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(GEOLOGICAL SOCIETY OF MALAYSIA)

Majlis (Council) 1980/81

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CATITAN GEOLOGI
(GEOLOGICAL NOTES)

GLACIALLY SMOOTHED AND POLISHED SURFACES ON MT. KINABALU, SABAH.

Peter H. Stauffer, Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

In late March of this year I was in Sabah visiting fourth year geology students with field projects along the new highway being built between Tamparuli and Ranau. During our work we had frequent spectacular views of Mt. Kinabalu (4101 m) under varied lighting conditions. I noticed that under low-angle illumination in the early morning, parts of the steep bare rock surfaces on the upper slopes of the mountain show very bright reflection (Fig. 1), appearing almost as bright as snowfields.

Normal rock surfaces are not so reflective, and the only two likely causes of such high reflectance over such large and irregular surfaces would appear to be (1) glacial smoothing and polishing and (2) wetting of the rock by water.

The possibility that these rock slopes were reflecting brightly because they were wet was, however, rejected for the following reasons:

1. Although night-time rain was frequent during our field work, several nights were perfectly clear and cloudless, yet the reflecting surfaces appeared just as extensive and prominent the following morning. The photograph in Figure 1 was in fact taken after such a clear night and when the mountain had been in full sun for an hour already; it therefore seems improbable that such steep rock surfaces could still have been wet either from mere night-time condensation or from rain many hours earlier.

2. The reflections are especially prominent on broad gently convex surfaces and do not show the tendency, expected of water running down a sloping surface, to form streaks or concentrate in channels or hollows (the dark streaks seen running down the slopes in the photograph appear to be shadows in groove-like hollows, possibly ice-carved).

I therefore conclude that the bright reflections seen are glacially smoothed and polished rock surfaces.

That Mt. Kinabalu was glaciated in the Pleistocene has been documented by Koopmans and Stauffer (1967), Jacobson (1970), and Tjia (1973). All of these authors noted remnants of actual glacial polish preserved on aplite dykes on the glacially-smoothed summit surface of the mountain. But these patches of actual polish constitute only a minute fraction of the summit surface. Jacobson (1970, p. 87) has estimated that 75% of the summit surface has exfoliated since the melting of the ice cap. However, Koopmans and Stauffer (1967, p. 31) described smooth, light-colored patches of rock scattered over the summit surface, which they interpreted to be only slightly weathered areas of glacial polish.

What then is the exact nature of the highly reflecting surfaces seen on the upper slopes? Despite the impressive brightness of the reflections seen (as shown in Fig. 1), it is very unlikely that these slopes are still covered by extensive actual glacial polish such as is seen only on aplite dykes on the summit surface. In fact, as the photograph shows, the intensity of reflections seems to be about the same on some parts of the summit surface itself which were at the correct angle to the sun at the time. Therefore the character of the surfaces is likely to be similar. The steep upper slopes most probably are glacially smoothed surfaces with perhaps scattered small patches of preserved or only slightly weathered glacial polish.

The bright reflections seen in Fig. 1 nicely show that the extent of such glacially smoothed surfaces on this southwest corner of Mt. Kinabalu. In general this extent confirms Koopman's air photo mapping (Koopmans and Stauffer, 1967, fig. 1), which interpreted the glaciated surface stretching down to somewhat below 12,000 feet (3657 m) between St. Johns' Peak and Kinabalu South.

If this interpretation of the cause of the bright reflections on some of the upper slopes of Mt. Kinabalu is correct, it would seem that an opportunity is presented for simple and accurate mapping of the extent of glacially modified surfaces on the mountain, including the northern flanks where this extent is still uncertain. An enterprising person with a camera and access to a small airplane could circle the mountain under various angles of sunlight, photographing the pattern of reflections, and later plot them out onto a topographic map. Perhaps some interested member of the Sabah Flying Club would like to take up this idea?

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Koopmans, B.N., and Stauffer, P.H., 1967. Glacial phenomena on Mount Kinabalu, Sabah. Geol. Surv. Borneo Region, Malaysia Bull. 8, 25-36.

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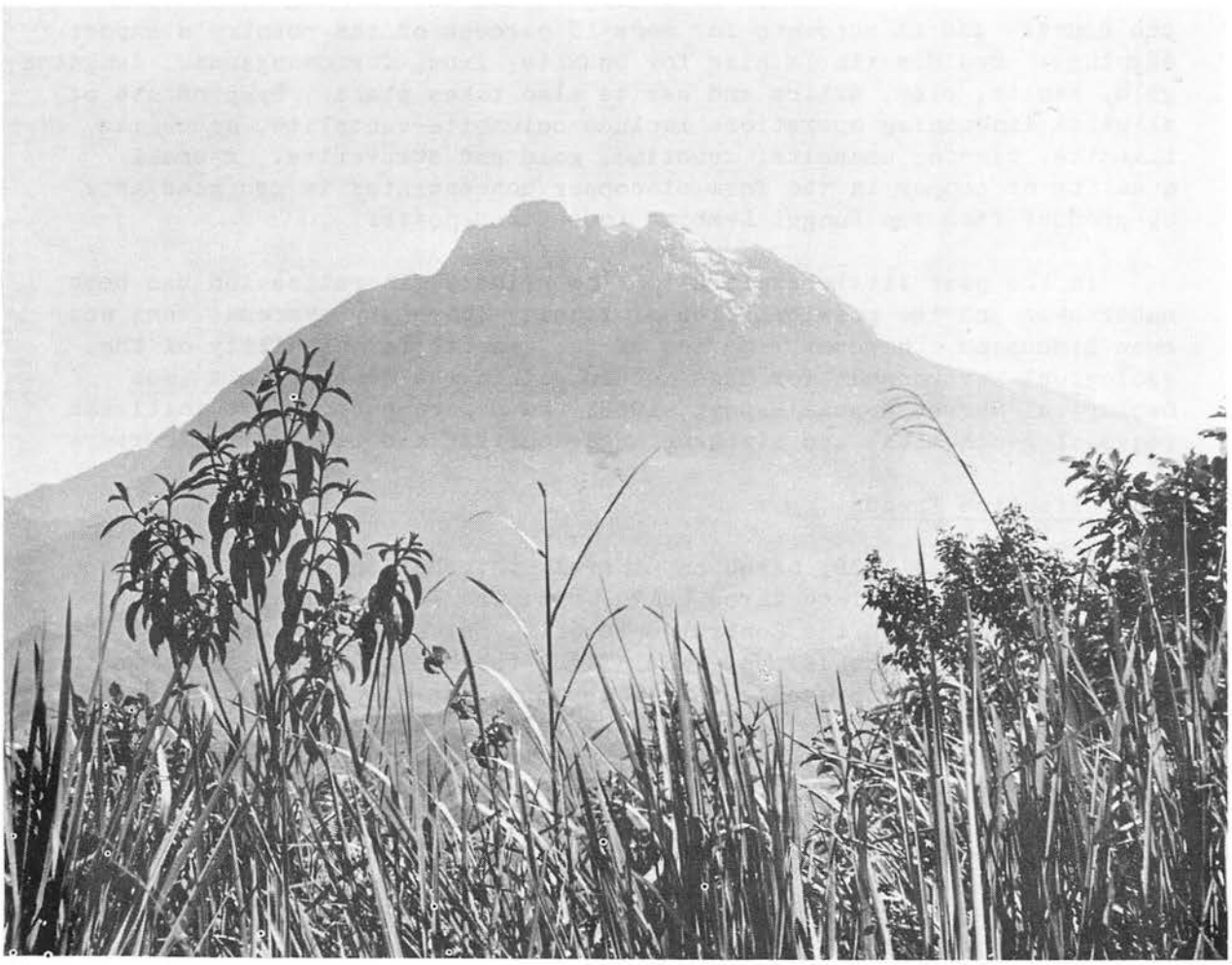

