

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

Jil. 10, No. 1 (Vol. 10, No. 1)

Jan-Feb 1984

KANDUNGAN (CONTENTS)

CATATAN GEOLOGI (GEOLOGICAL NOTES)

T.T. Kho: Occurrences of calcareous rocks in the Jerai Formation, Kedah, and their significance	1
Ibrahim Komoo & Basir Jasin: Koluvium Pos-Trias di Kawasan Genting Sempah	7
J.K. Raj: Use of the Mackintosh Probe for locating the sliding surfaces of slope failures	11

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Nik Mohamed: Watergun—A new marine source.	21
J.A. Hunter: Shallow Seismic Reflection Technique	21

BERITA PERSATUAN (NEWS OF THE SOCIETY)

GEOSEA V—Second and Final Circular	22
Keahlian (Membership)	27
Keahlian Profesional (Professional Membership)	27
Pertukaran Alamat (Change of Address)	27
Pertambahan Baru Perpustakaan (New Library Additions)	27

BERITA-BERITA LAIN (OTHER NEWS)

Second Asian Mining Conference	28
Coral Reef Congress—Reef and Man	28
IFAC Symposium on Automation for Mineral Resource Development	30
International Symposium on Karst Water Resources	31
High Heat Production Granites, Hydrothermal Circulation & Ore Genesis	32
Kursus-kursus Latihan (Training Courses)	34
Kalendar (Calendar)	36

Annexe: Bibliography of unpublished Theses and Final Year Project Reports (dissertations) in Geology of the National University of Malaysia (1970-1983)



DIKELUARKAN DWIBULANAN
ISSUED BIMONTHLY

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(GEOLOGICAL SOCIETY OF MALAYSIA)

Majlis (Council) 1983/84

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*Published by the Geological Society of Malaysia, Dept. of Geology,
University of Malaya, Kuala Lumpur 22-11 (Tel. 03-577036) -
15 March 1984.*

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

CATATAN GEOLOGI

(GEOLOGICAL NOTES)

OCCURRENCES OF CALCAREOUS ROCKS IN THE JERAI FORMATION, KEDAH AND THEIR SIGNIFICANCE

KHOO, T.T., Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

Abstract

An occurrence of a bed of marble in the Jerai Formation is described and it is suggested that this marble, the Jerai marble, could be the oldest carbonate unit in Peninsular Malaysia. The nature of calc-silicate layers in the Jerai Formation is also discussed and it is suggested that they could originally be calcareous sediments or even tuffaceous rocks.

The Jerai Formation in the Kedah Peak area, Kedah, has been found by Bradford (1972, p. 9-10) to be composed of two distinct facies - argillaceous and arenaceous. Both are metamorphosed. The argillaceous facies consists of schists and semi-schists and the arenaceous facies is made up predominantly of quartzite and some grit and granulite. He reported that the rocks of the argillaceous facies also contain minerals such as tourmaline, epidote, hornblende, garnet, albite, clinozoisite, actinolite and glaucophane. The last mineral is said by him to be a rare occurrence but its occurrence is doubted in Khoo (1980). Calc-silicate minerals are also present in some rocks of arenaceous facies such as garnet-epidote granulite, hornblende-zoisite, cassiterite granulite and others. On structural grounds, Bradford (1972, p. 10) regarded the schists to be older than the quartzite but both facies belong to the same geological age i.e. Upper Cambrian by lithological correlation with the Machinchang Formation of Langkawi.

However, the work 'granulite' in Bradford (1972) has the unusual distinction of being followed invariably by an asterisk beckoning one to an Editor's footnote in p. 14 which reads

"From the author's description in Chapter VIII of the conditions of temperature and pressure under which rocks of the Jerai Formation were metamorphosed it seems unlikely that the sequence includes any rocks of a true Granulite Facies. The occurrences of so-called granulite may be the result of low-grade metamorphism of impure, possibly calcareous, sands in the original sandstone."

However, in the Scottish sense, a granulite is a granoblastic metamorphic rock with rather equidimensional mineral without any grade significance. If the word 'granulite' is used in this sense, all the efforts to insert footnotes and even dubbing the granulites

as "so-called granulites" in the legend of Bradford's (1972) map, appear so unnecessary and uncommon,

Nevertheless, by whatever name the granulites of Bradford (1972) are known as, the inescapable fact is that they contain calc-silicate minerals. Darling, the Editor, (in Bradford, 1972) suggested that the rocks are calcareous bands in the original sandstone. Bradford (1972, p.21), however, interpreted otherwise and he argued

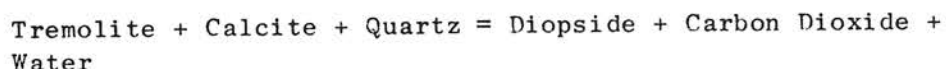
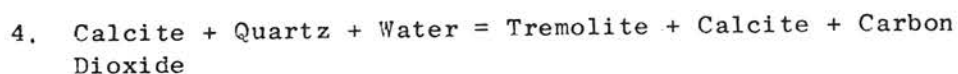
"The fact that the Jerai Formation sediments appear to have been deposited virtually without calcareous horizons is noteworthy. In a few places, as at the Public Works Department quarry at Gurun and the Cheng Teik quarry about ½ mile southeast of it, minerals like epidote, zoisite and clinozoisite occur locally in some quantity, and at the latter quarry even some calcite has been found. In view of the scarcity of calcium carbonate in the original sediments prior to their metamorphism it is thought probable that the origin of these calc-silicate minerals can be attributed mainly to calcium metasomatism."

In several unpublished studies of the Gunung Jerai area such as Paramanathan (1964), Rao (1972) and Chow (1979) the rocks containing calc-silicate minerals are also interpreted to be calcareous sedimentary bands before metamorphism. The view of Bradford (1972) appears to be the uncommon one.

From field and laboratory studies of the geology of the Gunung Jerai area since 1978, I am led to believe that the concordant calc-silicate rocks in the Gunung Jerai area are not metasomatic in origin as suggested by Bradford (1972). The scarcity of calcium carbonate in the Jerai Formation has been advanced as evidence for the calc-silicate rocks to be formed by calcium metasomatism. This evidence does not appear to be good enough in theory as well as in fact in view of recent discoveries.

The so-called fact that calcium carbonate is scarce in the original sediments cannot be considered a fact unless the observation is made on unmetamorphosed equivalent of the Jerai Formation which is unfortunately nowhere exposed in the Gunung Jerai area. It is a fact that a sediment containing carbonates, quartz, layered silicates, iron oxides, etc. could give rise to calc-silicate rocks without any carbonate mineral remaining after metamorphism. This is possible because of the breakdown of the carbonates and removal of carbon dioxide during metamorphism. For example,

1. Calcite + Quartz = Wollastonite + Carbon Dioxide
(Harker and Tuttle, 1956)
2. Calcite + Chlorite + Quartz = Clinozoisite + Actinolite + Carbon Dioxide + Water
(Deer, Howie and Zussman, 1962)
3. Calcite + Hematite + Quartz = Andradite + Carbon Dioxide
(Deer, Howie and Zussman, 1962)



(Turner, 1967)

It is possible that the present calc-silicate layers in the Jerai Formation may well have been former calcareous horizons before metamorphism. The suggestion of Bradford (1972) that the calc-silicate minerals are formed mainly by calcium metasomatism appears to be based not on a proven or demonstrable fact but an assumption.

The Jerai Formation does, in fact, contain at least one calcareous horizon. At the Lean Hong tin mine near Merbok (Figure 1) the bedrock is made up of a tourmalinized quartz-mica schist with a 23 m thick bed of white marble. The marble contains some calc-silicate bands. The marble-schist bedding is 160/20 and the schistosity is almost parallel to the bedding. At one spot of the marble-schist contact a pod of quartz-sulphide ore is seen to occur (Plate 1).

The origin of the calc-silicate rocks appears to be more likely due to metamorphism of beds or lenses of calcareous compositions. This is also a common and attainable geological situation. I am uncertain what the original rocks were apart from their calcareous compositions. Calcareous shale (Paramanathan, 1964) and impure dolomite (Rao, 1972) have been suggested. The latter appears unlikely in view of the lack of excess carbonates in the calc-silicate rocks. It is also possible that the original rocks were dacitic or andesitic tuffaceous materials. In connection with this possibility I would like to bring to the reader's attention of the occurrence of enigmatic calc-silicate blocks in the disused quarry at Gurun (Plate 2). The rock shows bouldery size calc-silicate bodies of different mineralogical compositions embedded in a matrix of calc-silicate totally different from any of the bodies. Some of the bodies have "rounded" edges, some with truncated ends and some appear to be split apart. The rock could be an agglomeratic tuff which have been deformed and metamorphosed. It could also be a banded calcareous horizon which have been metamorphosed and deformed, during which bands of various compositions are pulled apart and mobilized moving pieces of different composition into close proximity. Knowledge of the composition of the calc-silicate rocks does not permit us to know the nature of the original rocks in this case.

The occurrence of marble in the Lean Hong tin mine is most interesting. The marble occurs in the argillaceous facies of the Jerai Formation which is underlying the arenaceous facies, the quartzite. South of this mine, in a tributary of Sungai Eujang, an exposure of the Jerai quartzite dips 140/25 and cross-beddings in it show that there is no over-turning (Figure 1). I shall refer to the marble as the Jerai marble.

As the Jerai Formation is believed to be Upper Cambrian it is possible that the Jerai marble could be the oldest known carbonate rock in Peninsular Malaysia.

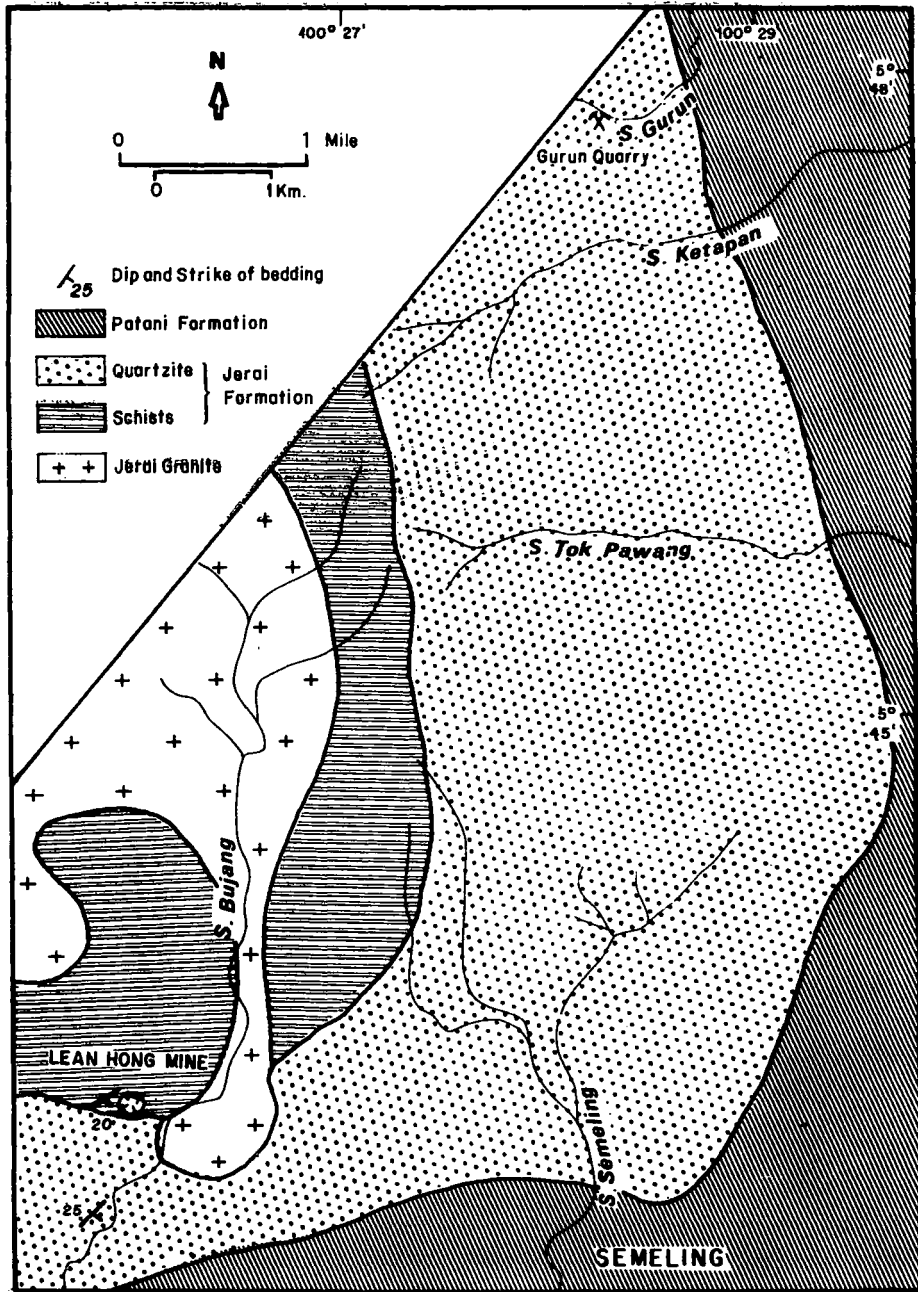


Fig. 1. Geological map of part of Gunung Jerai area, Kedah, after Bradford (1972) with some modifications.

