIAÇAO EUROCOAST-PORTUGAL, a/c Instituto de Hidráulica e Recursos Hídricos, Faculdade de Engenharia fo Porto, Rua dos Braga, 4099 Porto Codex-Portugal. Tel: 351-2-2050870; Fax: 351-2-2059280)

June 20–24
COASTAL SEDIMENTS 1999 (4th International Symposium on Coastal Engineering and Science of Coastal Sediment Processes), Hauppauge, New York, USA. (Contact: N. Kraus, Co-Chair, U.S. Army Engineer Waterways Experiment Station, Coastal & Hydraulics Laboratory, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199, USA. Tel: +1-601 634 2016; E-mail: preinfo@coastalsediments.org; Website: http://www.coastalsediments.org; abstract deadline: May 11, 1998)

June 21–22
THE GEOLOGY OF TODAY FOR TOMORROW (A satellite conference of the World Conference of Science), Budapest, Hungary. (Contact: János Halmai, Chairman of the Organizing Committee, Hungarian Geological Society, H-1371 Budapest, Pf. 433. Tel: 36 1 2517770; Fax: 36 1 3561215; E-mail: mail.mft@mtesz.hu; Website: http://www.mafi.hu/mft/alap.html)

June 21–24
FOURTH INTERNATIONAL AIRBORNE REMOTE SENSING CONFERENCE AND EXHIBITION, The Westin Hotel, Ottawa, Ontario, Canada. Organized by ERIM with sponsors that include NASA, Environment Canada, and U.S. DOE Nevada Operations Office and Remote Sensing Laboratory. (Contact: ERIM Airborne Conferences, Box 134008, Ann Arbor, MI 48113-4008 USA. Tel: +1 734 994 1200, ext. 3234; Fax: +1 734 994 8123; E-mail: wallman@erim.int.com; Website: http://www.erim-int.com/CONF/conf.html)

June 21–24
INTERNATIONAL GEOMOLOGICAL SYMPOSIUM. San Diego, California, USA. (Contact: Dona Dirlam, Gemological Institute of America, 5345 Armada Dr., Carlsbad, California 92008, USA. Tel: +1 760 603 4154; Fax: +1 760 603 4256; E-mail: ddirlam@gia.edu; abstract (poster) deadline: October 1, 1998)

June 21–25
SECOND INTERNATIONAL CONFERENCE ON EARTHQUAKE GEOTECHNICAL ENGINEERING, Lisbon, Portugal. (Contact: Pedro S. Sêco e Pinto, chairman for SICEGE, Laboratório Nacional de Engenharia Civil, Av. do Brasil, 101, 1799 Lisboa cedex, Portugal. Fax: (351) 847 81 87; E-mail: SICEGE@lnec.pt)

June 21–27
TERRANE ACCRETION ALONG THE WESTERN CORDILLERAN MARGIN: CONSTRAINTS ON TIMING AND DISPLACEMENT (Geological Society of America Penrose Conference), Seattle and Winthrop, Washington, USA. (Contact: J.B. Mahoney, Department of Geology, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin 54702-4004, USA. E-mail: mahonej@uwec.edu)

June 26 – July 1
CLAY MINERALS SOCIETY (36th Annual Meeting), Purdue University, West Lafayette, Indiana, USA. (Contact: Patricia Jo Eberl, Clay Minerals Society, P.O. Box 4416, Boulder, Colorado 80306, USA. Tel: +1 303 444 6405; Fax: +1 303 444 2260; E-mail: peberl@clays.org)

June 29 – July 2
THE 11TH INTERNATIONAL CONFERENCE OF THE GEOLOGICAL SOCIETY OF AFRICA: Earth resources for Africa, University of Cape Town, South Africa. The closing date for abstracts is the 1st of March 1999. (Contact: Congress Secretariat. Tel/Fax: +27 (21) 61 9547; E-mail: geoconf@gsal l.co.za; Website: www.gsal l.co.za)

July 11–14

KALENDAR (CALENDAR)

1999

January 18–24

SUBDUCTION TO STRIKE-SLIP TRANSITIONS ON PLATE BOUNDARIES (Penrose Conference of Geological Society of America), Puerto Plata, Dominican Republic. (Contact: P. Mann, Institute for Geophysics, University of Texas at Austin, Texas 78759-8500, USA. Fax: +1 512 471 8844; Website: http://www/ig.utexas.edu)

January 19–21

THE APPLICATION OF REMOTE SENSING AND GIS FOR DISASTER MANAGEMENT, Washington, D.C., USA. Sponsored by NASA, FEMA and the GW University. (Contact: Dr. Greg Shaw, Tel: (703) 729-8271; Fax: (703) 729-8271; E-mail: glshaw@gwu.edu; Website: http://www.gwu.edu/~cms/gis)

February 1–5

SHALLOW TETHYS (International Symposium), Chiang Mai, Thailand. (Contact: Shallow Tethys 5 Symposium Secretary, Dept. of Geological Sciences, Chiang Mai University, Chiang Mai 50200, Thailand. Fax: 66 53 89 2261)

February 13–18

GLACIAL-INTERGLACIAL SEA LEVEL CHANGES IN FOUR DIMENSIONS: QUATERNARY SEA LEVELS, CLIMATE CHANGE & CRUSTAL DYNAMICS (International Conference), Algarve, Portugal. (Contact: Josip Hendekovic, European Science Foundation, 1 quai Lezay-Marnesia, 67080 Strasbourg Cedex, France. Tel: +33 3 88 76 71; Fax: +33 3 88 36 69 87; E-mail: euresco@esf.org; Website: http://www.esf.org/euresco)

February 14–17

SOCIETY OF PETROLEUM ENGINEERS 15TH RESERVOIR SIMULATION SYMPOSIUM, Houston, Texas, USA. (Contact: SPE, 222 Palisades Creek Drive, Richardson, TX 75080, USA. Fax: 1 972 952-9435; E-mail: tech-prog@spelink.spe.org)

February 20–23

MEOS '99, Society of Petroleum Engineers' Middle East International Oil show and Conference, Bahrain. (Contact: Arabian Exhibition Management, P.O. Box 20200, Manama, Bahrain. Tel: 973 550-033; Fax: 973 553-288; E-mail: aeminfo@batelco.com.bh)

February 21–26

THIRD SOUTH ASIA GEOLOGICAL CONGRESS (GEOSAS-III), Lahore, Pakistan. Organized by Pakistan Academy of Geological Sciences in association with Institute of Geology, Punjab University, Lahore, Pakistan. (Contact: Punjab University, Lahore, Pakistan. (Contact: Prof. Dr. F.A. Shams, Institute of Geology, Punjab University, Lahore 54590, Pakistan. Tel: (+92-42) 5866809; Fax: (+92-42) 6312233; E-mail: geology1@paknet1.ptc.pk)

March 1–2

ORGANISM-ENVIRONMENT FEEDBACKS IN CARBONATE PLATFORMS AND REEFS (1999 Lyell International Meeting), Longon, UK (Contact: Enzo Insalaco, School of Earth Sciences, The University of Birmingham, Edgbaston, B15 2TT, UK. E-mail: e.insalaco@bham.ac.uk)

March 1–3

THIRTEENTH INTERNATIONAL CONFERENCE AND WORKSHOPS ON APPLIED GEOLOGIC REMOTE SENSING: Integrated Solutions for Real-World Problems. Hotel Vancouver, Vancouver, British Columbia, Canada. Organized by ERIM with sponsors that include NASA, U.S. DOE Nevada Operations Office and Remote Sensing Lab, and USGS. (Contact: ERIM Geologic Conferences, Box 134008, Ann Arbor, MI 48113-4008 USA. Tel: +1 734 994 1200, ext. 3234; Fax: +1 734 994 5123; E-mail: wallman@erim.int.com; Website: http://www.erim-int-com/CONF/conf.html)