Fig. 1. Mount Kinabalu in morning sun, showing brightly reflecting rock surfaces on upper slopes. Photograph taken at 9.00 a.m. on March 28, 1980, camera pointing ENE from Mile 22¾ of the new road from Tamparuli to Ranau. Tooth-like peak in center is St. Johns; Kinabalu South is gentle dark rise further to the right.

A NOTE ON POSSIBLE PORPHYRY SYSTEMS IN PENINSULAR MALAYSIA

Fateh Chand & A. Troup, Geological Survey of Malaysia, Ipoh, Perak.

Introduction

Traditionally, Peninsular Malaysia is known for its abundant tin deposits and up to this day tin mining is the main mining activity in the country and it accounts for some 15 percent of the country's export earnings. Besides tin, mining for bauxite, iron, ferromanganese, tungsten, gold, kaolin, clay, silica and barite also takes place. By-products of alluvial tin-mining operations include columbite-tantalite, scheelite, ilmenite, zircon, monazite, xenotime, gold and strüverite. A small quantity of copper in the form of copper concentrates is produced as a by-product from the Sungei Lembing lode-tin deposit.

In the past little exploration for primary mineralization has been undertaken and the possibilities of finding 'porphyry systems' were not even discussed. However, in view of the general favourability of the geological environment for base metals within the Central Belt (see Geological Survey Annual Report, 1968) the department in 1977 initiated regional geochemical and airborne magnetometric and radiometric surveys.

Mineralization Trends

Scrivenor in 1928, based on mineral distribution patterns, divided Peninsular Malaysia into three belts, viz: the Western Tin Belt, the Eastern Tin Belt and the Central Gold Belt. Although boundaries of these belts have been somewhat over simplified, the basis of this division is still valid. Their presence is now supported by studies made by the Geological Survey in the late sixties/early seventies and during the joint geochemical exploration programme (1977-1979) of the Central Belt area for base metals, precious metals and uranium by the Geological Survey of Malaysia and the Canadian International Development Agency (CIDA) (see Geological Survey Annual Reports and unpublished department files).

Briefly, within the Central Belt, gold mineralization is dominant in the western part where it is spatially associated with granitic intrusives and volcanics lying east of the Main Range. Lead-zinc mineralization occurs farther east associated with a Permo-Triassic calc-alkaline volcanogenic sequence interbedded with marine sediments. Also iron-manganese mineralization is found within this belt but confined to its eastern section. The Central Belt, which represents a late Palaeozoic-Mesozoic volcanic-intrusive zone, is thought to extend northwards into Thailand.

Porphyry Systems

In Peninsular Malaysia the concept of finding porphyry systems within the late Palaeozoic-Mesozoic succession have never been given any serious thought. Most mining companies in the past have geared their exploration for porphyry coppers in the traditional Tertiary calc-alkaline settings of Southeast Asia, thus leaving Peninsular Malaysia neglected. Interest in primary mineralization, however, was shown by

a few companies in this region for gold and possibly stratiform sulphide deposits.

Preliminary geochemical data collected from the Central Belt Project was processed, plotted, and interpreted in 1978. The results, to be published shortly, revealed the existence of geochemical patterns with strong similarities to that developed over porphyry copper - molybdenum systems. Subsequent field studies have supported the intital findings. An interpretation of geochemical data from South Pahang, submitted by an exploration company in 1978, was undertaken by the authors on behalf of the State Government agency. The finds displayed a similar picture and this was later confirmed by the company from geophysical work and subsequent exploratory diamond drilling. The Geological Survey has delineated several other copper-molybdenum centres and follow-up work will be initiated shortly.

Conclusion

Preliminary findings of the joint survey by the Geological Survey of Malaysia and CIDA show that porphyry systems have been identified for the first time in Peninsular Malaysia. These systems have to-date been located in the Permo-Triassic calc-alkaline volcanic-intrusive belt which shows similarities to the porphyry copper-molybdenum depesits of the Canadian Cordillera. Other intermediate intrusives, which carry traces of gold and base-metal mineralization, merit closer investigation.

Acknowledgements

The authors wish to thank D. Santokh Singh for his comments and to the Director-General, Geological Survey of Malaysia for permission to publish this note.

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MESYUARAT PERSATUAN
(MEETINGS OF THE SOCIETY)

V.P. ST. JOHN: Deep and shallow thrusting in Papua New Guinea

Those who braved the floods within the University of Malaya on Friday 28th November were rewarded with a most stimulating talk by Dr. St. John, Exploration Manager of Carigali-BP Malaysia.

With Bouger and isostatic anomalies from a pioneer gravity survey in the North-East of Papua New Guinea and by reference to elevated and submerged shorelines he produced a most convincing model for the obduction of a large slice of ocean crust, which he linked to compressive forces due to relative plate motions to the north. Further gravity traverses in a region to the West, once considered "a future Iran" on account of its oil potential beneath large limestone-capped anticlines, delineated the structure of these folds and later thrusts which can again be linked to regional tectonic forces, which evolved from compressive to shear forces. Although most of the major structures drilled have been dry with probable escape of the hydrocarbons along widespread faults, this region is one of renewed exploration interest in which this work by Dr. St. John will be of central importance.

C.A. Foss

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K. STEELE: Mineral exploration using deviated diamond drilling techniques

The joint meeting of the Society and the Geological Survey of Malaysia, together with the participation of Hargill Malaysia Sdn. Bhd., attracted a record crowd of about 150 at the International Hall, Hotel Merlin. The speaker for the afternoon of 16th December 1980 on "Mineral exploration using deviated diamond drilling techniques" was Ken Steele, Sales Manager, Boyles Brothers, Newcastle upon Tyne, U.K.