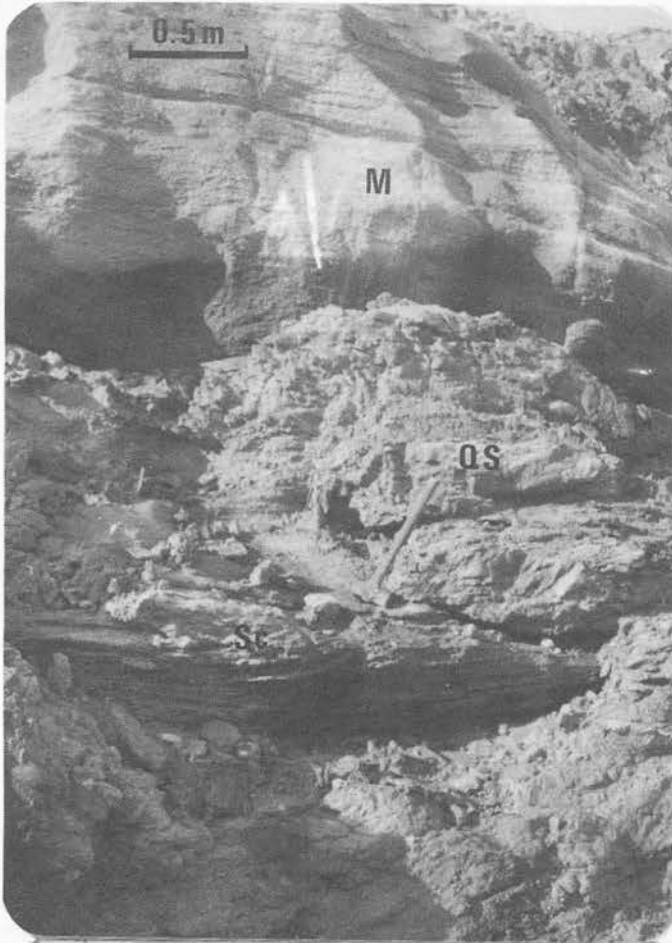


Plate 1.

Jerai Marble (M), Lean
Hong Mine, near Merbok.

QS - Quartz-sulphide
body.

Sc - Schist.



Plate 2.

Calc-silicate rock,
Gurun Quarry. Note
"inclusions" of
various types of
calc-silicate rocks.

Acknowledgement

I am grateful to Universiti Malaya for financial support under Research Project F28/79.

References

- Bradford, E.F., 1977. Geology and mineral resources of the Gunung Jerai area, Kedah. Geological Survey Malaysia District Memoir 13, 242 p.
- Chow, K.T., 1979. Geology of the Yan-Ayer Puteh area, Kedah, Unpubl. B.Sc. thesis, Universiti Malaya, 63 p.
- Deer, W.A., Howie, R.A. and Zussman, J., 1962. Rock-forming minerals, Vol. 1, Longmans, London, 333 p.
- Harker, R.I., and Tuttle, O.F., 1956. Experimental data on the P_{CO_2} -T curve for the reaction: Calcite-quartz = wollastonite + carbon dioxide. Am. J. Sci., 254, 239-256.
- Khoo, T.T., 1980. On a reported occurrence of glaucophane in Peninsular Malaysia. Warta Geologi, 6, p. 127.
- Paramanathan, S., 1964. The geology of the Gunung Jerai massif, South west, Kedah. Unpubl. B.Sc. (Hons) thesis, Univ. Malaya.
- Rao, A., 1972. Geology of geochemistry aspects of the southern Gunung Jerai area, Kedah. Unpubl. B.Sc. (Hons) thesis, Univ. Malaya.
- Turner, F.J., 1967. Thermodynamic appraisal of steps in progressive metamorphism of siliceous dolomitic limestone. Neues. Jahrb. Min. Monatsh, 1967, 1-22.

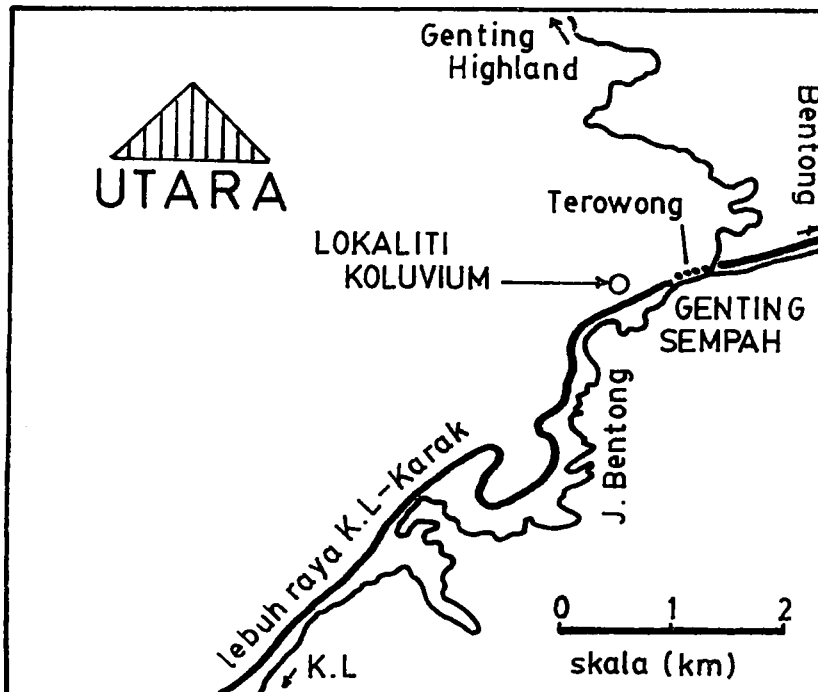
Manuscript received 20 Jan 1982

KOLUVIUM POS-TRIAS DI KAWASAN GENTING SEMPAH

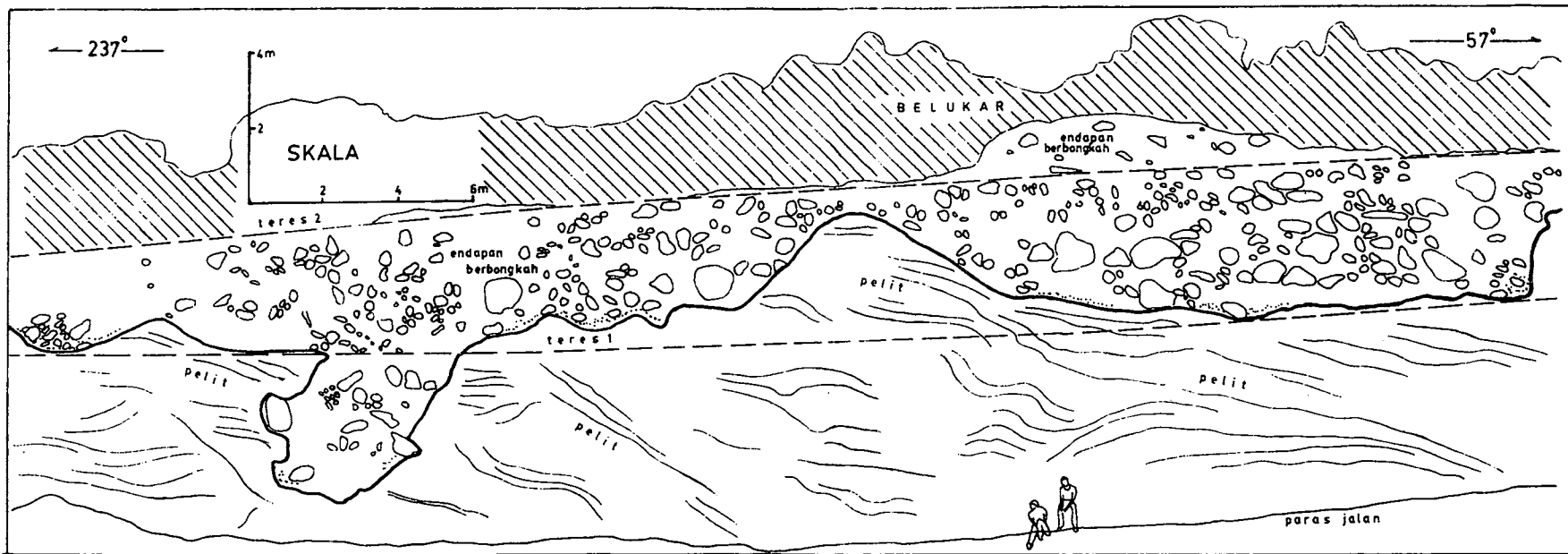
IBRAHIM Komoo dan BASIR Jasin, Universiti Kebangsaan Malaysia, Bangi, Selangor.

Ketika menyelia pelajar tahun kepujian, Universiti Kebangsaan Malaysia yang sedang melakukan latihan pemetaan kami telah terserempak dengan sebuah singkapan selebar lebih 40 m dan dengan ketinggian sekitar 10 m. Singkapan ini terletak kira-kira 300 m ke baratdaya Terowong iaitu sebuah potongan jalan di sebelah kiri lebuh raya Kuala Lumpur - Karak (Rajah 1). Di bahagian bawah singkapan ini terdiri dari batuan metasedimen (umumnya filit) dan di atasnya terletak secara tidak selaras batuan separuh terkonsolidasi yang terdiri dari bahan yang berasingan sangat buruk (Rajah 2). Oleh kerana keadaannya seakan bersifat tanah dan mengalami luluhawa sederhana hingga tinggi membuat seseorang mudah untuk tidak perasan terhadap kehadirannya.

Endapan yang ditakrifkan sebagai 'koluvium Pos-Trias' ini mempunyai ketebalan (pada singkapan) tidak menentu iaitu dari 1 m hingga mencapai lebih 5 m, dan lebarnya mencapai 40 m. Sempadannya dengan batuan metasedimen jelas dan merupakan sebagai sempadan hakisan. Bahan dari koluvium ini terdiri dari kerikil dan bongkah, mengikut turutan terbanyak granit, riolit, dasit, cert dan filit di dalam matriks tanah liat berpasir. Bongkah granit dan batuan volkano umumnya lebih besar berdiameter boleh mencapai hingga 2 m, sementara bongkah-bongkah cert dan filit secara relatif lebih kecil. Bentuk dari bongkah-bongkah ini pula dari separuh bersudut hingga membulat, dan umumnya separuh bulat. Peratusan kerikil dan bongkah dianggarkan lebih dari matriks tetapi keadaannya jarang bersentuhan antara satu dengan yang lain.



Rajah 1. Peta lokaliti koluvium



Rajah 2. Lakaran singkapan yang mengandungi endapan 'koluvium Pos-Trias'

Paling hampir kolumium ini mungkin dapat disamakan dengan endapan 'lapisan berbongkah' atau 'tanah liat berbongkah' yang dijumpai di beberapa kawasan di Semenanjung Malaysia. Di lembah Kinta umpamanya, endapan seperti ini dijumpai di bahagian tepi lembah berhampiran dengan kawasan perbukitan. Litologinya secara umum terdiri dari tanah liat berpasir dengan taburan bongkah-bongkah yang beratnya tidak melebihi 50 lb. (Rastall dalam Stauffer, 1973) Scrivenor (dalam Stauffer, 1973) menjelaskan kerikil dan bongkah dalam lapisan berbongkah ini kebanyakannya telah mengalami luluhawa yang sangat tinggi hingga sepenuhnya. Di Lembah Kancing berhampiran dengan Taman Templer, endapan yang hampir sama ditafsirkan sebagai endapan pengisi lembah berikutan dari satu tempoh hakisan yang pantas. Bongkah-bongkah umumnya terdiri dari granit berbentuk membulat hingga separuh bersudut dan berdiameter umumnya tidak melebihi 30 cm. Bongkah ya telah mengalami luluhawa yang tinggi hingga sepenuhnya Stauffer (1973) mencadangkan kebanyakan dari lapisan berbongkah yang dijumpai di kawasan Lembah Kinta dan sekitar Kuala Lumpur ini berusia awal Kuaterner.

Endapan yang hampir sama dengan kolumium ini pernah dijumpai berhampiran dengan lebuhraya Kuala Lumpur - Karak sebelum sampai simpang ke Bentung. Di sini bongkah-bongkah granit berdiameter hingga 5 m berada di dalam matriks tanah liat, pasir dan kerikil (Ibrahim Komoo *et al.*, 1982). Tetapi bongkah-bongkah granit di kawasan ini berkeadaan segar menjelaskan ia merupakan endapan kolumium muda. Kolumium di kawasan Genting Sempah pula, hampir keseluruhan bongkah-bongkah telah mengalami luluhawa sederhana hingga tinggi. Darjah luluhawa yang berlaku pada lapisan kolumium ini terutama terhadap bongkah granit yang bersaiz besar mencadangkan ia telah terendap pada masa yang agak lama. Keadaan terkonsolidasinya juga menyokong hal ini.

Satu perkara lagi yang agak menarik perhatian ialah berhubung dengan kedudukannya iaitu pada ketinggian 541 m (1774 kaki). Berbanding dengan kedudukan lapisan berbongkah di kawasan Lembah Kinta dan di sekitar Kuala Lumpur, kedudukan kolumium Genting Sempah ini secara relatif sangat tinggi. Hal ini mungkin mencadangkan keadaan topografi kuno dan paras denudasinya. Kehadiran bongkah-bongkah granit bersama batuan volkano dan metasedimen di sekitarnya menjelaskan ia pasti diendapkan selepas orogeni intrusi granit Trias yang membentuk sebahagian besar dari Banjaran Titiwangsa.