March 1–4

SOCIETY FOR MINING, METALLURGY, AND EXPLORATION (Annual Meeting), Denver, Colorado, USA. (Contact: SME, 8307 Shaffer Parkway, P.O. Box 625002, Littleton, CO 80162-5002, USA. Tel: 1 303 973 9550; E-mail: smenet@aol.com; Website: http://www.smenet.org/annual_meeting/index.html)

March 1–4
SOCIETY OF ECONOMIC GEOLOGISTS, Denver, Colorado, USA. SEG sponsors technical sessions at the SME Annual Meeting. (Information: http://www.mines.utah.edu/~wmgg/SEG.html)

March 9–11
INTERNATIONAL CONFERENCE ON PANGEA AND THE PALEOZOIC-MESOZOIC TRANSITION, Wuhan, Hubei, China. (Contact: Dr. Tong Jinan, Faculty of Earth Science, China University of Geosciences, Wuhan, Hubei 430074, China. Tel: +86-27-7482031; Fax: +86-27-7801763; E-mail: jntong@dns.cug.edu.cn)

March 14–17
APPLICATION OF GEOPHYSICS TO ENGINEERING AND ENVIRONMENTAL PROBLEMS (Symposium), Oakland, California, USA. (Contact: SAGEEP, 7632E, Costilla Ave., Englewood, Colorado, USA 80112. Tel: +1 303 771 2000; Fax: + 303 843 6232; Website: http://www.sageep.com)

March 15–19
LUNAR AND PLANETARY SCIENCE (30th International Conference), Houston, Texas, USA. (Contact: LeBecca Simmons, Conference Administrator, LPI Publications and Program Services Department, 3600 Bay Area Boulevard, Houston, TX 77058-1113, USA. Tel: 1 281 486 2158; Fax: 1 281 486 2160; E-mail: simmons@lpi.jsc.nasa.gov; Website: http://cass.jsc.nasa.gov/meetings/LPSC99/home.html; abstract deadlines: January 8, 1999 (hard copy); January 15, 1999 (electronic)

March 24–26
14TH HIMALAYA-KARAKORUM-TIBET WORKSHOP, Kloster Ettal, Germany. (Contact: Lothar Ratschbacher, Institut für Geologie, Universität Würzburg, Pleicherwall 1, D-97070, Würzburg, Germany. Tel: +49 931 312580; Fax: +49 931 312378; E-mail: lothar@geologie.uni-wuerzburg.de; Website: http://www.geologie.de)

March 25–28
NATIONAL EARTH SCIENCE TEACHERS ASSOCIATION (Annual Meeting), Boston, Mass, USA. (Contact: NESTA, 2000 Florida Ave., N.W., Washington, D.C. 20009, USA. Tel: +1 202 462 6910; Fax: +1 202 328 0566; E-mail: fireton@kosmos.agu.org)

March 25–31
MID-CRETACEOUS TO RECENT PLATE BOUNDARY PROCESSES IN THE SOUTHWEST PACIFIC (Penrose Conference of Geological Society of America), Canterbury, New Zealand (Contact: S. Baldwin, Geosciences Department, University of Arizona, UA PO Box 210077, Tucson, Arizona 85721, USA. Tel: +1 520 621 9688; Fax: +1 520 621 2672; E-mail: baldwin@geo.arizona.edu)

April 10–14
7TH MULTIDISCIPLINARY CONFERENCE ON SINKHOLES & THE ENGINEERING AND ENVIRONMENTAL IMPACTS OF KARST with an introductory course on applied karst hydrogeology, Harrisburg, Pennsylvania, USA. (Contact: Ms. Gayle Herring, P.E. LaMoreaux and Associates, Inc. (PELA), 106 Administration Rd., Oak Ridge, TN 37830 USA. Tel: 423-483-7639; E-mail: pelaor@usit.net; URL: http://www.uakron.edu/geology/karstwaters/7th.html)

April 11–14
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (Annual Meeting), San Antonio, Texas, USA. (Contact: AAPG Conventions Department, P.O. Box 979, 1444 S. Boulder Ave., Tulsa, OK 74101-0979, USA. Tel: +1 918 560 2679; Fax: +1 918 560 2684; E-mail: dkeim@aapg.org)

April 11–16
ASSOCIATION OF EXPLORATION GEOCHEMISTS — "Exploration Geochemistry into the 21st Century" (International Conference), Vancouver, British Columbia, Canada. (Contact: Venue West Conference Services Ltd. Tel: +1 604 681 5226; Fax 604 681 2503; E-mail: Venue West Conference Services Ltd.)

April 11–16
SOCIETY OF ECONOMIC GEOLOGISTS, Vancouver, British Columbia, Canada. SEG sponsors technical sessions at the meeting of the Association of Exploration Geochemists. (Information: http://www.mines.utah.edu/~wmgg/SEG.html and http://www.aeg.org/)

April 22–24
PETROLEUM GEOLOGY (2nd International Symposium), Zagreb, Croatia. (Contact: Zdenko Kristafor, Faculty of Mining, Geology, and

Petroleum Engineering, Pierottijeva 6, 10000 Zagreb, Croatia. Tel: +385-1 4605 201; Fax: +385-1 4836 074)

April 26–28
THRUST TECTONICS 99 (International Conference), Egham, Surrey, UK. (Contact: April Harper, Dept. of Geology, Royal Holloway University of London, Egham, Surrey TW20 0EX, UK. Tel: +44 1784 443618; Fax: +44 1784 438925)

May 3–4
ASSESSMENT AND REMEDIATION OF CONTAMINATED SITES IN ARCTIC AND COLD CLIMATES (International Conference), Edmonton, Alberta, Canada. (Contact: ARCSACC Conference — Edmonton '99, Room 303 CEB, Dept. of Civil and Environmental Engineering, University of Alberta, Edmonton, Alberta T6G 2G7, Canada. Tel: +1 403 497 3862; Fax: +1 403 497 3842; E-mail: kwbiggar@civil.ualberta.ca; ornahirm@pwgsc.gc.ca)

May 3–5
SEISMOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Seattle, Washington, USA. (Contact: S. Malone, Geophysics Program, Box 351650, University of Washington, Seattle, Washington 98195-1650, USA. Tel: +1 206 685 3811; Fax: +1 206 543 0489; E-mail: ssa99@geophys.washington.edu; Website: http://www.geophys.washington.edu/SEIS/SS A99; abstract deadline: February 5, 1999)

May 3–6
31ST OFFSHORE TECHNOLOGY CONFERENCE, Houston, USA. (Contact: OTC Meetings and Exhibits Unit, P.O. Box 833868, Richardson, TX 75083-3868, USA. Tel: 1 972 952-9494; Fax: 1 972 952-9435; E-mail: dweaver@spelink.spe.org)

May 6–7
GEOVISION '99: IMAGING APPLICATION IN GEOLOGY, Liége, Belgium. (Contact: Geovision '99, Université de Liége, Campus du Sart Tilman, Géologie de l'Ingénieur-Bât B19, 4000 Liége, Belgium. Tel: 32 4 366-2216; Fax: 32 4 366-2817; E-mail: fcheslet@ac.be)

May 24–26
WATER POLLUTION 99, Modelling, Measuring and Prediction (Fifth International Conference), Lemnos, Greece. Organized by: Wessex Institute of Technology, UK and Aristotle University of Thessaloniki, Greece. (Contact: Clare Duggan, Conference Secretariat Water Pollution 99, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK. Tel: 44 (0) 1703 293223; Fax: 44 (0) 1703 292853; E-mail: cduggan@wessex.ac.uk)

May 26–28
GEOLOGICAL ASSOCIATION OF CANADA-MINERALOGICAL ASSOCIATION OF CANADA, JOINT ANNUAL MEETING, Sudbury, Ontario. (Contact: Dr. P. Copper, Dept. of Earth Sciences, Laurentian University, Sudbury, Ontario P3E 2C6, Canada. Tel: (705) 657-1151 ext. 2267; Fax: (705) 675-4898; E-mail: gacmac99@nickel.laurentian.ca)