Mr. Steele indicated that deviation control can, if understood correctly, be applied to many exploration programmes to either reduce exploration costs or upgrade the value of the information obtained from the borehole. It is an established fact that to drill a vertical or straight hole is an exceedingly difficult feat and a survey of most boreholes would indicate some form of deviation in either angle of inclination or azimuth.

In his talk, Mr. Steele, considered some of the phenomena associated with deviation drilling as well as the techniques which are used to accentuate or minimise the phenomena and then proceeded to examine how these techniques can be applied to exploration programmes.

There are three approaches to the deviation problem, namely,

a) Estimate the likely deviation and lay out the holes accordingly;
b) Minimise the deviation as it occurs by various drilling techniques;

c) Correct the course of the hole by deflection methods where necessary.

Mr. Steele then went on to consider the deviation problem under two headings; mechanical and formation reaction, and indicated that the two are often inter-related.

The formation conditions which appear to accentuate deviation are strata changes of alternating hardness, foliation, bedding or fracture planes, the natural dip and strike of the formation and the angle of incidence between the intersection of the core barrel.

Considering the mechanical factors which influence deviation it can be shown that larger diameter core barrels tend to deviate less than smaller diameters. Long core barrels are preferable to short length barrels in maintaining straight progress and the addition of a sludge-pot attached by contra rotation connection to the core barrel head provides further assistance.

The design of the diamond bits employed will exert a considerable influence on alignment and it is normal to utilise stepped profiles and preferably internally stepped profiles for minimum deviation.

Reamer shells should obviously be employed at all times and the taper panel or spiral set are generally considered preferable with the addition of a second reamer stabiliser at the barrel head. Further, the use of drill collars in conventional drilling helps to reduce the surface applied weight.

The drilling regime of rotational speed and applied bit weight can have a considerable effect and is used in some programmes to accelerate or minimise deviation. It is essential that the diamond bits employed must be in good condition with good selected stones to help reduce the bit weight demand. The use of worn core barrels, bent rods, poor rod joints and mismatched rod size to core barrel diameter should be avoided at all costs where deviation control is of importance.

Outside the factors mentioned the course of a borehole can be deflected by the use of either a mechanical wedge or the use of a down hole motor with a bent sub. The maximum deviation which can be achieved is approximately 1½ degrees per wedge. The use of downhole and micro slim mud motors for drilling are now common place in both well deviation programmes and vertical wells where bit life permits.

Mr. Steele then ably demonstrated the use of deviation control in exploration programmes of two specific case histories selected from Australian mines to illustrate two dissimilar approaches. At Kambalda in Western Australia, to obtain the maximum utilisation from the pre-collared hole and provide the most cost effective and useful information for mine planning, a multi-branch hole technique is employed and holes are planned to provide a spread across an area to define the nature and limits of both ore bodies and the surrounding formations. The required deflections are carried out using combinations of mechanical wedges, mud motors and stiffened barrels. At Mount Isa Mine in Queensland, a

mathematical approach to deviation from historical observations of previously drilled holes has been developed, and the information obtained has been written into a computer programme which is then used to predict probable natural deviation when setting out exploration holes at the mine.

After a hesitant start, questions poured in one after another from the interested crowd present, seeking Mr. Steele's advice on their immediate drilling problems. Some even came prepared with core samples, drill bits, etc. Mr. S.K. Chung, Director-General of the Geological Survey of Malaysia, thanked the speaker for a most stimulating talk on behalf of the Society and the Survey.

G.H. Teh

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N.R. CAMERON: Aspects of the geology and stratigraphy of Northern Sumatra

The Society finished its program of meetings for the year 1980 with an interesting glimpse of Sumatran geology. On the afternoon of December 30th, Dr. N.R. Cameron spoke in the Department of Geology, University of Malaya on "Aspects of the geology and stratigraphy of Northern Sumatra".

Dr. Cameron has been one of the leaders of a five-year project of reconnaissance geological mapping and geochemistry covering all of Sumatra north of the equator, an area of about 190,000 km^2. This project was a joint effort by the Institute of Geological Sciences, London and the Geological Survey of Indonesia, and was largely financed by the Indonesian government. Begun in early 1975, the project officially terminated at the end of 1980, after an estimated 150 man-years of work put in by British and Indonesian geologists.

Out of this major effort has come a great amount of new information on the geology and stratigraphy of (at least northern) Sumatra. In his talk Dr. Cameron reviewed the major features of the emerging picture of Sumatra's geological evolution and discussed some of the possible interpretations and implications.

The stratigraphic succession in northern Sumatra can be divided into 4 major sequences whose mutual contacts are always unconformities or faults. The youngest of these consists of the Tertiary deposits, which are widespread and of course contain the important oil and gas resources, but which were not discussed in detail by Dr. Cameron because they have essentially no analog in Malaya. The pre-Tertiary comprises the *Tapanuli Group* (mainly Late Paleozoic 'flysch'), the *Peusangan Group* (Late Permian volcanic arc sequence overlain by Middle to Late Triassic sediments of varied types), and the *Woyla Group* (Late Jurassic to early Cretaceous ophiolite, hemipelagic sediments and volcanic arc rocks). The Woyla Group occurs only along the western edge of Sumatra, expecially at the northern tip in western Aceh, and to the south near the equator, and is interpreted to represent the remains of a volcanic arc and marginal (back-arc) basin formed in Mesozoic time along the oceanic edge of Sumatra.

The two other sequences, the Peusangan and Tapanuli Groups, occur to the east of the Woyla Group and are interpreted to have been laid down on a region of continental crust. This continental block is thought to be continuous with the Malay Peninsula (eastward to the 'Raub-Bentong Line' in Malaya) and northward into mainland Burma, and has been called the 'Mergui Platelet' by the project geologists. It is in this portion of Sumatra that very suggestive stratigraphic similarities to (western) Malaya are seen.

Pebbly mudstones assigned to the Bohorok Fm. of the Tapanuli Group are strongly reminiscent of those in the Phuket Group (Kaeng Krachan Fm.) of Thailand and of the Singa Fm. of northwest Malaya and have been tentatively interpreted as possible glacio-marine sediments related to the Late Paleozoic glaciation. The Bohorok Fm. seems to interfinger westward with the less pebbly (more distal?) Kluet Fm., which is overlain by the calcareous Alas Fm., probably mainly Permian. However, some limestones which had been assigned to the Alas Fm. have yielded conodonts identified as Visean by Dr. I. Metcalfe of the University of Malaya, indicating a more complicated stratigraphy.

An important orogenic episode in the mid-Permian deformed and metamorphosed the rocks of the Tapanuli Group prior to the deposition of the Peusangan Group, but this episode has apparently left little or no trace in Malaya. The Peusangan Group consists mainly of clastic sediments and volcanics interpreted to have been laid down along the western margin of a moderately deep basin in the area of the present Straits of Malacca. It was suggested that the Peusangan Group may be correlated in part with the Semanggol Fm. of northwestern Malaya.