Meskipun kawasan ini banyak mengalami pergerakan tektonik semasa usia Trias Atas - Jura Bawah (Lim Peng Lai *et al.*, 1979), tetapi dilihat dari ciri sentuhan dan gaya struktur batuan metasedimen di bawahnya jelas menunjukkan kolumium ini tidak mengalami sebarang pengangkatan selepas pengendapannya. Potongan jalan ini merupakan lanjutan dari sebuah bukit yang berada pada arah 147° iaitu di hadapan dari Rajah 2. Cerapan pada singkapan di hadapannya ini menunjukkan bahawa keseluruhan singkapan terdiri dari cert berperalapisan nipis hingga sederhana yang terlipat dan tersesar. Bahagian dasar dari singkapan ini jelas dapat dilihat zon filonit dan breksi sesar yang mencadangkan satu zon sesar berjurus sekitar 240° , dan yang juga menyebabkan ke dua singkapan ini secara litologinya berbeza. Walaupun tiada tanda-tanda yang jelas, kolumium ini mungkin diendapkan dalam lingkungan lembah sungai muda dan pergerakannya berarah sekitar barat - baratdaya.

Rujukan

- Ibrahim Komoo, Umar Hamzah dan Ismail Mohd Noor, 1982. Report on the soil investigation of the proposed Bentong Industrial Area, Pahang, Laporan untuk Perbadanan Kemajuan Negeri Pahang (tidak diterbitkan).
- Lim Peng Lai dan Tjia, H.D., 1979. The Genting thrust belt at Genting Sempah, Selangor, Sains Malaysiana, 8(2), 125-146.
- Stauffer, P.H., 1973. Cenozoic dalam Geology of the Malay Peninsula (Penyunting: Gobbett, D.J. dan Hutchison, C.S.), New York, John Wiley & Son, 143-175.

Manuskript diterima 4 Julai 1983.

USE OF THE MACKINTOSH PROBE FOR LOCATING THE SLIDING SURFACES OF SLOPE FAILURES

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Synopsis

The Mackintosh Probe can be successfully applied to locating the sliding surface of slope failures for differences of penetration resistance exist in the material on both sides of the sliding surface. Interpretation of the penetration resistance values, however, also sometimes requires a knowledge of the type of slope failure being investigated. Delineation of the overall sliding surface furthermore, requires not only the subsurface location of the sliding surface through Probings but also a knowledge of the type of failure and the geometry of the slope cut after failure.

Introduction

Investigations of slope failures invariably require the accurate location and delineation of the sliding surfaces so as to allow for their back stability analyses. These back analyses can then provide information on the factors responsible for failure. Various techniques are available for the accurate location of the sliding surfaces and include then excavation of test pits and trenches, probings and borings, and geophysical studies (Sowers and Royster, 1979). Probings are perhaps the most simple and economical method for distinct differences in penetration resistance are to be expected in the material on both sides of the sliding surface.

In this short communication are presented several examples of the application of the Mackintosh Probe to accurately locating the sliding surface of rotational and compound slides that have affected slope cuts in residual soils over the Kajang Schist. Back stability analyses of these slides are, however, not here considered for they will be discussed in later publications.

The Mackintosh Probe

The Mackintosh Probe is essentially a mining prospecting tool but has been adapted for use as a light dynamic cone penetrometer by engineers in Malaysia (Jewkes, 1954; Ting, 1972). In use as a penetrometer, the Probe consists of a cone shaped drive point that is screwed onto a drive rod and driven into the ground by repeatedly dropping a small hammer (of 4.5 kg weight) on the drive head (Fig. 1); the hammer falling through a fixed length of 30 cm along a guide rod. The resistance to penetration of the subsurface material is identified from the number of hammer blows required to advance the drive point a fixed distance into the ground. Extra drive rods can furthermore be coupled onto the initial drive rod to allow the Probe to be driven to a depth of about 16 m in suitable ground.

The application to subsurface investigations of the Mackintosh Probe has, however, several limitations that basically arise from the fact that it is not provided with sufficient energy to penetrate

hard layers (Ting, 1972). The sidewalls of deep Probe holes can also sometimes collapse giving rise to side friction on the drive rods and misleading values of penetration resistance (Ting 1972). The slender drive rods (OD 1.3 cm) can furthermore buckle during the probing of hard subsurface layers. On the other hand, however, the Probe is light, easily portable and operatable by a single person for shallow probings (to a depth of about 6 m). It is thus ideally suited to the determination of the penetration resistance of not very hard subsurface material located at shallow depths.

Kajang Schist

The Kajang Schist consists predominantly of light coloured quartz-mica and dark coloured graphitic-quartz-mica schists with some meta-quartzites and limestones and has given rise to a low-lying, undulating terrain around Kajang town (Fig. 2). The Kajang Schist is strongly folded with variable strikes and dips and is of a probable Lower Carboniferous to Permian age (Yin, 1976). Fresh and unweathered outcrops of these schists are, however, only rarely encountered and all slope cut exposures show well developed residual soils that are characterized by a distinct morphological horizonation (as schematically shown and described in Fig. 3). The thickness of the different morphological horizons, however, vary from exposure to exposure.

Slope cuts in these residual soils have been affected by a number of failures than can be classified as being either rotational or compound slides (following the classification of Skempton and Hutchison, 1969). These failures have occurred under different conditions and back stability analyses can thus provide information on the factors responsible for failure. To this end, the sliding surfaces of these failures were located with the use of a Mackintosh Probe. The following examples thus illustrate the usefulness of the Mackintosh Probe for locating the sliding surfaces of slope failures.

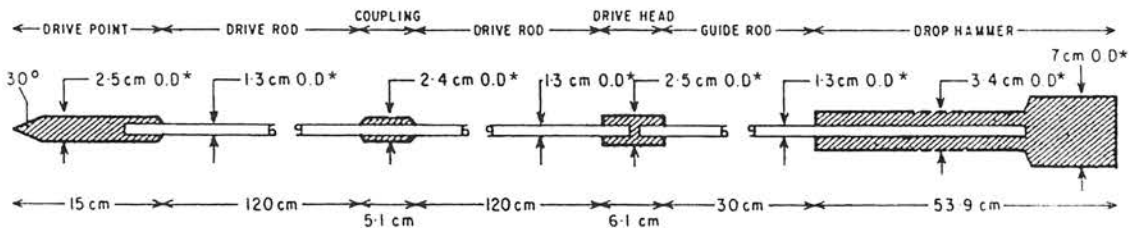


Fig. 1. General arrangement of the Mackintosh Probe.
Note: O.D* denotes outside diameter.

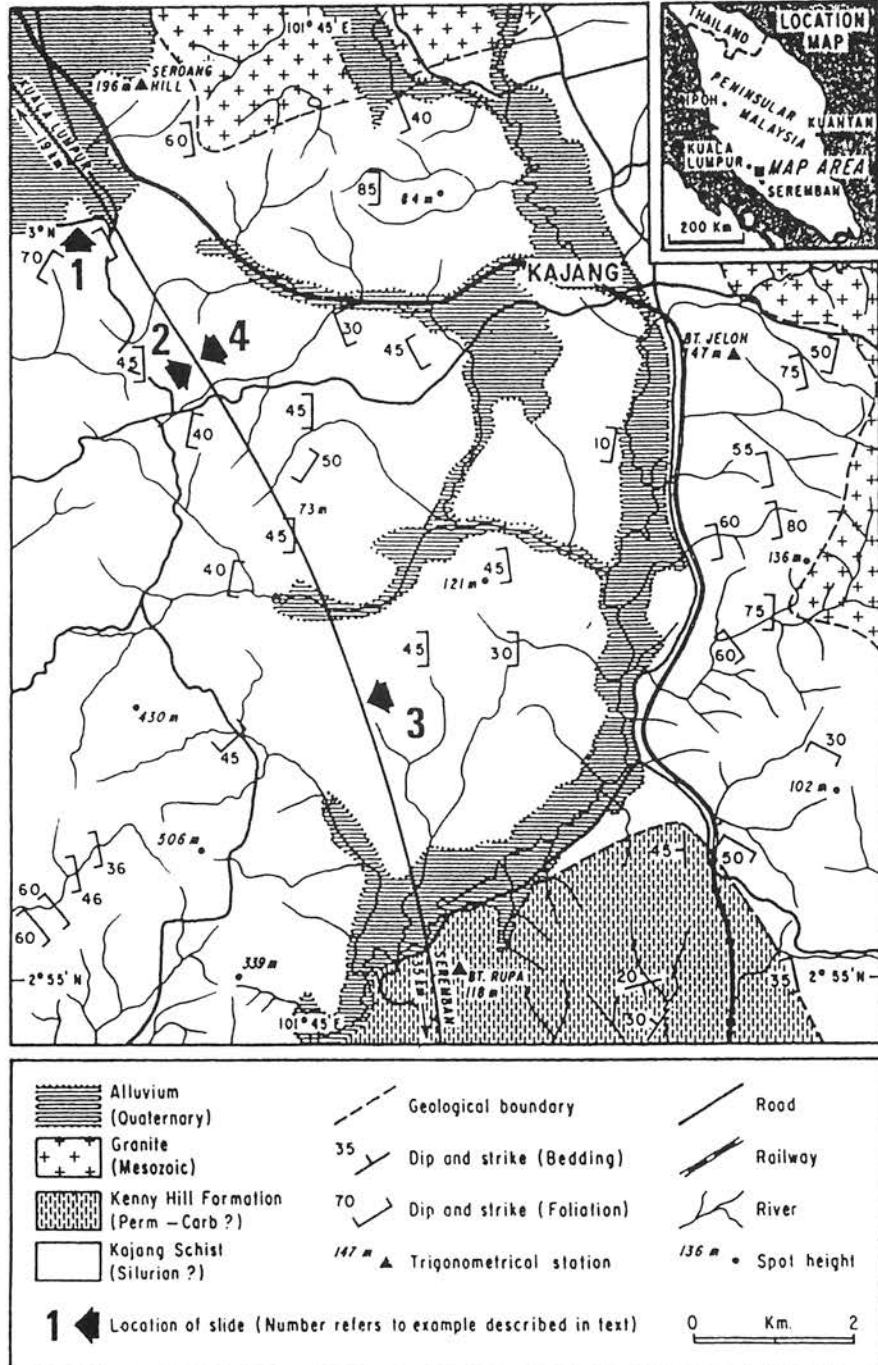


Fig. 2: Geological sketch map of the Kajang Area (after Yin, 1976).

Vertical depth	Morphological Horizon	Morphological Horizon	Field description
0	IB ₁		IB ₁ reddish yellow, friable, sandy clay; many gravel sized lateritic concretions and some lateritized corestones; boundary wavy, gradual.
	IB ₂		IB ₂ reddish yellow, clayey sand; firm, subangular blocky, moist, friable, dry; some lateritic concretions; boundary wavy, gradual.
	IB ₃		IB ₃ yellowish red, firm, clayey sand; friable, dry; some gravel sized lateritic concretions and lateritized corestones; boundary irregular, diffuse.
3m	IC ₁		IC ₁ yellowish red and reddish yellow mottled, stiff clayey sand; friable, dry; some gravel sized lateritized corestones and vein quartz clasts; boundary irregular, diffuse.
	IC ₂		IC ₂ yellowish red, firm, silt with some white mottles; distinct relict quartz veins and indistinct relict foliation planes; some lateritized corestones; boundary irregular, diffuse.
6m	II A		II A alternating bands of firm, silty material of reddish, purplish and whitish coloured completely weathered bedrock; distinct relict textures, quartz veins and foliation planes; angular blocky structure; some lateritized corestones; boundary broken, diffuse.
	II B		II B alternating bands of firm silty material of dark grey, reddish and yellowish coloured, less weathered and completely weathered bedrock; distinct relict bedrock textures, quartz veins, joint and foliation planes; angular blocky structure; boundary broken, diffuse.
9m	II C		II C thick bands of dark grey and yellow coloured, less weathered bedrock alternating with thin bands of reddish coloured, completely weathered bedrock; firm, silty weathered material; distinct relict bedrock textures, quartz veins, joint and foliation planes; angular blocky structure.

Fig. 3: Schematic sketch and field description of the main features of morphological horizons within the generalized residual soil profile over the Kajang Schist.

Examples of locating sliding surfaces with the Mackintosh Probe

The first example (Fig. 4) involves a rotational slide that occurred some six months after the end of excavation at a slope cut intersecting a zone of unconfined groundwater. This failure occurred under undrained conditions and was preceded by the development of desiccation cracks within the slope forming material and by the development of a tension crack at the upper end of the slide mass. Mackintosh Probing, along the centre line of the failed material, clearly show the position of the sliding surface by the sudden increase in values of penetration resistance (Fig. 4). From the subsurface locations of these points, and from the geometry of the slope cut after failure, it has thus been possible to delineate the overall sliding surface.