May 31 – June 2
SECOND INTERNATIONAL CONFERENCE ON ECOSYSTEMS AND SUSTAINABLE DEVELOPMENT, Lemnos, Greece. Organised by: Wessex Institute of Technology, UK and Universitat Jaume I, Spain. (Contact: Clare Duggan, Conference Secretariat-ECOSUD 99, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK. E-mail: cduggan@wessex.ac.uk)

May 31 – June 4
AMERICAN GEOPHYSICAL UNION (Spring Meeting), Boston, Massachusetts, USA. (Contact: AGU Meetings Department, 2000 Florida Avenue, NW, Washington, DC 20009 USA. Tel: +1 202 462 6900; Fax: +1 202 328 0566; E-mail: meetinginfo@kosmos.agu.org; Webgsite: http://www.agu.org)

June 5–9
CLIMATIC, BIOTIC, AND TECTONIC CORING TRANSECT OF TRIASSIC-JURASSIC PANGEA (International Workshop), Wolfville, Nova Scotia, Canada. (Contact: Paul Olsen, Lamont Doherty Earth Observatory, Rt. 9W, Palisades, New York 10964, USA. Tel: +1 914 365 8491; Fax: +1 914 365 2312; E-mail: polsen@ldeo.columbia.edu; Website: http://www.ldeo.columbia.edu)

June 6–9
VAIL ROCK 99 (Symposium), Vail, Colorado, USA, by American Rock Mechanics Association. (Contact: Expomasters. Tel: +1 303 771 2000; Fax: +1 303 843 6212; E-mail: mcramer@expomasters.com)]

June 15–17
ERES 99 (Second International Symposium on Earthquake Resistant Engineering Structures), Catania, Italy. Organized by: University of Catania, Italy and Wessex Institute of Technology, UK. (Contact: Liz Kerr, Symposium Secretariat, ERES 99, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton S040 7AA UK. Tel: +44 (0) 1703 293223; Fax: +44 (0) 1703 292853; E-mail: Liz@wessex.ac.uk)

June 17–19
SEMINAR ON COASTAL ZONE OF THE ALENTEJO, Porto, Portugal. (Contact: ASSOCIAÇAO EUROCOAST-PORTUGAL, a/c Instituto de Hidráulica e Recursos Hídricos, Faculdade de Engenharia fo Porto, Rua dos Braga, 4099 Porto Codex-Portugal. Tel: 351-2-2050870; Fax: 351-2-2059280)

June 20–24
COASTAL SEDIMENTS 1999 (4th International Symposium on Coastal Engineering and Science of Coastal Sediment Processes), Hauppauge, New York, USA. (Contact: N. Kraus, Co-Chair, U.S. Army Engineer Waterways Experiment Station, Coastal & Hydraulics Laboratory, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199, USA. Tel: +1-601 634 2016; E-mail: preinfo@coastalsediments.org; Website: http://www.coastalsediments.org; abstract deadline: May 11, 1998)

June 21–22
THE GEOLOGY OF TODAY FOR TOMORROW (A satellite conference of the World Conference of Science), Budapest, Hungary. (Contact: János Halmai, Chairman of the Organizing Committee, Hungarian Geological Society, H-1371 Budapest, Pf. 433. Tel: 36 1 2517770; Fax: 36 1 3561215; E-mail: mail.mft@mtesz.hu; Website: http://www.mafi.hu/mft/alap.html)

June 21–24
FOURTH INTERNATIONAL AIRBORNE REMOTE SENSING CONFERENCE AND EXHIBITION, The Westin Hotel, Ottawa, Ontario, Canada. Organized by ERIM with sponsors that include NASA, Environment Canada, and U.S. DOE Nevada Operations Office and Remote Sensing Laboratory. (Contact: ERIM Airborne Conferences, Box 134008, Ann Arbor, MI 48113-4008 USA. Tel: +1 734 994 1200, ext. 3234; Fax: +1 734 994 8123; E-mail: wallman@erim.int.com; Website: http://www.erim-int.com/CONF/conf.html)

June 21–24
INTERNATIONAL GEOMOLOGICAL SYMPOSIUM. San Diego, California, USA. (Contact: Dona Dirlam, Gemological Institute of America, 5345 Armada Dr., Carlsbad, California 92008, USA. Tel: +1 760 603 4154; Fax: +1 760 603 4256; E-mail: ddirlam@gia.edu; abstract (poster) deadline: October 1, 1998)

June 21–25
SECOND INTERNATIONAL CONFERENCE ON EARTHQUAKE GEOTECHNICAL ENGINEERING, Lisbon, Portugal. (Contact: Pedro S. Sêco e Pinto, chairman for SICEGE, Laboratório Nacional de Engenharia Civil, Av. do Brasil, 101, 1799 Lisboa cedex, Portugal. Fax: (351) 847 81 87; E-mail: SICEGE@lnec.pt)

June 21–27
TERRANE ACCRETION ALONG THE WESTERN CORDILLERAN MARGIN: CONSTRAINTS ON TIMING AND DISPLACEMENT (Geological Society of America Penrose Conference), Seattle and Winthrop, Washington, USA. (Contact: J.B. Mahoney, Department of Geology, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin 54702-4004, USA. E-mail: mahonej@uwec.edu)

June 26 – July 1
CLAY MINERALS SOCIETY (36th Annual Meeting), Purdue University, West Lafayette, Indiana, USA. (Contact: Patricia Jo Eberl, Clay Minerals Society, P.O. Box 4416, Boulder, Colorado 80306, USA. Tel: +1 303 444 6405; Fax: +1 303 444 2260; E-mail: peberl@clays.org)

June 29 – July 2
THE 11TH INTERNATIONAL CONFERENCE OF THE GEOLOGICAL SOCIETY OF AFRICA: Earth resources for Africa, University of Cape Town, South Africa. The closing date for abstracts is the 1st of March 1999. (Contact: Congress Secretariat. Tel/Fax: +27 (21) 61 9547; E-mail: geoconf@gsal l.co.za; Website: www.gsal l.co.za)

July 11–14

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (International Regional Conference), Istanbul, Turkey. (Contact: AAPG Conventions Dept., P.O. Box 979, Tulsa, OK 74101-0979, USA. Tel: 1 918 560 2679; Fax: 1 918 560 2684)

July 12–14
ICHNOFABRICS IN PETROLEUM GEOLOGY (International Meeting), Aberdeen, Scotland. (Contact: Stuart G. Buck, Mark J.F. Lawrence, Z&S Geology Ltd., Campus 2, Aberdeen Science and Technology Park, Balgo wnie Drive, Bridge of Don, Aberdeen, AB22 8GU, UK. Tel: +44 122 48 22 555; Fax: +44 122 48 23 777; E-mail: stuart.buck@zands.com *or* mark.lawrence@zands.com *or* Nigel H. Trewin, Department of Geology & Petroleum Geology, Meston Building, King's College, University of Aberdeen, Aberdeen, AB24 3UE, UK. Tel: +44 122 42 73 448; Fax: +44 122 42 72 785; E-mail: n.trewin@geol.abdn.co.uk)

July 12–15
THE BATHURST MEETING, Cambridge, UK. (Contact: Dr. J.A.D. Dickson, Dept. of Earth Sciences, University of Cambridge, Downing St, Cambridge, CB2 3EQ, UK. Tel: +44 1223 333400; Fax: +44 1223 333450; E-mail: jaddl@esc.cam.ac.uk)

July 12–16
NATIONAL SPELEOLOGICAL SOCIETY (Convention), Filer, Idaho, USA. (Contact: David W. Kesner, P.O. Box 1334, Boise, Idaho, USA 83701. Tel: +1 208 939 0979; E-mail: drdave@micron.net)