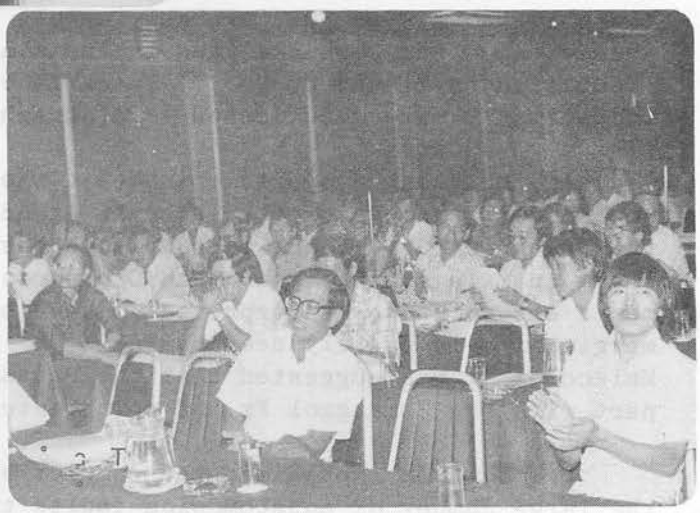
Dr. Cameron emphasized the complex structure of Sumatra, especially the large number of anastomosing faults thought to have had horizontal movement, which break up the island into lozenge-shaped blocks. The amount of movement on the faults, and therefore the relative positions of the blocks in past time, represent major unknown factors in the geology.

Speculating on the paleotectonic hostory, the speaker suggested that the Mergui Platelet had been part of the margin of Gondwanaland, in the west Australian region, and had rifted off from there during the Late Paleozoic. The possible glacio-marine deposits were suggested to be related to a small ice-sheet on the Mergui Platelet, with the ice moving southwestward into Sumatra and eastward into the Malay Peninsula.

About 40 members attended the meeting, and considerable discussion followed Dr. Cameron's talk. Several members of the audience especially challenged the more speculative interpretations such as the glacially-related origin of the Bohorok Fm. and the great importance of strike-slip faulting, which Dr. Cameron had suggested applied also to Malaya. In reply to a question about the results of the geochemical work, the speaker stated that indications of tin mineralization has been found at many localities in that part of the project area east of the Woyla Group. The rare diamonds found in alluvial tin mines in Sumatra were, according to Dr. Cameron, almost certainly coming out of the Bohorok Fm. pebbly mudstones.

GSM TECHNICAL TALKS

K. STEELE



A section of the record turnout at Steele's talk

N.R. CAMERON

Aspden (left) amongst the audience at Cameron's Talk

The speaker was visiting Kuala Lumpur with Dr. John Aspden, another I.G.S. member of the North Sumatra project, and their families. The day after the meeting they continued on their way northward, looking at the geology of Kedah, Perlis, Langkawi, and the Phuket area, guided by geologists from Malaysia and Thailand.

P.H. Stauffer

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Petroleum Geology Seminar 1980 - Report

The 1980 Petroleum Geology Seminar was successfully held on 12-13th December 1980 at the Hotel Merlin, Kuala Lumpur.

An excellent series of 15 papers (see Seminar Programme) were presented to the approximately 180 participants by speakers from the United States of America, United Kingdom, Brunei, Thailand, Singapore and Malaysia.

The seminar was declared open by the Deputy Minister of Energy, Posts and Telecommunications, Y.B. Datuk Dr. Nik Hussein.

In his speech, Y.B. Datuk Dr. Nik Hussein called on experienced expatriates involved in petroleum geology to share their knowledge with Malaysian geologists. He said their efforts would go a long way in assisting Malaysia to develop its own professional geologists who would play a major role in developing the country's petroleum industry.

The President of the Society, Dr. Mohammad Ayob said in his welcoming address that it was commendable that some oil comapnies are disclosing the methods and techniques which they employ currently to explore for petroleum.

Petroleum Geology Seminar 1980 - Programme, Friday, 12th Dec 1980

8.00 a.m. - 8.40 a.m.:	Registration
8.40 a.m. :	Arrival of invited guests
8.50 a.m. :	Arrival of Y.B. Datuk Dr. Nik Hussein, Deputy Minister, Energy, Telecommunications and Posts
	OPENING SESSION
9.00 a.m. - 9.10 a.m.:	Welcoming address by Dr. Mohammad Ayob, President of Geological Society of Malaysia
9.10 a.m. - 9.30 a.m.:	Opening address by Y.B. Datuk Dr. Nik Hussein, Deputy Minister of Energy, Telecommunications and Posts
9.30 a.m. -10.00 a.m.:	Coffee break
10.00 a.m. -10.40 a.m.:	Direct hydrocarbon indicators on seismic data in the Malay Basin (Khee Kok Kean, T.G. Carson, G.G. Phipps, R.J. Steele, Esso Production Malaysia Inc.)

10.40 a.m. - 11.40 a.m.	:	Review of principal hydrocarbon - bearing basins around the South China Sea (Ernest P. Du Bois, CCOP Project Office)
11.40 a.m. - 12.20 p.m.	:	Baram Delta geology and hydrocarbon occurrence (E.J.H. Rijks, Sarawak Shell Bhd.)
12.20 a.m. - 2.00 p.m.	:	Lunch
2.00 p.m. - 2.40 p.m.	:	Oil source bed hydrocarbon analysis - some methods and interpretations (S. Thompson, Robertson Research Singapore Pte Ltd.)
2.40 p.m. - 3.20 p.m.	:	Petroleum potential of Thailand (Boonrasri Yansan, Department of Mineral Resources, Thailand)
3.20 p.m. - 3.40 p.m.	:	Coffee break
3.40 p.m. - 4.20 p.m.	:	History of the Tapis Field (R.S.S. Koe, D.L. Bostwick, D.F. Wetherbee, Esso Production Malaysia Inc.)
4.20 p.m. - 5.00 p.m.	:	Utilization of repeat formation tester in formation evaluation (K. Dharmarajan, R.G. Bellis, S.E. Sabatka, Esso Production Malaysia Inc.)