The second example (Fig. 5) involves a rotational slide that occurred within about six months of the end of excavation at a slope cut intersecting a zone of unconfined groundwater. Although the exact date of failure is unknown, it is considered to have occurred under the same conditions as the first example. Mackintosh Probing

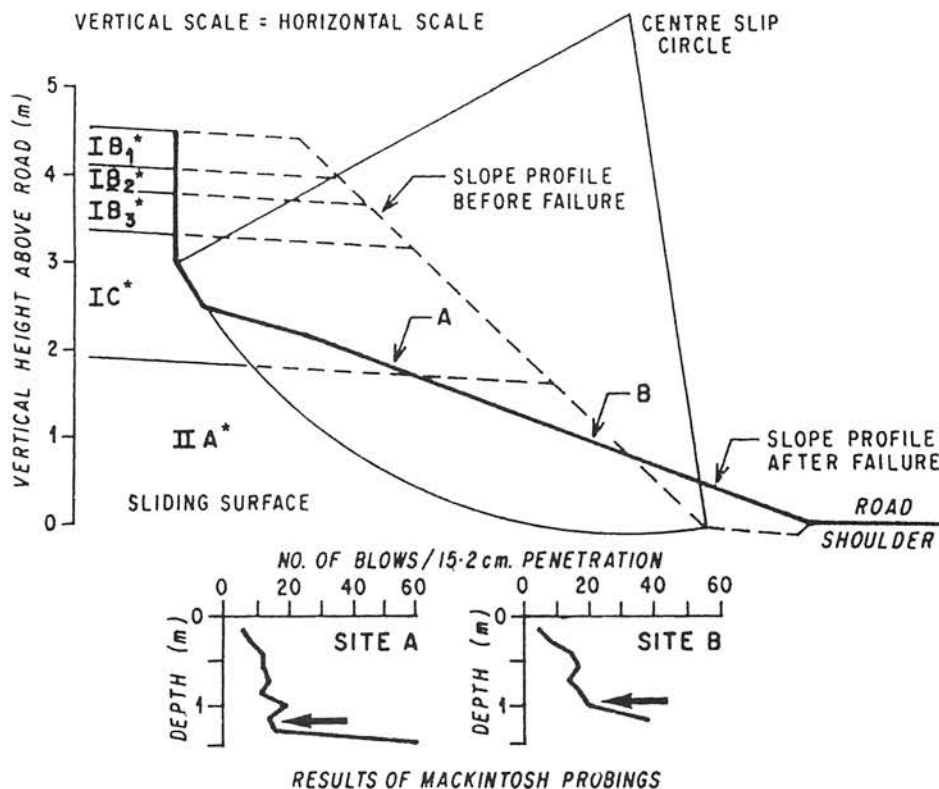


Fig. 4: First example of locating the sliding surface with the Mackintosh Probe.

Note: a) * refers to morphological horizon;
 b) location of slide shown in Fig. 2;
 c) arrows in results of Mackintosh Probing refer to interpreted positions of sliding surface.

along the centre line of the failed material again clearly show the position of the sliding surface by the sudden increase in values of penetration resistance (Fig. 5). From the subsurface locations of these points and from the geometry of the slope cut after failure, it has again been possible to delineate the overall sliding surface. It should be noted that the Probingings were carried out some six years after the time of actual failure, though this lapse of time appears to have little influence on the penetration resistance characteristics of the material on both sides of the sliding surface.

The third example (Fig. 6) involves a compound slide that occurred within about six months of the end of excavation at a slope cut intersecting a zone of unconfined groundwater. At the slope cut, the relict foliation dips towards the cut face and has thus led to the development of the sliding surface along a relict foliation plane. The exact date of failure is, however, unknown though it is considered to have occurred under undrained conditions. The slide is furthermore, considered to have been preceded by the development of desiccation cracks within the slope forming material and by the development of a tension crack at its upper end. Mackintosh Probingings along the centre line of the failed material once again clearly show the position of the sliding surface by the sudden increase in values of penetration resistance (Fig. 6). From the subsurface locations of these points, the type of failure and the geometry of the slope cut after failure, it has been possible to delineate the overall sliding surface. It should be noted that the Probingings were carried out some six years after the time of actual failure though this lapse of time appears to have little influence on the penetration resistance characteristics of the material on both sides of the sliding surface.

The fourth and final example (Fig. 7) involves a compound slide that occurred some six years after the end of excavation at a slope cut intersecting a zone of unconfined groundwater. At this slope cut, the relict foliation dips towards the slope cut face and has thus controlled in part the development of the sliding surface. In contrast to the other examples, however, this failure occurred under drained conditions mainly as a result of the rise of the groundwater table. Mackintosh Probingings along the centre line of the failed material furthermore show a variability of penetration resistance values and thus pose some problems on the identification of the sliding surface. Recognition of the partly translational character of the slide and its development parallel to the relict foliation, however, allowed for the interpretation of the sliding surface from the Probingings. From the subsurface locations of these points and from the geometry of the slope cut after failure it was then possible to delineate the overall sliding surface as shown in Fig. 7.

Discussion

From the above examples, it is clear that the sliding surfaces of slope failures can generally be identified by changes of penetration resistance (as measured with a Mackintosh Probe) in the material on both sides of the sliding surface. Care must, however, be exercised in the interpretation of the sliding surface for

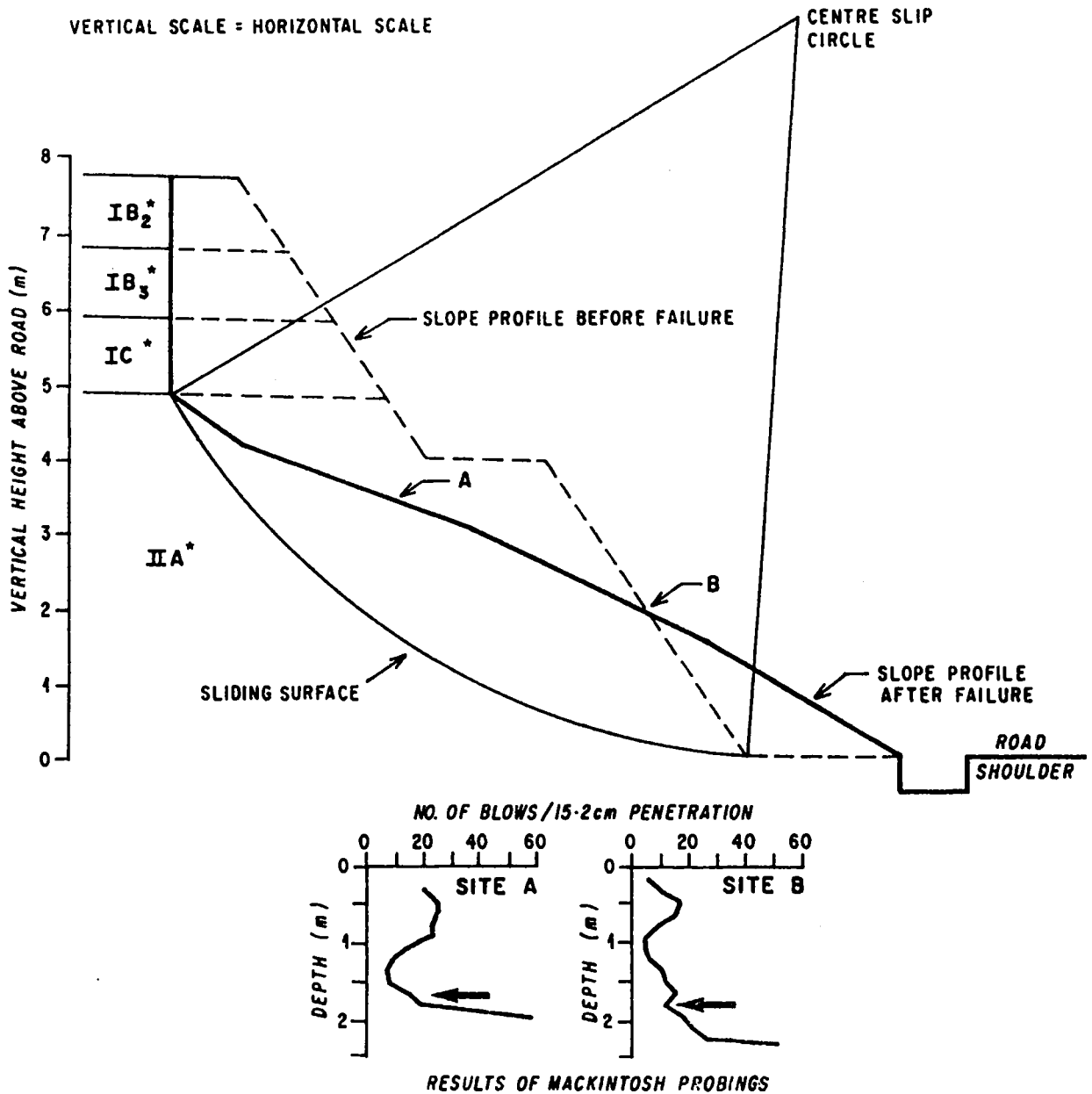


Fig. 5: Second example of locating the sliding surface with the Mackintosh Probe.

- Note: a) * refers to morphological horizon;
 b) location of slide shown in Fig. 2;
 c) arrows in results of Mackintosh Probing refer to interpreted positions of sliding surface.

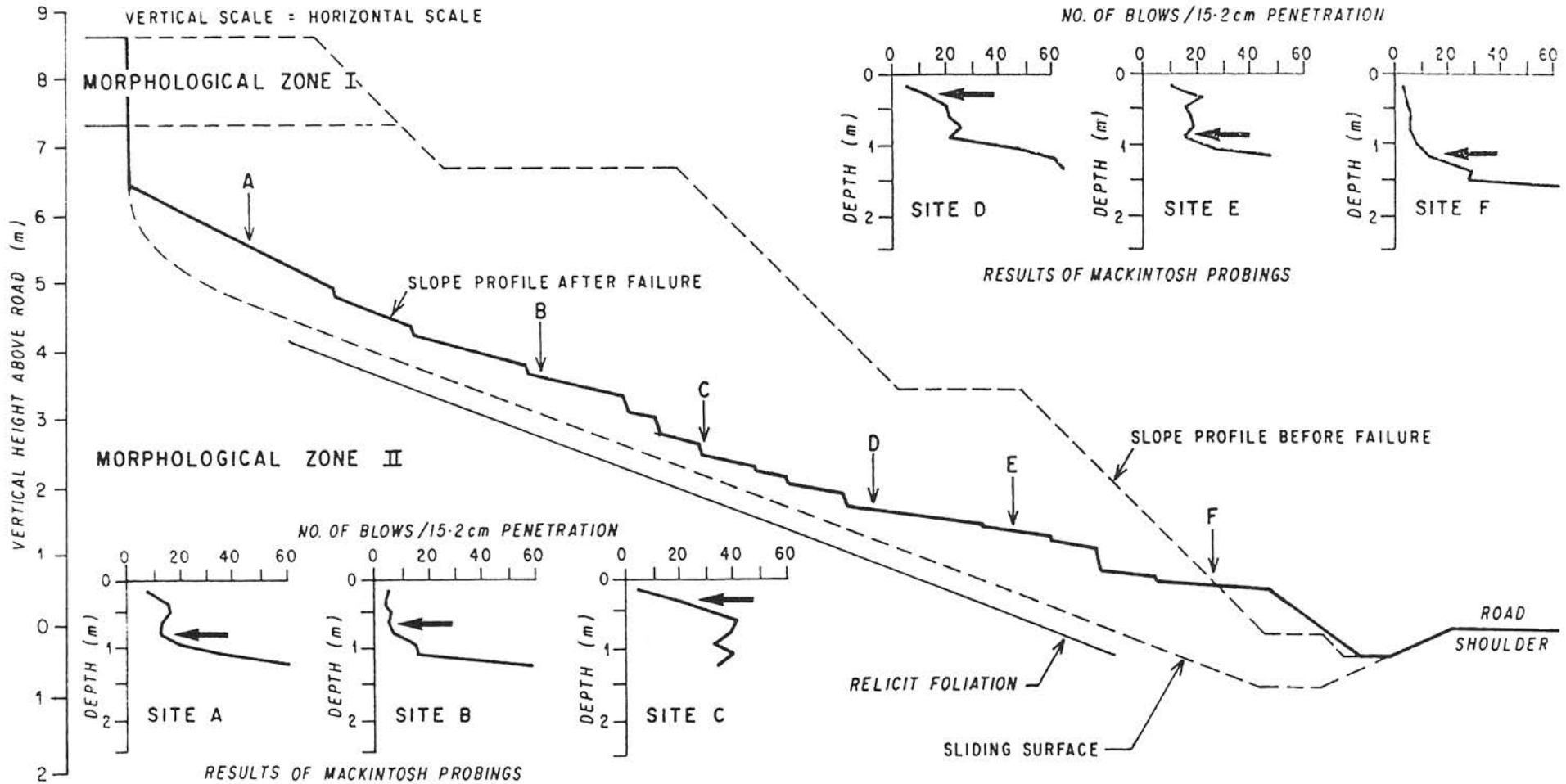


Fig. 6: Third example of locating the sliding surface with the Mackintosh Probe.

Note: a) location of slide shown in Fig. 2; b) slide debris has been excavated prior to Probing;
 c) arrows in results of Mackintosh Probing refer to interpreted positions of sliding surface.