July 15–20
ICHNOFABRICS (5th International Workshop and Field Seminar), Manchester, U.K. (Contact: John Pollard, Department of Earth Sciences, University of Manchester, Manchester, M13 9PL, UK. Tel: +44 161 27 53 817; Fax: +44 161 27 53 947; E-mail: john.pollard@man.ac.uk)

July 19–30
INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS, Birmingham, UK. (Contact: IUGG99, School of Earth Sciences, University of Birmingham, Edghaston, Birmingham B15 2TT, UK. Fax: 44 121 414 4942; E-mail: IUGG99@bham.ac.uk)

July 19–30
INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES (International Meeting), Birmingham, UK. (Contact: IUGG99, School of Earth Sciences, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK. Fax: 44 121 414 4942; E-mail: IUGG99@bham.ac.uk)

July 22–25
EUROPEAN PALEONTOLOGICAL ASSOCIATION WORKSHOP, Lisboa, Portugal. (Contact: CEPUNL, Quinta da Torre, P-2825 Monte de Caparica, Portugal. Tel: 351 1 2948573; Fax: 351 1 2948556; E-mail: cepunl@mail.fct.unl.pt; Website: http://www.si.fct.unl.pt/~w3cepunl)

August 3–12
INTERNATIONAL UNION FOR QUATERNARY RESEARCH (INQUA) (15th Congress), "The Environmental Background to Hominid Evolution in Africa", Durban, South Africa. (Contact: Dr. D. Margaret Avery, INQUA XV CONGRESS, P.O. Box 61, South Africa Museum, Capetown 8000, South Africa. Tel: +27 21 243 330; Fax: +27 21 246 716; E-mail: mavery@samuseum.ac.za; WWW: http://inqua.geoscience.org.za)

August 4–12
AFRICA, CRADLE OF HUMANKIND DURING THE QUATERNARY (XV INQUA Congress), Durban, South Africa. (Contact: Prof. T.C. Partridge, Climatology Research Center, University of Witwatersrand, 13 Cluny Rd., Forest Town, Johannesburg 2193, South Africa. Tel: +27 11 646 3324; Fax: +27 11 486 1689; E-mail: 141tcp@cosmos.wits.ac.za)

August 6–11
INTERNATIONAL ASSOCIATION OF MATHEMATICAL GEOLOGISTS (Annual International Conference) and IUGS Commission on Fossil Fuels, Trondheim, Norway. (Contact: IAMG í99, c/o Stephen Lippard, Department of Geology and Mineral Resources Engineering, 7034 Trondheim, Norway. Tel: +47-73 594828; Fax: 47-73 594814; E-mail: iamg99@geo.ntnu.no)

August 9–12
SOIL DYNAMICS AND EARTHQUAKE ENGINEERING (SDEE '99) (9th International Conference), Bergen, Norway. (Contact: K.

Atakan, SDEE '99 LOC, Institute of Solid Earth Physics, University of Bergen, Allegaten 41, 5007 Bergen, Norway. Tel: +47-55 583420; Fax: +47-55 589669; E-mail: sdee99@ifjf.uib.no; Website: http://www.ifjf.uib.no/seismo/sdee99.html; abstract deadline: January 31, 1999)

August 14–25
CARBONIFEROUS-PERMIAN (XIV International Congress), Calgary, Alberta, Canada. (Contact: Dr. Charles Henderson, Associate Professor, Department of Geology and Geophysics, The University of Calgary, N.W. Calgary, Alberta, Canada T2N 1N4. Tel: 403 220 6170; Fax: 403 285 0074; E-mail: henderson@geo.ucalgary.ca)

August 22–25
SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS (SGA) (5th Biennial Meeting) and International Association on the Genesis of Mineral Deposits (IAGOD, 10th Quadrennial Meeting) (Joint Meeting), "Mineral Deposits: Processes to Processing," London, UK. Imperial College Natural History Museum. (Contact: Dr. Chris Stanley, Department of Mineralogy, Natural History Museum, Cromwell Road, London, SW7 5BD, UK. Tel: +44 171 938 9361; Fax: +44 171 938 9268; E-mail: cjs@nhm.ac.uk)

August 22–27
GOLDSCHMIDT CONFERENCE (9th Annual, International), Cambridge, Massachusetts, USA. (Contact: Stein B. Jacobsen, Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02138, USA. Tel: +1-617 495 5233; Fax: +1-617 496 4387; E-mail: goldschmidt@eps.harvard.edu; Website: http://cass.jsc.nasa.gov/meetings/gold99/)

August 24–26
SEDIMENTOLOGY (19th Regional European Meeting), Copenhagen, Denmark. (Contact: Conventum Congress Service, Carit Etlarsvij 3, DK-1814, Frederiksberg C, Denmark. Tel: +45 31 31 08 47; Fax: +45 31 31 63 99; or Lars B Clemmensen, Geological Institute, Oster Voldgade 10, DK-1350, Copenhagen K, Denmark. Tel: +45 35 32 24 49; E-mail: larsc@geo.geol.ku.dk)

September
THE CONTINENTAL PERMIAN OF THE SOUTHERN ALPS AND SARDINIA (ITALY): Regional reports and general correlations (International Field Conference), Brescia, Italy. (Contact: Prof. G. Cassinis, Dipartimento di Scienze della Terra, Universita di Pavia, Via Ferrata, 1, I-27100 Pavia, Italy. Tel: 39 382 505834; Fax: 39 382 505890; E-mail: cassinis@ipv36.unipv.it)

September
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS (29th Congress), Bratislava, Slovakia. (Contact: Prof. L. Melioris, Comenius University, Mylinska Dolina, 84215 Bratislava, Slovakia. Tel/Fax: +42 7 725 446; E-mail: podzvody@fns.uniba.sk)

September
INTERNATIONAL SOCIETY OF ROCK MECHANICS (9th International Congress), Paris, France. (Contact: Dr. S. Gentier, Secrétaire Général du CFMR, BRGM/DR/GGP, Avenue Claude Guillemin, B.P. 6009, F-45060 Orléans Cedex 2, France. Tel: +33 2 38 64 38 77; Fax: +33 2 38 64 30 62)

September 6–9
BIOGEO IMAGES 99 (International Conference sponsored by SEPM, Association de Paleontologie Francaise, and others), Dijon, France. (Contact: BGI 99, Biogeosciences-Dijon, UMR 5561 CNRS, 6 blvd Gabriel, 21000 Dijon, France. E-mail: BGI99@u-bourgogne.fr; Website: http://www.u-bourgogne.fr/BIOGEOSCIENCE/BGI99.htm)

September 6–10
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS "Hydrogeology and Land Use Management" (29th Congress), Bratislava, Slovakia. (Contact: Marian Fendek, Geological Survey of Slovak Republic, Mylinska Dolina 1, 81704 Bratislava, Slovakia. Tel: +421-7 3705355; Fax: +421-7 371940; E-mail: IAHCONG@GSSR.SK)

September 6–12
MINING AND THE ENVIRONMENT II (International Meeting), Sudbury, Ontario, Canada. (Contact: Sudbury '99, Centre in Mining and Mineral Exploration Research (CIMMER), Laurentian University, Sudbury, Ontario, P3E 2C6, Canada. Tel: +705 673 6572;

Fax: +705 673 6508; E-mail: cmosher@nickel.laurentian.ca *or* bevans@nickel.laurentian.ca)

September 12–15
OIL & GAS IN THE 21ST CENTURY — DAWN OF THE THIRD AGE (AAPG International Conference and Exhibition), Birmingham, UK. (Contact: AAPG Convention Dept., P.O. Box 979, Tulsa, OK 74101-0979, USA. Tel: 1 918 560 2679; Fax: 1 918 560 2684; E-mail: convene@aapg.org; Website: www.aapg.org)