Saturday, 13th December 1980

9.00 a.m. - 9.40 a.m.	:	The stratigraphic relationship of Reed Bank, North Palawan and Mindoro to the Asian Mainland and their significance in the evolution of the South China Sea Basin (N.H. Holloway, Phillips Petroleum Company Far East, Singapore)
9.40 a.m. - 10.20 a.m.	:	Gamma ray and MWD (Measurement-While-Drilling) Logging (Trevor Dickinson, Gearhart Geodata Services, Scotland)
10.20 a.m. - 10.50 a.m.	:	Coffee break
10.50 a.m. - 11.30 a.m.	:	Computer application in petroleum exploration (J.F. Remfry, Dr. Noridah Ibrahim, Esso Production Malaysia Inc.)
11.30 a.m. - 12.10 a.m.	:	The petroleum geology of Brunei (D.W. Ellenor, Brunei Sheel Petroleum Co.Ltd)
12.10 p.m. - 2.00 p.m.	:	Lunch
2.00 p.m. - 2.40 p.m.	:	GLOBAL, A new computer-processed interpretation helps analyse complex lithologies (G.T. Milloy, Schlumberger Overseas S.A.)
2.40 p.m. - 3.20 p.m.	:	Palaeofacies development in the Lower Miocene to Pliocene of Western Offshore Sabah (M.J. Brolsma, Sarawak Sheel Berhad)
3.20 p.m. - 3.40 p.m.	:	Coffee break
3.40 p.m. - 4.20 p.m.	:	Abnormal pressure occurrence and detection techniques in the Malay Basin (C.H. Ford, R. G. Bellis, J.F. Wallace, Esso Production Malaysia Inc.)
4.20 p.m. - 5.00 p.m.	:	Enhanced analysis of 3-D seismic survey over a carbonate province (Mangat Thapar, B.R. Ayme, Cities Service Company, U.S.A.)
5.00 p.m. - 5.15 p.m.	:	Closing remarks

GSM PETROLEUM GEOLOGY SEMINAR 1980

PHOTOS BY C.P.LEE & G.H.TEH

GSM PETROLEUM GEOLOGY SEMINAR 1980


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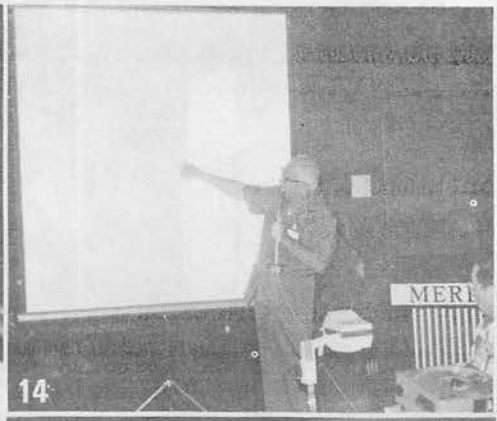
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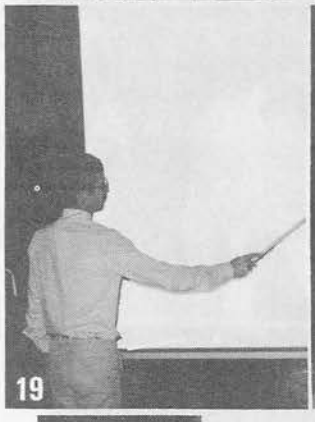
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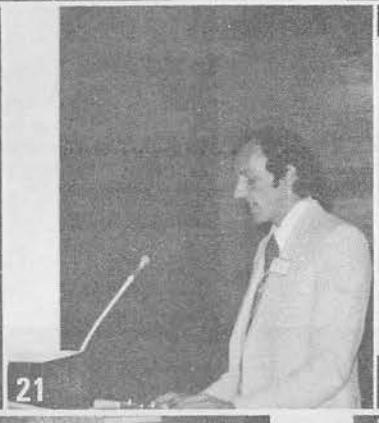
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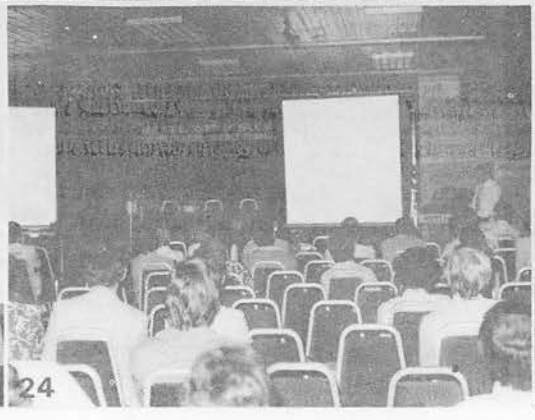
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PHOTOS BY C.P.LEE & G.H.TEH

GSM Petroleum Geology Seminar 1980 - Caption to Figures

Fig. 1. Participants registering for the Seminar.

Fig. 2. Datuk Dr. Nik Hussein being greeted on arrival.

Fig. 3. The participants at the opening ceremony.

Fig. 4. Ahmad Said welcoming the Deputy Minister and participants to the Seminar.

Fig. 5. Datuk Dr. Nik Hussein delivering his speech.

Fig. 6. GSM President, Dr. Mohd. Ayob, with his welcoming speech.

Fig. 7. Tea break and time for refreshments, discussions, etc.

Fig. 8. Participants helping themselves to the buffet lunch.

Fig. 9. Tea time again, standing room only.

Figs. 10, 11 & 12. GSM President, Dr. Mohd. Ayob, receiving donations for the Seminar from A. Bol (SHELL), J. Armitage (ESSO) and J.P. Aubert (SCHLUMBERGER) respectively.

Fig. 13. K.K. Khee starting off the Seminar with his important contribution.

Fig. 14. E.P. Du Bois indicating the location of his review.

Fig. 15. K.M. Lee, Session Chairman, congratulating E.J.H. Rijks for his excellent paper.

Fig. 16. J.N. Bubb, Session Chairman, presenting a souvenir to Miss Yansan for her contribution.

Fig. 17. A. Bol, Session Chairman, thanking D.W. Ellenor for his stimulating paper.

Fig. 18. J.N. Bubb, Session Chairman, handling over the GSM souvenir to R.S.S. Koe.

Fig. 19. M.J. Brolsma, ably presented his talk with the help of slide projections.

Fig. 20. N.H. Holloway receiving a GSM souvenir from Session Chairman, A. Bol.

Fig. 21. J.F. Remfry confidently presenting his paper.

Fig. 22. M. Thapar stressing a point on the screen.

Fig. 23. M. Johnson, Session Chairman, congratulating C.H. Ford on his good paper.

Fig. 24. A section of the participants listening to G.T. Milloy.

Fig. 25. T. Dickinson being congratulated by Session Chairman, A. Bol.

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Generous donations totalling about M$28,700 were received for the Seminar. They include:

1.	Cities Service East Asia Inc.	S$ 500
2.	Robertson Research (S) Pte. Ltd.	S$ 500
3.	Digicon Exploration Ltd.	S$1,000
4.	BNOC (British National Oil Corporation)	M$1,000
5.	Gearheart-Owen Industries Inc.	S$ 500
6.	Elf-Aquitaine Indonesie	M$2,000
7.	Esso Production Malaysia Inc.	M$6,000
8.	Idemitsu Oil Development Co. Ltd.	S$ 500
9.	Teikoku Oil Co. Ltd.	M$1,000
10.	BOC Drexel Oilfield Services (M) Sdn. Bhd.	M$ 200
11.	Energy Support Sdn.Bhd.	M$1,000
12.	Asie Sdn. Bhd.	M$ 500
13.	Sarawak Shell Berhad	M$5,000
14.	PETRONAS	M$3,000
15.	Schlumberger Overseas S.A.	M$1,500
16.	Caltex Oil Malaysia Ltd.	M$ 500
17.	Amoco International Oil Co.	US$ 500
18.	Geophysical Service (Malaysia) Sdn.	M$1,000
19.	DEMINEX	US$1,000

Gearhart-Owen Industries Inc., a well logging service company also ran a Hospitality Suite in the hotel during the two days and this was very well patronized.