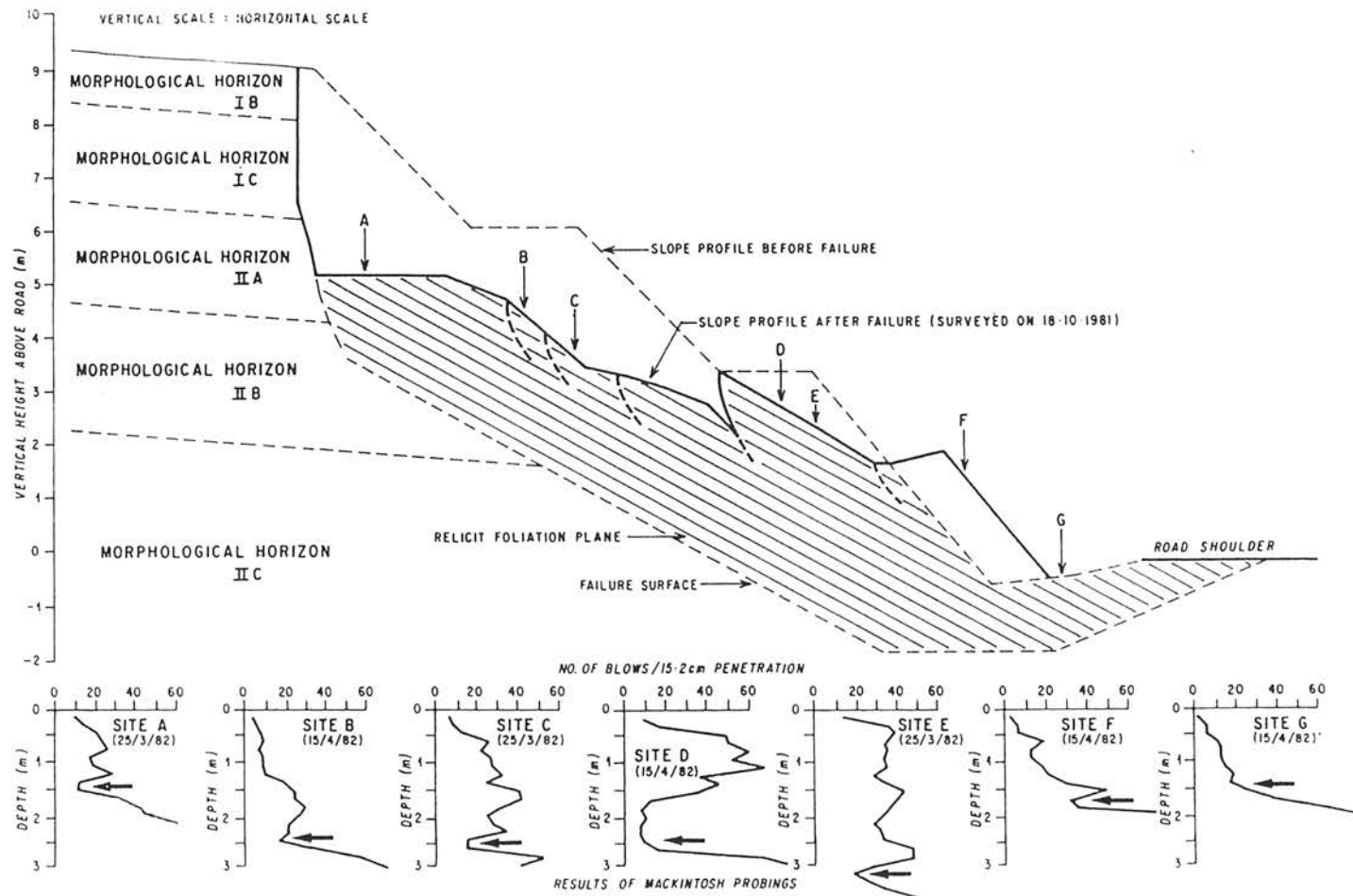


Fig. 7. Fourth example of locating the sliding surface with the Mackintosh Probe. Note: a) location of slide shown in Fig. 2; b) arrows in results of Mackintosh Probing refer to interpreted positions of sliding surface; c) Probing of different dates are located at different heights due to intermittent, post-failure movements of slide debris.

subsurface variability of penetration resistance values can lead to difficulties of interpretation (as shown by the fourth example). It then becomes necessary to take into consideration the type of slope failure before interpretation of the sliding surface can be made from the results of penetration resistance measurements. Thus, differences of penetration resistance of subsurface material alone should not be used for the recognition of the sliding surfaces of slope failures (as was suggested by Tan, 1983). Delineation of the overall sliding surfaces of slope failures furthermore requires not only the subsurface locations of the sliding surfaces through Probings, but also information on the type of failure and the geometry of the slope cut after failure. This information is necessary for the Probings only provide data at limited sites along the entire length of the sliding surface.

Conclusion

It is concluded that the Mackintosh Probe can be successfully applied to locating the sliding surfaces of slope failures for differences of penetration resistance exist in the material on both sides of the sliding surface. Interpretation of the penetration resistance values, however, also usually requires a knowledge of the type of slope failure being investigated. It is also concluded that the delineation of the overall sliding surface requires not only the subsurface locations of the sliding surface though Mackintosh Probings, but also a knowledge of the type of failure and the geometry of the slope cut after failure.

Acknowledgements

Cik Asmaliah Ahmad typed the manuscript while En. Srinivass drafted the figures.

References

- Jewkes, S.E. , 1954. Soil exploration with deep sounding apparatus and probing apparatus. J. Mal. Assoc. Inst. Civ. Eng., Vol. XX.
- Skempton, A.W. and Hutchinson, J., 1969. Stability of natural slopes and embankment foundations. Proc. 7th Int. Cont. Soil Mech. Foundn. Engng., Mexico, State-Of-The-Art. Vol, p. 291-340.
- Sowers, G.F. and Royster, D.L., 1979. Field Investigation. In R.L. Schuster and R.J. Krizek (Eds.), "Landslides - Analysis And Control", Nat. Acad. Sciences, Washington, D.C., Spec. Rept. 176, p. 81-111.
- Tan, B.K., 1983 - Koluvium atau granit terurai: alluvium muda atau aluvium tua? - kaedah tanpa geologi, Warta Geologi, Geol. Soc. Malaysia, V. 9, No. 2, p 45-50.
- Ting, W.H., 1972. Subsurface exploration and foundation in the Kuala Lumpur area. J. Inst. Engrs. Malaysia, V. 13, p. 19-25.
- Yin, E.M., 1976. Geological map of the Kuala Lumpur area, Sheet 94, Scale 1:63,360. Directorate of National Mapping, Malaysia.

PERTEMUAN PERSATUAN
(MEETINGS OF THE SOCIETY)

TECHNICAL TALKS

NIK Mohamed: Watergun - A new marine source

J.A. HUNTER: Shallow seismic reflection technique (including applications of bedrock mapping beneath alluvial cover)

On the evening of 9 February 1984 a large audience assembled to hear two consecutive 'state of the art' talks on seismic exploration techniques. The first talk was by Nik Mohamed of Shell who has recently returned to Malaysia from the Hague as chief geophysicist with Sabah Shell and Sarawak Shell. His talk was on the new watergun source which he has been involved in developing. The prime advantages of the gun are in its signal characteristics - it has more high frequency energy than the conventional airgun, and the signal is a lot clearer without the bubble effect. The watergun has already been used in surveys in the North Sea and is expected to soon replace the airgun worldwide. We might therefore expect to see it in use in Malaysia in the new future where hopefully the improved resolution due to its sharper signal may help in discovering new reserves.

The second talk by Dr. Jim Hunter of the Canadian Geological Survey was also on very recent developments in seismic exploration, this time in onshore surveys primarily for engineering purposes (although there was a large representative at the talk by parties interested in its application to alluvial mining). Dr. Hunter has been prominent in developing shallow seismic reflection techniques using conventional refraction equipment with processing of the records on a microcomputer, and his talk was richly illustrated with records from surveys he has conducted in Canada. The success of the method is highly dependant on core taken in acquisition and processing and it was the considerable experience of Dr. Hunter in troubleshooting different problems in various surveys which made his talk so interesting.

Both talks were followed by very lively debate and the meeting ran into the night - a tribute to both the lecturers and to the stamina of the audience.

C.A. Foss



NIK MOHAMED



J.A. HUNTER

BERITA PERSATUAN
(NEWS OF THE SOCIETY)

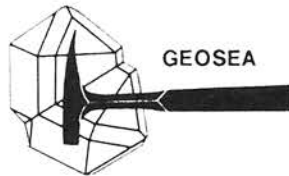
GEOSEA V - SECOND & FINAL CIRCULAR



PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA

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

GEOSEA V



Venue
FEDERAL HOTEL
KUALA LUMPUR
MALAYSIA

Date
9-13th APRIL 1984

Organized by:
Geological Society of Malaysia

In collaboration with:
University of Malaya
National University of Malaysia

With support and cooperation of:
Ministry of Primary Industries Malaysia
Geological Survey of Malaysia
Mines Research Institute, Malaysia
Petronas
States of Malaya Chamber of Mines
Southeast Asia Tin Research and Development Centre
Institute of Mineral Engineering, Malaysia
School of Physics, Science University of Malaysia
Faculty of Mechanical Engineering, University of Technology, Malaysia
Department of Soil Science, Agriculture University of Malaysia

Other cooperating organizations

Ikatan Ahli Geologi Indonesia
Geological Society of Philippines
Geological Society of Thailand
Association of Geoscientists for
International Development

CIFEG

Department of Mineral Resources,
Thailand.

OFFICIAL CARRIER



SECOND AND FINAL CIRCULAR * December 1983



**FIFTH REGIONAL CONGRESS
ON GEOLOGY, MINERAL
AND ENERGY RESOURCES OF
SOUTHEAST ASIA (GEOSEA V)**

From replies to the First Circular, the Geological Society of Malaysia is pleased to inform that we have received very encouraging response and interest in the Congress and all its associated activities. All interested persons are cordially welcomed to participate in the Congress and associated activities detailed below.

GEOSEA V CONGRESS

In response to the call for papers, we have received very numerous offers of papers for presentation and it is expected that 120-150 papers will be presented in the Congress. In addition there will be keynote papers by distinguished geoscientists on topics of general interest to the GEOSEA core countries since 1981 (GEOSEA IV). There will be sessions on Tectonics, Economic Geology, Quaternary/Applied Quaternary Geology, etc.

Venue: Federal Hotel, Kuala Lumpur

Dates: 9th-13th April 1984

REGISTRATION FEES

	Before 25th March 1984	After 25th March 1984
Members	MR165/US\$70	MR230/US\$100
Non-members	MR185/US\$80	MR275/US\$120

GEOSEA V Training/Continuing Education Courses

With the kind support and cooperation of many organizations and individuals, the following Training/Continuing Education Courses will be held subject to sufficient enrolment and other reasons. Some courses have limited places. Course fees will NOT be refunded to those who failed to attend the courses they have been selected to attend. Fees will be fully refunded to all those not selected for the courses they wish to attend. Limited support will be available to enable deserving participants to attend the courses. Details of the courses are given below and further details will be available to all those responding. Venue will be in the University of Malaya unless otherwise stated (US\$1 = MR 2.3).

CCOP-ASCOPE-GEOSEA Course on CARBONATE DIAGENESIS

INSTRUCTORS: Prof. R.G.C. Bathurst and others

PLACES: Limited.

FEES: To be determined. Need to confirm intention to attend for further information.

DATES: 4th-6th April 1984.

**SEATRAD-GEOSEA Course on GEOCHEMICAL EXPLORATION IN
TROPICAL TERRAIN**

INSTRUCTORS: Dr. W.K. Fletcher, Dr. S. Paramanathan

PLACES: About 20.

FEES: US\$25

DATES: 3rd-7th April 1984

COURSE CONTENTS: Basic principles, calculation of thresholds, estimation of backgrounds, distribution of metals in soils and sediments, analysis of samples, soil surveys, soil profile effects, drainage surveys, etc.
VENUE: SEATRAD Centre. Ipoh; Bujang Melaka (Fieldwork)
PARTICIPANTS: Preferably 2-3 years experience in exploration geology.

GEOSEA Course on ALLUVIAL DEPOSITS EVALUATION
INSTRUCTORS: Staff of Malaysia Mining Corp. & Mines Research Institute, Malaysia
PLACES: 40
FEES: US\$10
DATES: 7th-8 April 1984

GEOSEA Course on CURRENT CONCEPTS IN TECTONICS
INSTRUCTORS: DR. A.J. Barber, Dr. E. Buffetaut
PLACES: 60
FEES: US\$10
DATES: 7th-8 April 1984
COURSE CONTENT: Rifting, dispersal, amalgamation, accretion, collision, consolidation, translation along major transcurrent fault zones, implications on theories of orogeny, metamorphism, magmatism, metallogenesis, hydrocarbon accumulation, etc. with examples from East Asian region.

GEOSEA Course on GEOCHEMISTRY OF GRANITE
INSTRUCTOR: Dr. M.P. Atherton
PLACES: 60
FEES: US\$5
DATE: 6th April 1984
COURSE CONTENT: Continuing education course on granite-geochemical aspects.

AMF-GEOSEA Course on COAL DEPOSITS—EXPLORATION AND ASSESSMENT
INSTRUCTORS: Mr. E. Milligan, Dr. A. White
PLACES: About 40
FEES: US\$380 including Course Manual
DATES: 4th-7th April 1984
COURSE CONTENT: Coal geology, exploration methods, techniques, depositional environment, seam splitting and lensing, resources and reserves assessment, calculating and classification of reserves, mining methods, coal properties, test-coal washing technology, feasibility studies, conceptual modelling, financing, etc.

GEOSEA Course on DISTRICT ANALYSIS AS A PROCESS FOR TARGET GENERATION AND EXPLORATION DESIGN-Sn/W DEPOSITS
INSTRUCTORS: Dr. R. Taylor, Dr. P.J. Pollard
PLACES: 60
FEES: US\$20
DATE: 14th April 1984
COURSE CONTENT: Economic perspectives, environment selection, district analysis, models/criteria selection, lineament analysis, tonnage grade diagrams, mineralization plotting approaches, alteration systems, cusps and dome location.

GEOSEA V Field Trips

The following field trips will be held subject to sufficient participation and other factors. In some trips the number of persons able to participate are limited. The cost for each trip is indicated and it does not include food during the trip. The excursion fees will be refunded if either the trips are called-off, all vacancies in the particular trip have been filled or two-weeks notice have been given that participant concerned wishes to withdraw from the trip. Otherwise excursion fees paid may not be refundable.

Trip 1—Langkawi

Dates: 13th (night)–18th April 1984. Trip ends at Kuala Perlis. Palaeozoic stratigraphy, structures, regional and contact metamorphism, granites. Cost: US\$100.