September 16–17
NON-VOLCANIC RIFTING OF CONTINENTAL MARGINS: A COMPARISON OF EVIDENCE FROM LAND AND SEA (International Conference of Geological Society of London), London, United Kingdom. (Contact: R.B. Whitmarsh, Challenger Division, Southampton Oceanography Centre, European Way, Southampton U.K. SO14 3ZH; Fax: +44 1703 596554; E-mail: bob.whitmarsh@soc.soton.ac.uk; Website: http://www.soest.hawaii.edu/margins/; abstract deadline: April 16, 1999)

September 19–24
ABRAHAM GOTTLOB WERNER (1749–1817) AND HIS TIMES, Freiberg, Germany. Organized by TU Bergakademie Freiberg and the International Commission on the History of Geological Sciences (INHIGEO). (Contact: Dr. Peter Schmidt. Tel: +49 (0) 3731 39-3235; Fax: +49 (0) 3731 39-3289; E-mail: pschmidt@ub.tu-freiberg.de *or* Prof. Dr. Helmuth Albrecht. Tel: +49 (0) 3731 39-3406; Fax: +49 (0) 3731 39-3406; E-mail: halbrecht@vwl.tu-freiberg.de)

September 26 – October 2
VII INTERNATIONAL SYMPOSIUM ON MESOZOIC TERRESTRIAL ECOSYSTEMS, Buenos Aires, Argentina. (Contact: Georgina Del Fueyo, Avda. Angel Gallardo 470, 1405 Buenos Aires, República Argentina. Tel/Fax: 54-1 983-4151; E-mail: imposio@musbr.org.secyt.gov.ar)

September 26 – October 6
FIFTH INTERNATIONAL CONGRESS ON RUDISTS, Erlangen, Germany (with post-conference excursion to the Alps). (Contact: Prof. Dr. Richard Höfling, Institut für Paläontologie, Universität Erlangen-Nürnberg, Loewenichstrasse 28, D-91054 Erlangen, Germany. Tel: +49 9131-85 22 710; Fax: +49 9131-85 22 690; E-mail: richie@pal.pal.uni-erlangen.de)

September 27–30
PALEOCEANOLOGY OF REEFS AND CARBONATE PLATFORMS: MIOCENE TO MODERN (International Meeting), Aix-en-Provence, France. (Contact: Gilbert F. Camoin, Cerege BP 80, F-13545, Aix-en-Provence, cedex-4, France. Tel: +33 4 42 97 15 49; E-mail: camoin@cerege.fr)

October 3–6
VII INTERNATIONAL CONGRESS ON PACIFIC NEOGENE STRATIGRAPHY, Mexico City, Mexico. (Contact: Prof. A. Molina-Cruz, Inst. Cien, Mar. y Limnol., UNAM, Ap. Post 70-305, Ciudad Universitaria, Mexoco D.F. 04510. Tel: 52-5-6225816; Fax: 52-5-6160748; E-mail: amolina@mar.icymyl.unam.mx)

October 13–17
FOSSIL ALGAE (7th International Symposium), Nanjing, China. (Contact: Mu Xi-nan, Nanjing Institute of Geology and Palaeontology, Academia Sinica, 39 East Beijing Road, Nanjing 210008, China. Fax: +86-25 335 7026); E-mail: algae@pub.jlonline.com)

October 25–28
GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Denver, Colorado, USA. (Contact: GSA Meetings Dept., P.O. Box 9140, Boulder, CO 80301-9140, USA. Tel: +1 303 447 2020; Fax: +1 303 447 1133; E-mail: meetings@geosociety.org; WWW: http://www.geosociety.org/meetings/index.htm)

October 30 – November 4
SOIL SCIENCE SOCIETY OF AMERICA (Annual Meeting), Salt Lake City, Utah, USA. (Contact: SSSA, 677 So, Segoe Rd., Madison, WI 53711, USA. Tel: 1 608 273 8090; Fax: 1 608 273 2021; E-mail: rbarnes@agronomy.org)

November 7–10
ENVIRONMENTAL HYDROLOGY AND HYDROGEOLOGY (4th USA/CIS Joint Conference), San Francisco, California, USA. (Contact: American Institute of Hydrogeology, 2499 Rice Street, Suite 135, St. Paul, Minnesota 55113-3724, USA. Tel: +1 651 484 8169; Fax: +1 651 484 8357; E-mail: AIHydro@aol.com; Website: http://www.aihydro.org; abstracts deadline: February 28, 1999)

December 5–8

ADVANCED RESERVOIR CHARACTERIZATION FOR THE TWENTY-FIRST CENTURY (Research Conference sponsored by Gulf Coast Section of Society of Economic Paleontologists and Mineralogists Foundation), Houston, Texas. (Contact: GCSSEPM Foundation, 165 Pinehurst Rd., West Hartland, Conn. 06091-0065, USA. Tel: 800/436-1424; Fax: 860/738-3542; E-mail; gcssepm@mail.snet.net; WWW:http://www.gcssepm.org)

2000

January 24–28

OCEAN SCIENCES (Meeting sponsored by AGU), San Antonio, Texas, USA. (Contact: AGU Meetings Department, 2000 Florida Avenue, NW, Washington, DC 20009 USA. Tel: +1 202 462 6900; Fax: +1 202 328 0566; E-mail: meetinginfo@kosmos.agu.org; Website: http://www.agu.org)

March 6–9

SOCIETY FOR MINING, METALLURGY, AND EXPLORATION (Annual Meeting), Salt Lake City, Utah, USA. (Contact: SME, 8307 Shaffer Parkway, P.O. Box 625002, Littleton, CO 80162-5002, USA. Tel: 1 303 973 9550; E-mail: smenet@aol.com)

March 8–9

THE NATURE AND TECTONIC SIGNIFICANCE OF FAULT ZONE WEAKENING (International Research Meeting, sponsored by UK Tectonic Studies Group), London, UK. (Contact: R.E. Holdsworth, Department of Geological Sciences, University of Durham, Durham DH1 3LE, UK. Fax: +44 0191 374 2510; E-mail: R.E.Holdsworth@durham.ac.uk; Website: http://www.dur.ac.uk/~dgllms/reh.htm; abstract deadline: 30 September 1999)

April 6–9

NATIONAL EARTH SCIENCE TEACHERS ASSOCIATION (Annual Meeting), Orlando, Florida, USA. (Contact: NESTA, 2000 Florida Ave., N.W., Washington, D.C. 20009, USA. Tel: +1 202 462 6910; Fax: +1 202 328 0566; E-mail: fireton@kosmos.agu.org)

April 16–19

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (Annual Meeting), New Orleans, Louisiana, USA. (Contact: AAPG Conventions Department, P.O. Box 979, 1444 S. Boulder Ave., Tulsa, OK 74101-0979, USA. Tel: +1 918 560 2679; Fax: +1 918 560 2684; E-mail: dkeim@aapg.org)

May 7–11

SALT SYMPOSIUM, The Hague, The Netherlands. (Contact: Secretariat Organizing Committee, 8th World Salt Symposium, P.O. Box 25, 7550 GC Hengelo Ov, The Netherlands. Tel: 31 74 244 3908; Fax: 31 74 2443272; E-mail: Salt.2000@inter.NL.net)

May 15–18

GEOLOGY AND ORE DEPOSITS 2000: THE GREAT BASIN AND BEYOND (Conference), Reno-Spark, Nevada, USA. (Contact: Geological Society of Nevada, P.O. Box 12021, Reno, Nevada 89510, USA. Tel: +1-702 323 3500; Fax: +1-702 323 3599; E-mail: gsnsymp@nbmg.unr.edu; Website: http://www.seismo.unr.edu/GSN)

May 23–25

TRACERS AND MODELLING IN CONTAMINANT HYDROLOGY (International Conference), Liege, Belgium. (Contact: TraM'2000, LGIH, University of Liege, B19 Sart-Tilman, 40000 Liege, Belgium. Tel: +32 4 366 2216; Fax: +32 4 366 2817; E-mail: adassarg@lgih.ulg.ac.be)