The Organizing Committee would like to thank all the organizations and individuals who helped make the 1980 Seminar another resounding success.

A. Said

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Petroleum Geology Seminar 1980 - Abstracts of Papers

Direct hydrocarbon indicators on seismic data in the Malay Basin

KHEE KOK KEAN, G.G. PHIPPS and R.J. STEELE
Exploration Dept., Esso Production Malaysia Inc., Kuala Lumpur

The presence of hydrocarbons within clastic sediments often causes significant changes in their velocity and density properties. These changes are particularly evident in young Tertiary clastic basins. The Malay Basin is one such example. Using typical Malay Basin sand and shale velocities and densities, seismic modelling shows that hydrocarbon bearing sands strongly influence the seismic response. Similar effects are seen to occur on seismic data across hydrocarbon bearing fields. Careful analysis of these seismic response characteristics allows the geophysicist to predict the occurrence of hydrocarbons in the subsurface. However, caution should be used as other conditions can cause similar effects on the seismic data.

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REVIEW OF PRINCIPAL HYDROCARBON - BEARING BASINS AROUND THE SOUTH CHINA SEA

ERNEST P. DU BOIS
Senior Petroleum Geologist, CCOP Project Office, c/o ESCAP, UN Building, Bangkok 2, Thailand

As a consequence of exploration for hydrocarbons, and of research programmes conducted by academic and international institutions, substantial progress has been made in recent years in definition of hydrocarbon-bearing basins, and those potentially so, in the vicinity of the South China Sea. Basin and depositional provinces now recognized include: the Thai Basin, Malay Basin, West Natuna and Penyu Basins, Saigon (Ho Chi Minh) and Mekong (Vung Tau) Basins, East Natuna area, the Greater Sarawak Basin including Central Luconia and Balingian depositional provinces, the Baram Delta/Brunei-Sabah Basin and the Northwest Palawan shelf.

With the exception of the basins and provinces offshore Sarawak-Brunei-Sabah, most sedimentary basin-fill was deposited within continenal to coastal environments and tends to be gas-prone. Principal producing provinces offshore North Borneo are the Central Luconia Carbonate Platform, which is gas-prone, and the Baram Delta, which is oil-prone.

Most hydrocarbons are associated with rocks of mid-Miocene age, although Oligocene and Pliocene occurrence are locally significant.

*****

BARAM DELTA GEOLOGY AND HYDROCARBON OCCURRENCE

E.J.H. RIJKS
Exploration Dept., Sarawak Shell Bhd., Lutong, Sarawak

The Baram Delta Province constitutes only a relatively small part of Sarawak Shell's total contract area in Sarawak, but contains the bulk of the oil reserves discovered to date.

These reserves are distributed over 10 fields of which only one, the Miri field, discovered in 1910, is situated on land.

The Baram Delta depocentre developed during the Late Eocene and as from early Middle Miocene onwards is characterised by the deposition of various regressive phases of clastic sedimentation.

The tectonic style of the Baram Delta shows the interaction of two types of deformation:-

a) gravity induced growth faults, generally hading to the north and arcuate in shape, and
b) compressional folds with NE-SW trending axes, which originated during Late Upper Miocene.

All fields and most of the remaining prospects are located at the intersection of the growth faults and the anticlinal trends.

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OIL SOURCE BED HYDROCARBON ANALYSIS - SOME METHODS AND INTERPRETATIONS

STEVE THOMPSON, Robertson Research (S) Pte. Ltd., Unit 10E-17E, 5th Floor, Block 6, Ayer Rajah Industrial Estate, 55 Ayer Rajah Road, Singapore 5

A well section, designated "Wildcat-1", has been evaluated by a suite of geochemical techniques including pyrolysis and gas chromatography. The operating principles of pyrolysis and gas chromatography are briefly discussed, and the basic interpretations that may be obtained from these data are presented. The results of the analyses indicate that the 1000 to 1800 metres interval of the well section has little or no hydrocarbon generating potential at any level of thermal maturity. However the 1800 to 3000 metres interval is a fair source rock generating moderate quantities of oil between about 2200 to 2900 metres. Pyrolysis alone was sufficient to screen out the poor source rocks between 1000 and 1800 metres, but insufficient to unequivocally delineate the oil generation in the 1900 to 3000 metres interval. However without pyrolysis neither the quantity of oil generation from this interval between 2200 to 2900 metres, nor its unrealised potential between 1800 and 2200 metres could have been estimated.

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PETROLEUM POTENTIAL OF THAILAND

NARES SATTAYARUK & BOONRASRI YANSAN
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The history of oil exploration in Thailand could be dated back to the 1940's when the first exploratory well for petroleum was drilled with little success at Fang Basin of Tertiary age, located at the northern top of the country. At any rate, it was not until the year 1964 when offshore exploration began in the Gulf of Thailand and the Andaman Sea, The hydrocarbon accumulation in the Tertiary sedimentary basins in the Gulf bears its first petroleum potential while the pre-Tertiary sedimentary basins offer the possibility of the second petroleum potential target. The recent discovery of natural gas in the Gulf is of the order of 9 trillion cubic feet which will serve the demand of the country for at least 20 years at the production rate of 750 MMCFD. Condensate at the rate of 10,000 barrels per day will also be recovered. In the Andaman Sea, the pre-Tertiary sedimentary basins which lie within the deep water area bear more favourable conditions for hydrocarbon potential than the shallow water area. Although the onshore exploration has been started for a number of years all over the country, it is still requires the carrying out of detailed seismic survey. It is believed that the rocks of Mesozoic-Paleozoic age which underlie the Khorat Plateau and the Chaophraya Basin of the northeastern and central part of Thailand, respectively, are the most possible potential area for petroleum exploration.

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UTILIZATION OF THE REPEAT FORMATION TESTER IN FORMATION EVALUATION IN THE MALAY BASIN

KRISHNAN DHARMARAJAN, R.G. BELLIS, & S.E. SABATKA
Exploration Dept. Esso Production Malaysia Inc., P.O. Box 857, Kuala Lumpur

Esso Production Malaysia Inc. has made extensive use of the Repeat Formation Tester (RFT) in the Malay Basin due to log analysis not always being definitive because of variable rock quality and problems in R_o determination.