Trip 2—Kinta Tin Field

Dates: 14th–17th April 1984. Trip ends at Ipoh. Geology of Kinta Valley, tin mineralization, alluvial mining and deposits. Cost: US\$100.

Trip 3—Eastern Belt, Peninsular Malaysia

Dates: 14th–18th April 1984. Trip ends at Johor Baru/Singapore. Upper Palaeozoic-Triassic sediments, Mesozoic continental sediments, Quaternary basalt, tin mineralization, granites. Cost: US\$120.

Trip 4—Kuala Lumpur Tin Field/Genting Highlands

Dates: 14th–15th April 1984. Geology of Kuala Lumpur area, tin mineralization, mining, granites. Main Range Granite, shear zones, volcanics, metasediments. Cost US\$12 (exclude lodging).

Trip 5—Lupar Line—Bau, Sarawak

Dates: 14th–19th April 1984. Melange, Bau gold and stibnite mineralization. Trip ends at Kuching. Cost: US\$600 (including airfares–Kuala Lumpur–Kuching return).

Trip 6—Kota Kinabalu—Tawau, Sabah

Dates: 14th–20th April 1984. Crocker Formation, ophiolites, basement complex, copper mineralization, Tertiary sediments. Trip ends at Kota Kinabalu. Cost: US\$750 (including airfare–Kuala Lumpur–Kota Kinabalu return).

OTHER ACTIVITIES

TRAINING SEMINAR on Geological/Geotechnical Problems of Urban Centres. Organized by the University of Malaya in collaboration with UNESCO, SE Asia Regional Network of Geosciences, Geological Society of Malaysia, AGID, Asian Institute of Technology.

Venue: University of Malaya
Dates: 27th–31st March 1984
Seminar Fee: US\$100

LANDPLAN II—Workshop on Role of Geology in Planning and Development of Urban Centres in Southeast Asia. Organized by Geological Society of Malaysia, AGID, Geological Society of Thailand.

Venue: University of Malaya
Dates: 2nd–5th April 1984
Registration Fee: US\$50.

ACCOMMODATION

Hotels

The venue, Federal Hotel, is situated in a busy district of Kuala Lumpur. Restaurants, banks, travel agencies and shopping complexes are all close-by. Other than the Federal Hotel, other hotels in the area are as follows (US\$1.00 = MR 2.3).

Regent Hotel. Tel. 03-425588. Rates (Convention): Single MR216/Double MR 240 nett

Federal Hotel. Tel. 03-489166. Rates (Convention): Single & Double MR 100 nett

OTHER HOTELS—USUAL RATES (including taxes, charges)

Range: MR 80-100

Malaysia Hotel (Tel. 03-428033); Sungai Wang Hotel (Tel. 03-485255)

Range: MR 60-70

Apollo Hotel (Tel. 03-428133); Emerald Hotel (Tel. 03-429233)

Range: MR 45-60

Town House Hotel (Tel: 03-420233); Taiichi Hotel (Tel. 03-427533).

Please note that the Federal and Regent Hotels have given preferential convention rates to participants of GEOSEA V and all those wishing to avail to the preferential rates must book their rooms through the Organizing Secretary.

Hostel

Participants can also be accommodated in hostels of the University of Malaya from 1st-15th April 1984. Payments need to be made immediately on checking into the hostels. Please indicate the duration of your stay in the registration form. The rate is about MR 30 for accommodation and meals and about MR 15 for accommodation only.

Official Carrier

The Malaysian Airline System, MAS, is the official carrier for GEOSEA V. Special arrangements have been made with MAS as regards transportation of participants from London, Paris, Amsterdam, Frankfurt, Tokyo, Taipeh, Madras, Bangkok, Manila, Jakarta, Perth, Sydney, Melbourne, Singapore, Hong Kong and Seoul. Participants who wish to avail themselves to this special facility should indicate their travelling plans in the registration form. The Organizing Secretary will instruct MAS accordingly and tickets will be paid and issued at the departure points.

Further Information

Contact.

T.T. Khoo,

Organizing Chairman,

Geological Society of Malaysia,

Dept. of Geology, University of Malaya,

Kuala Lumpur.

Tel: 03-577036. Cable: UNIVSEL.

Telex: UNIMAL MA 37453

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

Jasvir Singh A/L Suba Singh, Trim and Form Division, Texas
Instruments (M) Sdn. Bhd, P.O. Box 2227, Kuala Lumpur.
Mohamed Yusop bin Ahmad Muhaiyuddin, Esso Production Malaysia Inc.
P.O. Box 10857, Kuala Lumpur.
Bahari bin Md. Nasib, Makmal Petronas, Hulu Kelang, Selangor.
Mohd Zailon bin Ramli, Jabatan Penyiasatan Kajibumi, P.O. Box 560,
Kuching, Sarawak.
Vaeravan s/o Ramanathan, 3/218, Taman Sri Segambut, Jinjang
Selatan, Kuala Lumpur.

Student Members

Che Aziz bin Ali, UKM, Bangi, Selangor.

KEAHLIAN PROFESSIONAL (PROFESSIONAL MEMBERSHIP)

The following have been elected as Professional Members of
the Society:

Abdul Aziz bin Hussin, Jabatan Kejuruteraan Petroleum, UTM, Jalan
Gurney, Kuala Lumpur.
Lim Peong Siong, Geological Survey, Kota Kinabalu, Sabah.
Mohamad Shah Abdullah, ITM, Shah Alam, Selangor.

PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following member has informed the Society of his new
address:

Ian Stuart Carter, c/o 1 Beech Grove, Knott-End, Blackpoor FY6 OAL,
England.
Teoh Lay Hock, c/o Jabatan Penyiasatan Kajibumi, Wisma Persekutuan,
Kota Bharu, Kelantan.
Richard A.S. Cayier, 3 Lawler St., Chermside, Brisbane, QID,
Australia.H
H.E. Zeissink, Ashton Mining Limited, 20th Floor, 444 Queen Street,
Brisbane, QLD, 4000.
R.G. Hollamby, c/o Kelco Rotary, 22 Henrietta Street, London, WC2.
Scott E. Sabatka, c/o Exxon U.S.A., 110 South 5th Street, Kingsville,
Texas 78363, U.S.A.

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:

1. Diesel & Gas Turbine' - worldwide. Nov & Dec 1983.
2. Journal of the Geological Society, vol. 140, pt. 5, 1983.
3. Journal of Science of the Hiroshima Univ. v. 8, no. 2, 1983.
4. National library, S'pore. Adult reference collections, accession list. Oct 1983.
5. Geol. Sur. India, News. vol. 14, 1-4, 1983.
6. Petroleum News, vol. 14, no. 9, 1983.
7. Bulletin of the National Science Museum, v. 9, no. 3, 1983.
8. Bulletin, IMM, no. 925, 1983.
9. Geophysical Research Bull. v. 21, no. 3, 1983.
10. Geosciences Newsletter, vol. 6, no. 1, 1983.

BERITA - BERITA LAIN (OTHER NEWS)

SECOND ASIAN MINING CONFERENCE

The Second Asian Mining Conference, previously announced as to be held in Manila, The Philippines, from 5 to 8 November, 1984, will now be held in Manila from 11 to 14 February, 1985.

Associated with the conference will be the Second Asian Mining Exhibition, which is to be organized by Industrial and Trade Fairs International, Ltd.

Full details of the conference, the exhibition and the related events are available from:

The Conference Office,
The Institution of Mining and Metallurgy,
44 Portland Place,
London W1N 4ER,
England.

Telephone 01-580 3802

Telex 261410 IMM G

FIFTH INTERNATIONAL CORAL REEF CONGRESS - REEF AND MAN

Tahiti

27th May - 1st June 1985

Preliminary announcement

Coral reefs in the world

More than one hundred countries in the intertropical world have coral reefs along their coastlines and there are some four

hundred atolls widespread over the three major oceans. The coral reef ecosystem is one of the most diverse, and certainly, one of the largest such communities in the world. Coral reefs play an important role in subsistence economies and in the cultural context of developing countries; such reefs are particularly important with respect to development and exploitation of resources for economic ends as well to pollution and environmental degradation.

From India (1969) to Tahiti (1985)

From the time of the first international symposium on coral reefs, held in India in 1969, through the most recent symposium in Manila, 1981, the scientific community has met - with quite fruitful results - every four years to take stock of current knowledge on, and problems related to coral reefs. Scientists have consistently worked to enlarge the scope of these symposia; indeed the title of the Manila assembly, "Reef and Man", attests to the multi-disciplinary character of this latest symposium, which will be still further developed at the Tahiti Congress.

Moreover, every effort will be made to obtain representation by scientists and interested parties of Third World and developing countries.

Sponsorship

It is under the auspices of the International Coral Reef Committee of the International Association for Biological Oceanography (IABO, member of the IUBS and the ICSU), that the next of these meetings is to be held in 1985. The 5th International Coral Reef Congress will take place in Tahiti, French Polynesia, between the 27th of May and the 1st of June. It will be hosted by the Research Center of the Museum National d'Histoire Naturelle and the Ecole Pratique des Hautes Etudes in French Polynesia, and has received the approval and support of the French Polynesian authorities and numerous Ministers of the French government.

Other organizations and agencies, both national and international, will be involved in sponsoring this Congress. International organizations will be formally requested to assist certain aspects of activities of the meeting.

An invitation to natural and social scientists, to managers and economists

Among the specialists invited to attend the Tahiti Congress proposed for the 27th of May through the 1st of June, 1985, are various members of the natural science fields (biology, geology, paleontology), social scientists, economists, pollution and environmental management specialists, as well as others specializing in human health problems (ichthyotoxicity), exploitation of coral reef resources and the rational use of ecosystems (tourism, aquaculture).

Seminars, symposia, sessions

The activities of the Congress will be divided into three broad categories:

SEMINARS (discussions of reports detailing current knowledge on given scientific questions, and of future research needs);

SYMPOSIA (presentation of topical research and concluding synthesis of papers);

SESSIONS devoted to miscellaneous contributions in various disciplines concerning coral reefs and man.

Congress proceedings

An editorial board will determine acceptability for presentation and suitability for publication in the Congress proceedings.

Field trips

Field trips, both before and after the Congress, are being planned, on high volcanic islands (Society archipelago) and on atolls (Tuamotu archipelago). These field trips will be for 3 and/or 6 days.

To receive the second announcement

In 1984, further information will be provided, and there will be a general call for papers. In order for us to organize the Congress and lay the plans for the sessions and other activities, kindly complete and return the form (following page) as soon as possible (before 15th October 1983) to ANTENNE MUSEUM-EPHE, CONGRES Récifs Coralliens 1985, B.P. 562, PAPEETE, TAHITI, POLYNÉSIE FRANÇAISE.

IFAC SYMPOSIUM ON AUTOMATION FOR MINERAL RESOURCE DEVELOPMENT

Brisbane Queensland Australia

9-11 July 1985

Organised in conjunction with the 1985 Annual Conference of The Australasian Institute of Mining and Metallurgy

IFAC

The International Federation of Automatic Control is comprised of 42 National Member Organisations each one representing the technical societies concerned with automatic control in its own country.

The National Member in Australia is The Institution of Engineers, Australia.

Theme

Mineral resources are frequently located in remote or hazardous areas and techniques involving automation, remote control and automatic control are important in their development. Metalliferous nodules are now being experimentally mined on the ocean floor, minerals are mined on land at depths approaching 4 km and in areas of extremely high temperatures, and coal is mined in areas prone to gas and rock outbursts, and roof falls. Mines are being developed in harsh environments ranging from hot, remote desert areas to the Arctic. The purpose of the symposium is to discuss the use of advanced automation technology in the development of mineral resources with particular emphasis on those which occur in remote areas or potentially hazardous environments. Sessions will be

concerned with robotics, automation and appropriate control techniques.

Topics

1. Automated Mining Systems
 - a) Undersea mining
 - b) Remote areas
 - c) Hazardous environments
 - d) Ground control and excavation design
 - e) Hard rock and soft rock systems
 - f) Monitoring and communication
 - g) Mineral transportation
 - h) Case studies
2. Automated Extraction Systems
 - a) In-situ techniques including gassification
 - b) Mineral concentration and extraction systems
 - c) Case studies
3. General
 - a) Remote Sensing and Image Processing
 - b) Robotics and the working environment
 - c) Simulators for system design and personnel training
 - d) Education for automated mining and extraction systems

Theoretical and applied papers in other areas will be considered if their application to the main theme is clearly demonstrated.

Key Dates

Closing date for submission of abstracts	1 Apr 1984
Provisional acceptance of papers	1 Jul 1984
Draft of final papers to Committee	1 Oct 1984
Final acceptance of papers	1 Nov 1984
Submission of camera ready papers	1 Jan 1984
Distribution of Volume to registrants	15 May 1985
Symposium	9-11 Jul 1985

For further information:

The Chief Executive Officer
 The Australasian Institute of Mining and Metallurgy,
 P.O. Box 310,
 Carlton South,
 Victoria,
 Australia 3053.

INTERNATIONAL SYMPOSIUM ON KARST WATER RESOURCES

Antalya/Ankara, Turkey.

July 7 - 19, 1985.

Karst water resources is subject of symposium in Turkey

An International Symposium of Karst Water Resources is scheduled

for July 7 - 19, 1985 in Ankara and Antalya, Turkey. The Symposium will be sponsored by the Karst Water Resources Research Center Project of Hacettepe University, the United Nations Development Program, United Nations Technical Cooperation Department, and the Turkish State Hydraulic Works (DSI). Cooperators will be the Turkish National Committee for the International Hydrological Program, the International Association of Hydrological Sciences, and other international technical societies and United Nations organizations. Activities will take place in Ankara, Antalya, and locations in between.