June 24–30

INTERNATIONAL PALYNOLOGICAL CONGRESS (10th), Nanjing, China. (Contact: Secretary of the Organizing Committee for 10th International Palynological Conference, Nanjing Institute of Geology and Palaeontology, Academis Sinica, 39 East Beijing Road, nanjing 210008, China. Website: http://members.spree.com/sip/spore/index.htm)

July 16–22

APPLIED MINERALOGY — ICAM 2000 (6th International Congress), Gottingen & Hannover, Germany. (Contact: ICAM 2000 Office, P.O. Bx 510153, D-30631 Hannover, GERMANY. Tel: +49-511 643 2298; Fax: +49-511 643 3685; E-mail: ICAM2000@bgr.de; Website: www.bgr.de/ICAM2000; abstract deadline: September 1, 1999)

July 18–23
INTERNATIONAL ASSOCIATION OF VOLCANOLOGY AND CHEMISTRY OF THE EARTH INTERIOR (IAVCEI) GENERAL ASSEMBLY 2000, Bandung, Indonesia. (Contact: Secretariat, Volcanological Survey of Indonesia, Jalan Diponegoro 57, Bandung 40122, Indonesia. Tel: +62-22 772606; Fax: +62-22 702761; E-mail: iavcei@vsi.dpe.go.id; Website: http://www.vsi.dpe.go.id/iavcei.html; abstract deadline: February 29, 2000)

July 31 – August 4
JOINT WORLD CONGRESS ON GROUNDWATER, Forteleza, Brazil. (Contact: ABAS, Ceara Chapter, Avienda Santos Dumont, 7700 Papicu, Fortaleza, CEP 60 150-163, Brazil. Tel: +55 85 265 1288; Fax: +55 85 265 2212)

August 6–17
31ST INTERNATIONAL GEOLOGICAL CONGRESS, Geology and Sustainable Development: Challenges for the Third Millennium, Rio de Janeiro, Brazil. (Contact: 31st IGC Secretariat Bureau, Av. Pasteur, 404-ANEXO 31 IGC, Urca, Rio de Janeiro RJ, CEP 22.290-240 Brazil. Tel: +55 21 295 5847; Fax: +55 21 295 8094; E-mail: 3ligc@cristal.cprm.gov.br; Website: www.3ligc.org. To request current Circular, send e-mail to mailto:address@3ligc.org)

September 3–8
GOLDSCHMIDT 2000 (International Conference), Oxford, UK. (Contact: P. Beattie, Cambridge Publications, Publications House, P.O. Box 27, Cambridge UK CB1 4GL. Tel: +44-1223 333438; Fax: +44-1223 333438; E-mail: Gold2000@campublic.co.uk; Website: http://www.campublic.co.uk/science/conference/Gold2000/)

October
INTERNATIONAL MILLENNIUM CONGRESS ON GEOENGINEERING, Melbourne, Australia. (More information soon)

October 15–18 (Provisional)
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (International Meeting), Bali, Indonesia. (Contact: AAPG Conventions Dept., P.O. Box 979, Tulsa, OK 74101-0979, USA. Tel: 1 918 560 2679; Fax: 1 918 560 2684)

October 23–27
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS (30th Annual Meeting), Cape Town, South Africa.

November 13–16
GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Reno, Nevada, USA. (Contact: GSA Meetings Dept., P.O. Box 9140, Boulder, CO 80301-9140, USA. Tel: +1 303 447 2020; Fax: +1 303 447 1133; E-mail: meetings@geosociety.org; WWW: http://www.geosociety.org/meetings/index.htm)

November 19–24
GEOTECHNICAL AND GEOLOGICAL ENGINEERING — GEOENG 2000 (International Conference), Melbourne, Australia. (Contact: GeoEng2000, ICMS Pty. Ltd., 84 Queensbridge Street, Southbank, Vic 3006, Australia. Tel: +61 3 9682 0244; Fax: +61 3 9682 0288); E-mail: geoeng2000@icms.com.au; Website: http://civil-www.eng.monash.edu.au/discipl/mgg/geo2000.htm)

2001

March 22–25
NATIONAL EARTH SCIENCE TEACHERS ASSOCIATION (Annual Meeting), St. Louis, Missouri, USA. (Contact: NESTA, 2000 Florida Ave., N.W., Washington, D.C. 20009, USA. Tel: +1 202 462 6910; Fax: +1 202 328 0566; E-mail: fireton@kosmos.agu.org)

April 8–11
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (Annual Meeting), Denver, Colorado, USA. (Contact: AAPG Conventions Department, P.O. Box 979, 1444 S. Boulder Ave., Tulsa, OK 74101-0979, USA. Tel: +1 918 560 2679; Fax: +1 918 560 2684; E-mail: dkeim@aapg.org)

August 23–28
INTERNATIONAL CONFERENCE ON GEOMORPHOLOGY (5th), Tokyo, Japan. (Contact: Prof. K. Kashiwaya, Dept. of Earth Sciences, Kanazawa University, Kanazawa, 920-1192 Japan. E-mail: kashi@kenroku.kanazawa-u.ac.jp)

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

Back Issues Available

Bulletin 1 (Feb 1968). 79 p. Studies in Malaysian Geology. Edited by P.H. Stauffer. A collection of papers presented at a meeting of the Geological Society on 31st January 1967. Price: RM3.00. **Out of Stock.**

Bulletin 2 (Dec 1968). 152 p. Bibliography and Index of the Geology of West Malaysia and Singapore by D.J. Gobbett. Price: RM10.00 - Softcover, M$15.00.

Bulletin 3 (Mar 1970). 146 p. Papers in Geomorphology and Stratigraphy (with Bibliography supplement). Edited by P.H. Stauffer. Price: RM10.00.

Bulletin 4 (Jun 1971). 100 p. Papers in Petrology, Structure and Economic Geology. Edited by P.H. Stauffer. Price: RM10.00.

Bulletin 5 (Feb 1973). 70 p. The Search for Tungsten Deposits by K.F.G. Hosking. Price: RM10.00.

Bulletin 6 (Jul 1973). 334 p. Proceedings, Regional Conference on the Geology of Southeast Asia. A collection of papers, Kuala Lumpur, March, 1972. Edited by B.K. Tan. Price: RM22.00 – hardcover only.

Bulletin 7 (Jun 1974). 138 p. A collection of papers on geology. Edited by B.K. Tan. Price: RM12.00.

Bulletin 8 (Dec 1977). 158 p. A collection of papers on geology. Edited by T.T. Khoo. Price: RM12.00.

Bulletin 9 (Nov 1977). 277 p. The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting. 12-13 November 1975, Kuala Lumpur, Edited by J.A. Roddick & T.T. Khoo. Price: RM25.00. **Out of stock.**

Bulletin 10 (Dec 1978). 95 p. A collection of papers on the geology of Southeast Asia. Edited by C.H. Yeap. Price: RM10.00. **Out of stock.**

Bulletin 11 (Dec 1979). 393 p. Geology of Tin Deposits. A collection of papers presented at the International Symposium of 'Geology of Tin Deposits', 23-25 March 1978, Kuala Lumpur. Edited by C.H. Yeap. Price: RM50.00.

Bulletin 12 (Aug 1980). 86 p. A collection of papers on geology. Edited by G.H. Teh. Price: RM20.00.

Bulletin 13 (Dec 1980). 111 p. A collection of papers on geology of Malaysia and Thailand. Edited by G.H. Teh. Price: RM20.00.

Bulletin 14 (Dec 1981). 151 p. A collection of papers on geology of Southeast Asia. Edited by G.H. Teh. Price: RM30.00.

Bulletin 15 (Dec 1982). 151 p. A collection of papers on geology. Edited by G.H. Teh. Price: RM30.00.

Bulletin 16 (Dec 1983). 239 p. A collection of papers on geology. Edited by G.H. Teh. Price: RM30.00.

Bulletin 17 (Dec 1984). 371 p. A collection of papers on geology. Edited by G.H. Teh. Price: RM35.00.