The initial part of the presentation will review the basic operating principle of the RFT and the modifications made to improve testing success. An example of a Malay Basin well mud log, electric logs and log analysis will be presented. The planned (or theoretical) RFT testing program will then be presented and discussed followed by the results of the actual testing program.

Additional information that can be derived from RFT data will be discussed. This will include:-

1. permeability determination
2. fluid contact prediction
3. definition of hydrocarbon systems
4. hydrocarbon assessments
5. future well planning and
6. abnormal pressure determination.

The presentation will close with a discussion on problems related to RFT use and points to be remembered for good RFT results.

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THE STRATIGRAPHIC AND TECTONIC RELATIONSHIP OF REED BANK, NORTH PALAWAN AND MINDORO TO THE ASIAN MAINLAND AND THEIR SIGNIFICANCE IN THE TECTONIC EVOLUTION OF THE SOUTH CHINA SEA BASIN

N.H. HOLLOWAY
Phillips Petroleum Co. Far East, Goldhill Plaza, Newton Road, P.O. Box 149, Killiney Road, Singapore 9123.

It has been suggested by many authors that the Reed Bank, North Palawan and Mindoro (the North Palawan Block) once occupied a pre-drift position contiguous with the South China mainland. This paper presents additional stratigraphic and tectonic evidence in support of this hypothesis as well as a model for the evolution of the South China Sea Basin since the Triassic.

Four prominent pre-Neogene regional unconformities are recognised both on and offshore the China mainland, in Taiwan and in the North Palawan Block. The synchrony of these unconformities strongly suggests a common pre-Neogene history for all these areas. The events are dated (1) Upper Triassic, (2) Upper Jurassic, (3) Upper-most Cretaceous to

Palaeocene, and (4) Mid-Oligocene. They are considered to correspond to the following tectonic episodes respectively (1) the Indosinian Orogeny, (2) an early phase of the Yenshanian Orogeny, (3) onset of rifting in the South China Sea (also a late phase of the Yenshanian), and (4) the South China Sea "Breakup" event (rift-drift transition). Throughout the Palawan area, an important regional unconformity occurs at the end of the Middle Miocene which corresponds to cessation of subduction in the Palawan trench and also of sea floor spreading the South China Sea Basin.

These events are broadly compatible with the sea floor magnetic reversal anomalies established by Taylor and Hayes for the South China Sea Basin. These anomalies form the basis of the pre-drift fit proposed in this paper.

The tectonic evolution of the South China Sea Basin since the Triassic is summarised in the following stages:-

1. Suture of Indosinian and South China blocks along the Red River line (Indosinian event).
2. Jurassic to Mid-Cretaceous northwestward subduction from south-eastern Vietnam to Taiwan with the North Palawan Block lying in a trench to forearc position.
3. Upper Cretaceous shift of subduction to the south and the inception of the Philippine island arc system. Commencement of attenuation by block faulting (rift onset unconformity) fo the broad South China continental shelf. Concomitant initiation of southward movement of old oceanic crust and the inception of southward subduction along the Lupar Line in Sarawak and the proto-Palawan trench.
4. Continued crustal attenuation, most significantly at the western end of the basin such that continental material reached and locked the western part of the Sarawak subduction system by the late Eocene. About 85% stretching of the continental crust is believed to have occurred before sea floor spreading became established.
5. Mid-Oligocene initiation of sea floor generation along a zone of weakness coincident with the Jurassic-Cretaceous palaeomagmatic arc. Northeastward migration of subduction cessation in Borneo owning to the progressive locking effect of southward drifting continental material.
6. Early to Mid-Miocene collision of the North Palawan Block with the Palawan Trench and concomitant cessation of sea floor spreading.
7. Further impact between the North Palawan Block and the anticlockwise pivoting Philippine island arc system.

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GAMMA RAY AND MWD (MEASUREMENT-WHILE-DRILLING) LOGGING

TREVOR DICKINSON,
Gearhart Geodata Services Ltd., Scotland

1. Review of Gearhart MWD Pulse Telemetry System with particular reference to the primary applications of the Directional and Gamma Ray tools.
2. A comparison with other designs currently produced/available.
3. Future development of Composite MWD tools for example Annulus Pressure, Temperature, Resistivity and Gamma Ray.

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COMPUTER APPLICATIONS IN PETROLEUM EXPLORATION

J.F. REMFRY & NORIDAH IBRAHIM
Exploration Dept., Esso Production Malaysia Inc., P.O. Box 857, Kuala Lumpur

Esso Production Malaysia Incorporated has a Computer Applications Group within the Exploration Department to aid in its exploration efforts. The Computer Applications Group operates a Data General mini-computer and has access to an IBM main frame computer. The group has developed and uses a number of computer programmes to assist exploration staff in their day to day interpretation. Most of these programmes are simple, fast, very easy to use and readily accessible. Exploration identifies three categories into which these programmes fall; namely, data base, data management and applications. The purpose of this paper is to illustrate some of the programmes in each of the categories and show how they are used in EPMI's exploration effort.

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THE PETROLEUM GEOLOGY OF BRUNEI

D.W. ELLENOR
Exploration Department, Brunei Shell Petroleum Co. Ltd., Seria, Brunei.

Brunei lies within the Baram Delta Basin, an early Miocene to Recent depression filled with 35,000 - 45,000 feet of northward prograding deltaic and associated non-deltaic clastic wedges. Regressive topset sequences (i.e. coastal distributary channels, beach barriers, etc.) form the main exploration objectives.

The degree of deformation within the Brunei sector of the Baram Delta Basin decreases from south to north and is currently considered to be the result of gravity tectonics controlled by differential basin margin movements and basin morphology. On- and near-shore, en-echelon complexly faulted anticlinal ridges separated by broad, deep unfaulted synclines are found, while further offshore, N- and S-hading growth faults, lacking well-expressed associated rollover structures, occur. Hydrocarbons have been discovered in both structural provinces.

Shell began exploration in Brunei in 1913 and to date have shot over 60,000 km of seismic and drilled 89 exploration wells, including 54 offshore. From these activities, 10 commercially exploitable oil/gas fields, including the giants - Seria, S.W. Ampa and Champion - and 8 pregently marginal fields, have been found. As such, tiny Brunei (5200 mi^2) surely must rank as one of the most prolific hydrocarbon provinces/square mile in the world.

The search continues, but now for the ever smaller fault/dip closure and the subtle stratigraphic trap where that elusive, but increasingly more valuable barrel, may be trapped.

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GLOBAL, A NEW COMPUTER-PROCESSED INTERPRETATION HELPS ANALYSE COMPLEX LITHOLOGIES

G.T. MILLOY
Schlumberger Overseas S.A., 3rd Floor, Wisma Bunga Raya, 153, Jalan Ampang, Kuala Lumpur 04-07

A new computer-processed interpretation, GLOBAL can handle very complex lithologies and is adaptable to all kinds of models and local conditions.