Because of the unique problems associated with water resources development and construction in karstic areas, this symposium is organized to bring together international interdisciplinary specialists in karst in various parts of the world. Turkey provides an especially appropriate location for the symposium because of the quantity, variety, and importance of the karstic areas found there. Interesting field trips to points of interest around Antalya on the beautiful Mediterranean, and between there and Ankara, will be planned for the second week of the symposium. The first week will be occupied with technical papers presented orally or by poster format. Papers may be presented in Turkish or English, with simultaneous translation.

The technical program is expected to provide broad coverage of topics related to water resources in karst areas. Subjects that may be considered for the symposium include hydrogeology, geochemistry, modeling, laboratory testing, tracer techniques, geophysics and other exploration methods, land subsidence and sinkhole formation, remote sensing techniques, ground-water and surface-water hydraulics and interpretation, engineering properties and problems, water-supply estimation, irrigation potential and irrigation practice, among other potential subjects.

Notice of intent to offer a paper and/or attend the symposium should be sent to Associate Professor Dr. Gultekin Gunay, Hydrogeological Engineering Department, Hacettepe University, Engineering Faculty, Beytepe. Ankara, Turkey, or to A. Ivan Johnson, Water Resources Consultant, Woodward-Clyde Consultants, 7600 East Orchard Road, Harlequin Plaza North, Englewood, Colorado 80111, U.S.A. Details concerning the symposium arrangements and instruction on preparation of abstracts will be sent to those persons indicating interest in the symposium.

HIGH HEAT PRODUCTION (HHP) GRANITES, HYDROTHERMAL CIRCULATION AND ORE GENESIS

The conference will be held in St. Austell, Cornwall, from 22 to 26 September, 1985, and followed by four days of field excursions to mining operations and sites of special geological interest illustrative of aspects of magmatic differentiation, hydrothermal alteration and mineralization in the Cornish province.

The conference will provide an opportunity for all those with an interest in the genesis, hydrothermal alteration and mineralization

of Sn-W and uranium provinces to discuss current views and present thinking on new research concerned with the formation of the host granites, their mineral and geothermal resources and related aspects of exploration. The venue chosen for the conference lies on the south Cornish coast with immediate access to exemplary localities that illustrate those related features of hydrothermal alteration, mineralization, etc., for which Cornwall is justly famous. Field excursions have been planned to give the best possible overview of these phenomena and their influence on the mining of metals and industrial minerals.

Call for papers

The Organizing Committee will be pleased to consider papers that deal with the following topics:

- * Regional distribution, classification and genesis of the HHP granite.
- * Water-rock interaction and origin of aqueous fluids; duration and timing of hydrothermal circulation.
- * Hydrothermal alteration and mineral zonation.
- * Ore deposition in HHP granites.
- * Exploration and exploitation of ores, industrial minerals and thermal resources.
- * Distribution of heat-producing elements in granitic bodies.

Contributions are also sought on mathematical modelling, geochemistry (including isotope geochemistry and fluid inclusion studies), petrology, remote sensing, structural geology and economic and environmental aspects of exploration and exploitation in HHP terrain. Abstracts (200-300 words) of papers should be submitted to the Conference Officer, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England, by 1 June, 1984. Final manuscripts will be required by 1 January, 1985. A preprinted volume of papers will be sent to registrants in advance of the conference.

Enquiries

All enquiries should be addressed to the Conference Office of the Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR.

KURSUS-KURSUS LATIHAN (TRAINING COURSES)

A bracketed date (Mar-Apr 1983) denotes entry in that issue carried additional information.

January 1984-March 1984

Remote sensing application and digital image processing (Enschede, The Netherlands). Certificate courses on techniques for national resources surveys, organized annually by the International Institute of Aerial Surveys and Earth Sciences (ITC). Sponsored by Unesco, English. For information: ITC Student Affairs Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

January 16-July 13, 1984

Post-experience courses on water resources technology in developing countries (Birmingham, U.K.). For information: Dr. N.T. Kettegoda, Dept. Civil Engineering, University of Birmingham, Box 363, Birmingham, U.K. B15 2TT.

February 1984 - March 1984

Geochemical prospecting techniques (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. French. For information: Musée royal de l'Afrique centrale, Steenveg op Leuven, 13, B-1980 Tervuren, Belgium.

February 1984 - November 1984

Photointerpretation applied to geology and geotechnics (Bogota, Colombia). Course organized by the Interamerican Centre of Photointerpretation (CIAF) in cooperation with ITC and Unesco. Spanish. For information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

February 15 1984 - December 15 1984

Geothermics (Pisa, Italy). Certificate course organized annually by the Istituto Internazionale per le Ricerche Geotermiche and sponsored by Unesco, UNDP and Italy. English. For information: Dr. Mario Fanelli, Istituto Internazionale per le Ricerche Geotermiche, Via Buongusto 1, 56100 Pisa, Italy. Telephone (050) 41503 or 46069.

March 5 - 30 1984

Geological and hydrological hazards (Denver, Colorado, USA). Training course for foreign scientists organized by the U.S. Geological Survey. English. For information: Training Section, Office of International Geology, U.S. Geological Survey, National Center, M/S 917, Reston, VA 22092, USA.

March 1984 - April 1984

Mineral exploration (Paris, France). Short course based on a simulation method organized annually by the Ecole Nationale Supérieure des Mines and sponsored by Unesco. French. For information: Prof. H. Pelissonnier, Ecole des Mines, 60 Bd Saint Michel, 75272 Paris, Cedex 06, France.

April 23 May 25 1984

Applications in geologic and hydrologic exploration and planning (Sioux Falls, South Dakota, USA). International Workshop. For information: Chief, Training and Assistance, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD57198, USA. Telephone: (605) 594-6114.

May 28 - June 29 1984

Remote sensing: geologic applications (Flagstaff, Arizona, USA). Advanced training program for foreign scientists organized by U.S. Geological Survey. English. For information: U.S. Geological Survey Training Center, 917 National Center, Reston, Virginia 22092, USA.

July 1984

Regional geochemical exploration in tropics (Recife, Brazil). 3-week workshop. For information: Prof. Arao Horowitz, Coordenador do Programa de Mestrado em Quimica, Univ. Federal de Pernambuco, Cidade Universitaria, 50000 Recife, Brazil.

July 1984 - August 1984

Summer course on earth sciences: Crystallography, Mineralogy, Metallogeny (Madrid, Spain). Annual course organized by the Department of Geology and Geochemistry of the Universidad Autonoma de Madrid and sponsored by Unesco. Spanish. For information: Prof. T. Monseur, Departamento de Geologia y Geoquimica, Facultad de Ciencias, Universidad Autonoma de Madrid, Canto Blanco, Madrid 34, Spain.

September 1984 - November 1984

Geothermal energy (Kyushu, Japan). Annual short course organized by the Government of Japan and sponsored by Unesco. English. For information: Japan International Cooperation Agency (2nd Training Division, Training Affairs Department), P.O. Box 216, Shinjuku Mitsui Building, 2-1 Nishi-shinjuku, Shinkuku-ku, Tokyo 160, Japan.

September 1984 - November 1984

Mining exploration and exploration geophysics (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. English. For information: ITC (ME), 3 Kanaalweg, 2628 Delft, The Netherlands.

October 1984 - November 1984

Tectonics, seismology and seismic risk assessments (Potsdam, G.D.R.). One month training course organized annually by East German Academy of Sciences in collaboration with Unesco. English. For information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR 1500 Potsdam, G.D.R.

October 1 - November 2, 1984

Remote sensing: Geologic applications (Flagstaff, Arizona, USA). Advanced training program for foreign scientists organized by U.S. Geological Survey. English. For information: U.S. Geological Survey Training Center, 917 National Center, Reston, Virginia 22092, USA.

October 1984 - September 1985

Fundamental and Applied Quaternary Geology (Brussels, Belgium). Annually organized training course leading to a Master's degree on Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. English and French. For information: Prof. Dr. R.

Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

KALENDAR (CALENDAR)

A bracketed date (Mar-Apr 1983) denotes entry in that issue carried additional information.

1984

- March 18 - 25 : Land subsidence (3rd International Symposium), Venice, Italy. Sponsored by IAH. (A. Ivan Johnson, 3rd International Symposium on Land Subsidence, Woodward-Clyde Consultants, 7600 East Orchard Road, Englewood, Co. 80111, USA).
- March 19 - 23 : Offshore Mineral Resources (2nd International Seminar), Brest, France, Languages: French and English (Mr. Louis Galtier, Association Germinal, B.P. 6009, 45060 Orleans, Cedex, France).
- March 25 - 29 : Soil salinity under irrigation - processes and management (International Meeting), Bet Dagan, Israel. Sponsored by ISSS and Israel Society of Soil Science. (Dr. B. Yaron, P.O. Box 3054, Tel-Aviv 61030, Israel).
- March 26 - 30 : Computer applications in the mineral industries (18th International Symposium), London, U.K. Organized by the Institution of Mining and Metallurgy. (The Conference Office, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK).
- March 26 - 30 : Recent advances in mineral science and technology (International Conference), Johannesburg, South Africa. Sponsored by the South African Council for Mineral Technology. (The Conference Secretary (C.25), Mintek, Private Bag X3015, Randburg, 2125 South Africa) (May-Jun 1983).
- March 27 - 31 : Landplan II - Geoscience applied to urban problems in SE Asia (Workshop), Kuala Lumpur. (Organizing Secretary, Landplan II, Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia).
- April 9 - 13 : Geology, Mineral and Energy Resources of Southeast Asia (GEOSEA V), Kuala Lumpur, Malaysia. Sponsored by Geological Society of Malaysia. (T.T. Khoo, Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia).
- April 12 - 13 : Diagenesis and low-temperature metamorphism (Meeting), Bristol, U.K. (D. Robinson, Department of Geology, The University, Queen's Building, University Walks, Bristol BS8 1TR, U.K.).
- May 10 - 12 : Mineralisation in volcanic processes (Geological Society and Volcanic Studies Group Joint Meeting), Aberystwyth, Wales, U.K. (Geological Society, Burlington House, Piccadilly, London W1V 0JU, UK).

- May 14 - 18 : Geomechanics (4th Australia-New Zealand Conference), Perth, Western Australia. (The Conference Manager, 4th A.N.Z. Geomechanics Conference, The Institution of Engineers, Australia, 11 National Circuit, Barton, ACT 2600, Australia).
- May 20 - 23 : Industrial minerals (6th International Congress), Toronto, Canada. (B.M. Coope - Editor, Industrial Minerals, 45/46 Lower Marsh, London SE1, UK).
- May 21 - 23 : Aggregates (International Symposium), Nice, France. Sponsored by IAEG. Languages: English and French. (M. Louis Prime), L.C.P.C., 58 boulevard Lefebvre, 75732 Paris Cedex 15, France).
- May 21 - 23 : Climate: Present, past and future (Symposium), New York, N.Y., USA. Sponsored by Columbia University in honour of Rhodes W. Fairbridge. (John E. Sanders, Dept. of Geology, Columbia University, 606 West 120 Street, New York, NY 10027, USA).
- May 21 - 23 : Groundwater resource utilization and contaminant Hydrogeology (International Symposium), Montreal, Quebec, Canada. Sponsored by Canadian National Chapter of IAH and CWWA. Languages: English and French. (Mr. H. Sommelet, Geomines Ltd., 1010 Sherbrooke St. W., Suite 2202, Montreal, Quebec, Canada H3A 2R7).
- June 5 - 11 : Geology of the Himalayas (International Symposium), Chengdu, China. Field excursion to Tibet. Languages: Chinese and English. (Mr. Li Tingdong, Secretary-General of the Organizing Committee, c/o Chinese Academy of Geological Sciences, Baiwanzhuan, Beijing, P.R. China).
- June 6 - 9 : Interpraevent (Interdisciplinary Symposium on mountain rivers, torrents, snow avalanches, slope stability, etc.) Villach, Austria. (Interpraevent 1984, Postfach 134, A-9501, Villach, Austria).
- June 15 - 17 : Sedimentology of nearshore and shelf sands and sandstones (Research Symposium), Calgary, Canada. (R. John Knight, Petro-Canada, P.O. Box 2844, Calgary, Alberta, Canada T2P 3E3).
- June 18 - 23 : 7th International Peat Congress, Dublin, Ireland. Study tours and post-congress tours. (International Peat Congress, c/o Bordna Mona, Lower Baggot Street, Dublin 2, Ireland).
- June 20 - 23 : Geomembranes (International Conference), Denver, Colorado, USA. Conference to precede the Impermeable Barriers for Soil and Rock Symposium. (A. Ivan Johnson, Woodward-Clyde Consultants, P.O. Box 4036, Denver, Co. 20204, USA).
- June 23 - 26 : Practical applications of groundwater geochemistry (Workshop), Banff, Alberta, Canada. (Dr. E.I. Wallick, Alberta Research Council, 5th Floor, Terrace Plaza, 4445 Calgary Trail South, Edmonton, Alberta, Canada T6H 5R7).