Bulletin 18 (Nov 1985). 209 p. Special Issue on Petroleum Geology. Edited by G.H. Teh & S. Paramananthan. Price: RM30.00.

Bulletin 19 (Apr 1986) **& 20** (Aug 1986). GEOSEA V Proceedings Vols. I & II, Fifth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia, Kuala Lumpur, 9-13 April 1984. Edited by G.H. Teh & S. Paramananthan. Price for both Bulletins 19 & 20: Members – RM50.00, Non-Members – RM125.00.

Bulletin 21 (Dec 1987). 271 p. Special Issue on Petroleum Geology Vol. II. Edited by G.H. Teh. Price: RM40.00.

Bulletin 22 (Dec 1988). 272 p. Special Issue on Petroleum Geology Vol. III. Edited by G.H. Teh. Price: RM40.00.

Bulletin 23 (Aug 1989). 215 p. A collection of papers on the geology of Malaysia, Thailand and Burma. Edited by G.H. Teh. Price: RM35.00.

Bulletin 24 (Oct 1989). 199 p. A collection of papers presented at GSM Annual Geological Conference 1987 and 1988. Edited by G.H. Teh. Price: RM35.00.

Bulletin 25 (Dec 1989). 161 p. Special Issue on Petroleum Geology Vol. IV. Edited by G.H. Teh. Price: RM40.00.

Bulletin 26 (Apr 1990). 223 p. A collection of papers presented at GSM Annual Geological Conference 1989 and others. Edited by G.H. Teh. Price: RM40.00.

Bulletin 27 (Nov 1990). 292 p. Special Issue on Petroleum Geology Vol. V. Edited by G.H. Teh. Price: RM40.00.

Bulletin 28 (Nov 1991). 292 p. Special Issue on Petroleum Geology Vol. VI. Edited by G.H. Teh. Price: RM40.00.

Bulletin 29 (Jul 1991). 255 p. A collection of papers presented at GSM Annual Geological Conference 1990 and others. Edited by G.H. Teh. Price: RM40.00.

Bulletin 30 (Apr 1992). 90 p. Annotated bibliography of the geology of the South China Sea and adjacent parts of Borneo by N.S. Haile. Edited by G.H. Teh. Price RM20.00

Bulletin 31 (Jul 1992). 176 p. A collection of papers presented at GSM Annual Geological Conference 1991 and others. Edited by G.H. Teh. Price: RM35.00.

Bulletin 32 (Nov 1992). 283 p. Special Issue on Petroleum Geology Vol. VII. Edited by G.H. Teh. Price RM50.00

Bulletin 33 (Nov 1993). 419 p. Proceedings Symposium on Tectonic Framework and Energy Resources of the Western Margin of the Pacific Basin. Edited by G.H. Teh. Price: RM60.00.

Bulletin 34 (Dec 1993). 181 p. Bibliography and Index — Publications of the Geological Society of Malaysia 1967-1993. Compiled by T.F. Ng. Edited by G.H. Teh. Price: RM30.00.

Bulletin 35 (Jul 1994). 174 p. A collection of papers presented at GSM Annual Geological Conference 1992 & 1993 and others. Edited by G.H. Teh. Price: RM35.00.

Field Guide 1 (1973). A 7-day one thousand mile, geological excursion in Central and South Malaya (West Malaysia and Singapore). 40 p. by C.S. Hutchison. Price: RM5.00. **Out of stock.**

Abstracts of papers (1972). Regional Conference on the Geology of Southeast Asia, Kuala Lumpur, 1972. 64 p. 8 figs, 3 tables, many extended abstracts. Edited by N.S. Haile. Price: RM6.00.

Proceedings of the Workshop on Stratigraphic Correlation of Thailand and Malaysia Vol. 1. (1983). Technical Papers. 383 p. Price: RM25.00 (Members: RM12.00).

WARTA GEOLOGI (Newsletter of the Geological Society of Malaysia). Price: RM5.00 per bimonthly issue from July 1966.

PACKAGE DEAL 1: Bulletin nos. 2-8, 11
Student Members: RM10.00; Members: RM20.00;
Non-Members: RM40.00

PACKAGE DEAL 2: Bulletin nos. 12-16
Student Members: RM30.00; Members: RM40.00;
Non-Members: RM60.00

PACKAGE DEAL 3: Bulletin nos. 17-18 and 21-23
Student Members: RM60.00; Members: RM80.00;
Non-Members: RM100.00

PACKAGE DEAL 4: Combination of Package Deals 1-3
Student Members: RM100.00; Members: RM140.00;
Non-Members: RM200.00

PACKAGE DEAL 5: Bulletin nos. 19 & 20 + Proceedings of Workshop on Stratigraphic Correlation of Thailand & Malaysia Vol. 1.
Student Members: RM30.00; Members: RM50.00;
Non-Members: RM125.00

Please note that the Package Deal offers is limited to ONE order per member only. There is no limit on the number of orders for non-members. Prices may be changed without notice.

Individual copies of Bulletin nos. 2-8 and Warta Geologi are available to members at half price. All prices quoted are not inclusive of postage. Please write in for details on postage. Allow 8-10 weeks for delivery.
Cheques, money orders or bank drafts must accompany all orders.

Orders should be addressed to:

The Hon. Assistant Secretary, Geological Society of Malaysia
c/o Dept. of Geology,
University of Malaya,
50603 Kuala Lumpur,
MALAYSIA.
TEL: 603-7577036, FAX: 603-7563900

For orders, please write to the Society and you will be invoiced.

ORDER FORM

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATION

Date: .....

The Assistant Secretary,
Geological Society of Malaysia,
c/o Department of Geology,
University of Malaya,
50603 Kuala Lumpur,
MALAYSIA

Dear Sir,

Please send me the following publications. I enclose US$/RM*..... in cheque/money order/bank draft.*

Item	No. of Copies	Price

Sub–Total _____

Total _____

Signature: .....

*Delete where applicable

Please mail to : .....

(Please print) .....

.....

.....

.....

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

	WARTA GEOLOGI Format: 20 cm x 28 cm		BULLETIN Format: 20 cm x 28 cm	
RATES:	Black & White	Colour	Black & White	Colour
Inside full page per issue	RM300	RM600	RM1,000	RM1,500
Inside half page per issue	RM200	RM500	RM500	RM800
Inside full page for 6 issues	RM1,500	RM3,000	—	—
Inside half page for 6 issues	RM1,000	RM2,500	—	—

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,
50603 Kuala Lumpur, Malaysia.

For further information, please ring 603-7577036 or fax 603-7563900.

The Editor,
Geological Society of Malaysia
c/o Dept. of Geology,
University of Malaya,
50603 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 ☐ six issues ☐	one issue ☐ six issue ☐	one issue ☐ issues ☐	one issue ☐ issues ☐
Inside half page	one issue ☐ six issues ☐	one issue ☐ six issue ☐	one issue ☐ issues ☐	one issue ☐ issues ☐

Artwork/Positive film/slide* enclosed ☐ not enclosed ☐

Company .....

Address .....

.....

Enclosed cheque/money order/bank draft* ..... for RM .....

Person to be contacted ..... Tel: .....

Designation ..... Fax: .....

* Please delete as appropriate.

Signature .....

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

General Information

Papers should be as concise as possible. However, there is no fixed limit as to the length and number of illustrations. Normally, the whole paper should not exceed 30 printed pages. The page size will be 204 x 280 mm (8 x 11 inches).

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.

The final decision of any paper submitted for publication rests with the Editor who is aided by a Special Editorial Advisory Board. The Editor may send any paper submitted for review by one or more reviewers. Authors can also include other reviewers' comments of their papers. 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 be Editor for reconsideration if they do not agree with the reasons for rejection. The Editor will consider the appeal together with the Special 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 and accepted.

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

One set of proofs will be sent to the author (if time permits), to be checked for printer's errors. In the case of two or more authors, please indicate to whom the proofs should be sent.

Twenty-five reprints of each article published are supplied free-of-charge. Additional reprints can be ordered on a reprint order form, which is included with the proofs.

Correspondence: All papers should be submitted to

The Editor (Dr. Teh Guan Hoe)
Geological Society of Malaysia
c/o Geology Department
University of Malaya
50603 Kuala Lumpur, MALAYSIA
Tel: (603) 7577036 Fax: (603) 7563900
E-mail: geologi@po.jaring.my

Script Requirements

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

Two copies of the text and illustrations must be submitted. The scripts must be typewritten double-spaced on paper not exceeding 210 x 297 mm (or 8.27 x 11.69 inches, A4 size). 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. The figure number should be marked in pencil on the margin or reverse side.

Original maps and illustrations or as glossy prints should ideally be submitted with sufficiently bold and large lettering to permit reduction to 18 x 25 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 x 12.5 cm and preferably larger. Use of metric system of measurements (SI) is strongly urged wherever possible.

An abstract in English which is concise and informative is required for each paper.

References cited in the text should be listed at the end of the paper and arranged in alphabetical order and typed double-spaced. The name of the book or journal must be in *italics*. The references should be quoted in the following manner:

HAMILTON, W., 1979. Tectonics of the Indonesian region. *U.S. Geological Survey Professional Paper* 1078, 345p.

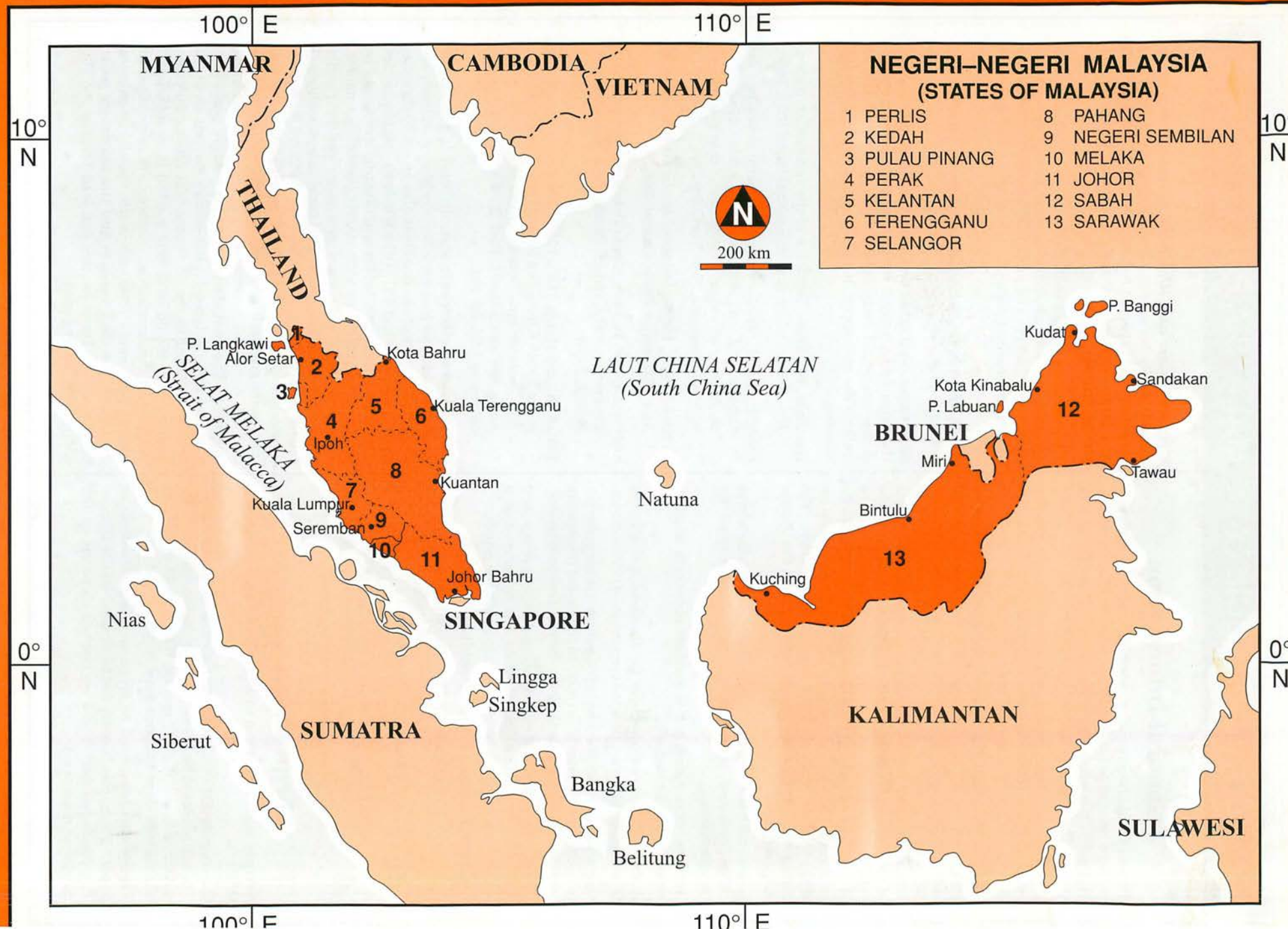
HOSKING, K.F.G., 1973. Primary mineral deposits. *In:* Gobbett, D.J. and Hutchison, C.S. (Eds.), *Geology of the Malay Peninsula (West Malaysia and Singapore).* Wiley-Interscience, New York, 335-390.

HUTCHISON, C.S., 1989. *Geological Evolution of South-east Asia*. Clarendon Press, Oxford, 368p.

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

TAYLOR, B., AND HAYES, D.E., 1980. The tectonic evolution of the South China Sea basin. *In:* D.E. Hayes (Ed.), The Tectonic and Geologic Evolution of Southeast Asian Sea and Islands, Part 2. *Am. Geophy. Union Monograph* 23, 89-104.

Submission of electronic text. In order to publish the paper as quickly as possible after acceptance, authors are requested to submit the final text also on a 3.5" diskette. Both Macintosh and PC (DOS/Windows) platforms are supported. Main text, tables and illustrations should be stored in separate files with clearly identifiable names. Text made with most word processors can be readily processed but authors are advised to provide an additional copy of the text file in ASCII format. Preferred format for illustration is Encapsulated PostScript (EPS) but authors may submit graphic files in their native form. It is essential that the name and version of softwares used is clearly indicated. The final manuscript may contain parts (e.g. formulae, complex tables) or last-minute corrections which are not included in the electronic text on the diskette; however, this should be clearly marked in an additional hardcopy of the manuscript. Authors are encouraged to ensure that apart from any such small last-minute corrections, **the disk version and the hardcopy must be identical**. Discrepancies can lead to proofs of the wrong version being made.


100° E
110° E
10° N
0° N
MYANMAR
CAMBODIA
VIETNAM
THAILAND
N
200 km
NEGERI–NEGERI MALAYSIA
(STATES OF MALAYSIA)
1 PERLIS
2 KEDAH
3 PULAU PINANG
4 PERAK
5 KELANTAN
6 TERENGGANU
7 SELANGOR
8 PAHANG
9 NEGERI SEMBILAN
10 MELAKA
11 JOHOR
12 SABAH
13 SARAWAK
P. Langkawi
Alor Setar
Kota Bahru
Kuala Terengganu
Ipoh
Kuantan
Kuala Lumpur
Seremban
Johor Bahru
SELAT MELAKA
(Strait of Malacca)
LAUT CHINA SELATAN
(South China Sea)
Natuna
P. Banggi
Kudat
Kota Kinabalu
Sandakan
P. Labuan
BRUNEI
Miri
Tawau
Bintulu
Kuching
SINGAPORE
Nias
Lingga
Singkep
SUMATRA
Siberut
Bangka
Belitung
KALIMANTAN
SULAWESI