- June 23 - 30 : Melanges of the Appalachian Orogen (Penrose Conference), Newfoundland. (B. Lorenz, Department of Earth Sciences, Memorial University, St. John's, Newfoundland, Canada A1B 3X5)
- June 24 - 27 : Codata (9th International Conference), Jerusalem, Israel. (The Secretariat, 9th International CODATA Conference, 122 Hayarkon Street, P.O. Box 3054, 61030 Tel Aviv, Israel)
- June 26 - 28 : Deep structure of the continental crust (International Symposium), Ithaca, N.Y., USA. (Muawia Barazangi, Department of Geological Sciences, Cornell University, Ithaca, NY 14853, USA).
- July : Volcanic Soils (International Panel) Tenerife, Canary Islands. (M.E. Fernandez Caldas, Dpto. de Edafologia, Univ. de la Laguna, Tenerife, Islas Canarias, Spain)
- August : Mapping of the soil-water balance (Meeting), Budapest, Hungary. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Aug 4 - 14 : 27th International Geological Congress, Moscow, USSR. (N.A. Bogdanov, General Secretary, Organizing Committee of the 27th IGC, Staromonetny per. 22, Moscow 109180, USSR)
- Aug 9 - 18 : Crystallography, (13th General Assembly and International Congress), Hamburg, F.R.G. (E.E. Snider, American Crystallographic Association, 335 East 45th Street, New York, NY 10017, USA).
- Aug 24 - 30 : 6th International Palynological Conference, Calgary, Canada. Sponsored by ICP, CAP, CSPG, the University of Calgary, and Arctic Institute of North America. Pre- and post-Conference excursions. (L. Kokoski, Conference Office, Faculty of Continuing Education, Education Tower Room 102, Calgary, Alberta, Canada T2N 1N4)
- Aug 27 - 31 : Water movement in heavy clay soils (Meeting), Wageningen, Netherlands. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Sept 3 - 8 : Caledonide Orogen, (IGCP Project 27, Working Group Meeting), Edinburgh, Scotland. Pre-Meeting excursions in Ireland, Scotland, England and Wales. (A.L. Harris, The University of Liverpool, Jame Herdman Laboratories of Geology, Brownlow Street, P.O. Box 147, Liverpool L69 3BX, UK)
- Sept 10 - 14 : Titanium (5th International Conference), Munich, F.R.G. (Deutsche Gesellschaft fur Metallkunde EV, Adenauerallee 21, D-6370 Oberursel 1, F.R.G.)
- Sept 16 - 22 : Landslides (4th International Symposium), Toronto, Canada. Sponsored in part by IAEG (Mr. J.L. Seychuk, Chairman, Organizing Committee, ISL/84, P.O. Box 370, Station A, Rexdale, Ont., Canada M9W 5L3)

- Oct 1 - 5 : Remote sensing of environment (18th International Symposium), Paris, France. (Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107, USA)
- Oct 14 - 20 : Mineral processing and extractive metallurgy. (International Conference), Kunming, P.R. China. (The Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)
- Oct 31 - Nov 7 : Seismology and physics of the earth's interior (Regional Assembly of the International Association) Hyderabad, India. (Organizing Committee, IASPEI Regional Assembly, National Geophysical Research Institute, Hyderabad 500 007, India)
- Nov/Dec : Land evaluation for soil erosion hazard assessment (Meeting), Enschede, Netherlands. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Nov 5 - 8 : Geological Society of America (Annual Meeting), Reno, USA. (S.S. Beggs, Geological Society of America, P.O. Box 9140, 330 Penrose Place, Boulder, Co. 80301, USA)
- Nov 19 - 22 : 12th World Mining Congress, New Delhi, India (Organizing Committee, Institute of Engineers, 8 Gokhale Road, Calcutta 700 020, India)
- Nov 20 - Dec 5 : Late Quaternary Sea-Level Changes (International Symposium and Field Meeting), Argentina and Chile. IGCP - 200 and INAU Commission on Quaternary Shorelines. (Prof. Dr. Enrique Schnack, Centro de Geologia de Costas, C.C. 722, Correo Central, ARG-7600, Mar del Plata, Argentina)
- Dec 2 - 5 : Future petroleum provinces of the world (AAPG W.E. Pratt Memorial Conference), Phoenix, Ariz., USA. (AAPG, P.O. Box 979, Tulsa, OK 74101, USA)
- Dec 2 - 6 : Society of Exploration Geophysicists, (54th Annual Meeting), Atlanta, Georgia, USA. (J. Hyden, SEG, Box 3098, Tulsa, Oklahoma 74101, USA)

1985

- January : International Association of Hydrogeologists (International Congress), Tucson, Arizona, USA. Sponsored by IAH and AGU. (Eugene S. Simpson, Dept. of Hydrology and Water Resources, College of Earth Sciences, The University of Arizona, Tucson, AZ 85721, USA)
- January : Acid-Sulphate Soils (meeting), Dakar, Senegal (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Feb 11 - 14 : Asian Mining '85 (2nd Conference), Manila, Philippines. (Meeting Secretary, The Institute of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)

- April 10 - 12 : Forum on the Geology of Industrial Minerals, ann. mtg. Tucson, Ariz. (H. Wesley Peirce, Arizona Bureau of Geology & Mineral Technology, 845 N. Park Ave. Tucson 85719. Phone 602/621-7906)
- June : Tunnelling (4th International Symposium), Brighton, UK. (The Secretary, Institute of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)
- June 9 - 15 : Water Resources (5th World Congress), Brussels, Belgium. (Dr. L.W. Debacker, c/o Brussels International Conference Centre, Parc des Expositions, Place de Belgique, B-1020 Brussels, Belgium)
- July 28 - Aug 2 : 8th International Clay Conference, Denver, Colorado. Sponsored by AIPEA. (Dr. A.J. Herbillon, Groupe de Physico-Chimie Minerale et de Catalyse, Univ. Catholique de Louvain, Place Croix du Sud 1, B-1348 Louvain-la-Neuve, Belgium)
- Aug 19 - 23 : Sixth Gondwana Symposium. Columbus, Ohio, USA. Sponsored by IUGS and Geological Society of America. (D. Elliott, Inst. of Polar Studies, Ohio State University, 103 Mendenhall, 125 South Oval Mall, Columbus, Oh 43210, USA)
- Sep 8 - 13 : Hydrogeology in the service of man (18th IAH Congress - International Symposium), Cambridge, UK. (J. Day, Hydrogeology Unit, Maclean Building, Crowmarsh Gifford, Wallingford, OX10 8BB, UK)
- Sept 9 - 13 : Fossil and living brachiopods (Meeting), Brest, France. (Congres Brachiopodes, Univ. Bretagne occidentale, Laboratoire du Paleozoique - 6, av. Le Gorgen 29283 Brest Cedex, France)
- Sept 15 - 21 : Geomorphology, resources, environment and the developing world (International Conference), Manchester, UK. (Prof. Ian Douglas, School of Geography, University of Manchester, Manchester M13 9PL, UK)
- Sept 22 - 28 : Chemrawn IV: Chemistry and resources of the global Ocean (Meeting), Woods Hole, Mass., USA. (Prof. G. Ourisson, Centre de Neurochimie, Universite Louis Pasteur, 5 rue Blaise Pascal, F-67084 Strasbourg, France)
- Sept 22 - 26 : High heat production granites, hydrothermal circulation and ore genesis, mtg. St. Austell, Cornwall. (Institution of Mining & Metallurgy, 44 Portland Place, London W1N 4BR. Phone: 01-580 3802. Tel-ex. 261410)

1986

- May 11 - 16 : Mining and Metallurgical Congress (13th), Canberra, Australia. (Council of Mining and Metallurgical Institutions, 44 Portland Place, London, W1N 4BR, UK)
- July 13 - 18 : International Mineralogical Association (General Meeting), Stanford, Calif., USA. (Prof. C.T. Prewitt, Dept. of Earth and Space Sciences, State University of New York, Stony Brook, NY 11794, USA)
- Aug 11 - 15 : Kimberlite (4th International Conference), Perth, Western Australia. (Dr. A.F. brendall, Geological Survey of Western Australia, 66 Adelaide Terrace, Perth, W.A., Australia)
- Aug 13 - 20 : Soil Science (13th International Congress), Hamburg, F.R.G. (Prof. Dr. K.H. Hartge, Inst. fur Bodenkunde, Univ. Hannover, Herrenhaserstrasse 2, D-3000 Hannover 21, F.R.G.)
- Aug 25 - 29 : IAS Sedimentological Congress (12th International), Canberra, Australia. (Dr. K.A.W. Crook, Dept. of Geology, Australian National University, P.O. Box 5, Canberra, ACT, 2600, Australia).

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**KANDUNGAN
CONTENTS**

- 1 Structures in Peninsular Malaysia and their interpretations
B.K. Tan
- 9 Some thoughts on the crustal structure of Peninsular Malaysia—results of a gravity traverse
Patrick J.C. Ryall
- 19 Stratigraphy and sedimentology of Middle Triassic rocks exposed near Lanchang, Pahang, Peninsular Malaysia
Ian Metcalfe, S.P. Sivam and Peter H. Stauffer
- 31 The Lubok Antu Melange, Lupar Valley, West Sarawak: a Lower Tertiary subduction complex
Denis N.K. Tan
- 47 Carboniferous corals from Northeast Thailand
Henri Fontaine, Rucha Ingavat and Daniel Vachard
- 57 Net directions and rates of present-day beach transport by littoral drift along the East Coast of Peninsular Malaysia.
J.K. Raj
- 71 Offshore Gunung Jerai shallow seismic survey
G. van Klinken and Q.A. Halim
- 83 Rock geochemical exploration at Thabyebintaung Pb-Zn prospect, Bawsaing, Southern Shan State, Burma
U Khin Zaw, U Aung Pwa and U Mg Mg Gyi
- 95 Some applications and problems of the seismic refraction technique in civil engineering projects in Malaysia
B.K. Lim and S.J. Jones
- 123 Oil source bed hydrocarbon analysis: some methods and interpretations
S. Thompson
- 141 Osmiridium— a discovery in Cheroh, Pahang, Peninsular Malaysia—and its significance
Shu Yeoh Khoon

**Editor
G.H. TEH**



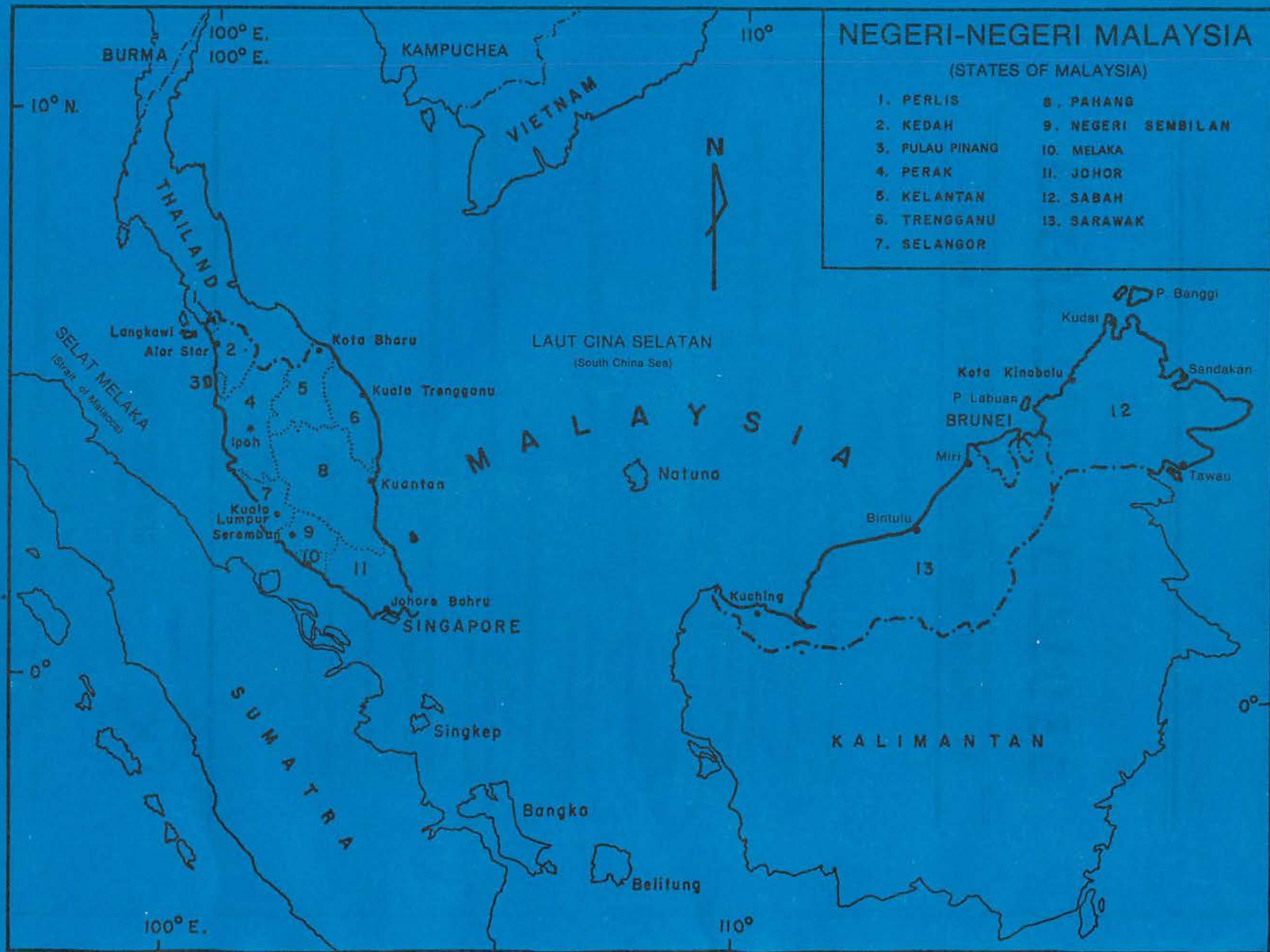
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