This is achieved by simultaneous use of all log information. Each logging sensor is related by its response equation to the rock parameters such as density and porosity. The errors associated with each equation are defined by a model and the GLOBAL method is then used to obtain the solution with the minimum error.

A quality curve is presented indicating how well the answers fit the chosen model. The curve helps to determine if the model is inadequate, or if insufficient information is available to solve the interpretation problem.

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PALEOFACIES DEVELOPMENT IN THE LOWER MIOCENE TO PLIOCENE OF WESTERN OFFSHORE SABAH

M.J. BROLSMA
Exploration Dept., Sarawak Shell Bhd., Lutong, Sarawak

A stratigraphic compilation of all SSPC exploration wells in offshore Sabah has resulted in 18 stratigraphically arranged paleofacies maps of the Early Miocene to Pliocene sequence. These paleofacies maps depict the areal distribution of depositional environments and sand percentages, and clearly show their inter-relationships. The effects of the various periods of erosion and/or non-deposition are shown. The diachroneity of some of these unconformities is well established. The stability and slope angle of the depositional shelf can be inferred. It appears to vary considerably from area to area through geological times.

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THE OCCURRENCE AND DETECTION OF GEOPRESSURE IN THE MALAY BASIN

C.H. FORD, J.F. WALLACE & J.G. BELLIS
Exploration Dept., Esso Production Malaysia Inc., P.O. Box 857, Kuala Lumpur

Geopressure occurs in the subsurface when some of the compressional forces exerted on a rock are supported by fluids within the rock. This results in the formation pressure at a particular depth being greater than the hydrostatic pressure of a column of water equivalent to that depth. In the Malay Basin geopressure has been detected in two thirds of the exploration wells drilled by EPMI. The onset of geopressure is, to some degree, stratigraphically controlled, occurring in progressively older rock units from north-west to south-east and from the centre to the flanks of the basin.

It is EPMI's policy to drill exploration wells such that the pressure exerted by the column of drilling fluid is approximately 250 psi greater than the formation pressure. To maintain this overbalanced condition, pre-spud prediction and instantaneous detection of subsurface geopressure is essential. Prior to drilling, the onset of geopressure can be predicted by seismic velocity analysis and by stratigraphic correlation with nearby wells. During drilling, rate of bit penetration and exponents derived from this parameter can be used to detect entry into a geopressured zone. If the well "kicks", an underbalanced situation exists and the formation pressure can be calculated from surface pressures when the well is shut in. Interpretation of drill cuttings and the gas content, temperature and salinity of drill fluids aid in the detection of geopressure, but these parameters are not instantaneously available as they can only be obtained by circulating drilling fluids from the bit to the surface. Subsequent to drilling, interpretation of geopressure can be made from analysis of electric log response, and direct measurement of pressure can be made by wireline test techniques and production testing.

In an effort to provide a wider range of instantaneous detection parameters, research is being directed towards developing measurement-while-drilling systems, which are as yet unavailable in Southeast Asia. In the meantime, geopressure prediction and detection in the Malay Basin is a team effort between seismic interpreters, drilling engineers, wellsite geologists and mud logging personnel.

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ENHANCED ANALYSIS OF 3-D SEISMIC SURVEY OVER A CARBONATE PROVINCE

M.R. THAPAR
Cities Service Co., P.O. Box 300, Tulsa, Oklahoma 74102, USA

B.R. AYME
Cities Service Co. International, P.O. Box 642, Houston, Texas 77001, USA

Seismic response from carbonate rocks varies from weak reflections (dim spots), associated with reef-like features, to strong reflections from carbonate rocks having a much higher velocity than the surrounding rocks. Amplitude, frequency, and velocity of seismic reflections can

be diagnostic of the presence of hydrocarbons.

A three dimensional (3-D) seismic survey was carried out for Philippines-Cities Services, Inc. by Geophysical Service, Inc. in February, 1978. One of the objectives of this 3-D survey was to define the shape and size of the productive Nido features. It was also important to determine the relative locations of these features. Finally, the 3-D seismic survey data were to be employed for locating new exploratory wells to increase the oil reserves within the Nido area.

A three dimensional seismic survey is well suited for resolving reflections anomalies from reef-like (dome shaped) features by employing some of the state-of-the-art processing techniques. Cities Service's Data Processing Center displayed these seismic data in various colors by using the Cit-Chrome (Pat.) seismic color processing system. These color plots can highlight seismic parameters such as: amplitude, frequency, absorption, energy and energy frequency. Cities' experience with frequency anomalies over known hydrocarbon saturated zones indicates that low frequency anomalies can be an indicator for the presence of hydrocarbons.

All of the 88 3-D seismic lines were processed in color to show "Energy Frequency" of the seismic reflections. These "Energy Frequency" color plots were laminated onto plexiglass sheets to form a 3-D color display. A close examination of this 3-D display reveals some interesting geophysical facts regarding the location of some of the non-commercial wells.

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BERITA PERSATUAN
(NEWS OF THE SOCIETY)

DATE OF AGM 1981

The Council has fixed Friday 10th April 1981 as the date for the AGM of the Society. The venue is the Lotus Room, Hotel Merlin, Kuala Lumpur.

The AGM will take place immediately after the GSM Regional Geology Seminar '81 (Theme: Geology of the Central Belt, Peninsular Malaysia and Thailand).

The Society dinner will be held on the same evening and members will be further informed shortly.

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RESIGNATION AND COOPTION OF COUNCILLOR

S.S. Subramaniam tendered in his resignation as Councillor.

The GSM Council accepted his resignation and co-opted Dr. Ismail Mohd. Noor of Universiti Kebangsaan Malaysia to fill in the vacancy.

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MEMBERSHIP SUBSCRIPTION FOR 1981 - REMINDER

Your membership subscription for 1981 is now due. Please forward us a crossed cheque in favour of the Geological Society of Malaysia (inclusive of bank charges for outstation cheques) at your earliest convenience if you have not done so.

Subscription in Malaysia dollars is M$15.00

Subscription in Singapore dollars is S$17.50 (inclusive of bank charges)

Subscription in US dollars is US$8.80 (inclusive of bank charges)

Members who fail to pay up their 1981 subscriptions, will not receive anything further after Vol. 6, No. 6 of the WARTA.

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LETTER TO THE EDITOR

A.A. Meyerhoff
P.O. Box 4602
Tulsa, Oklahoma 74104

November 10 1980

Dr. G.H. Teh
Editor
Geological Society of Malaysia
c/o Department of Geology
University of Malaya
Kuala Lumpur 22-11, Malaysia

Dear Dr. Teh

Thank you very much for your letter of October 21, and for sending me the summary of my talk plus Dr. Haile's comments. As you know, I am a member of the Geological Society of Malaysia, so that I already had seen both.

I have very few comments to make regarding Dr. Haile's letter. Dr. Haile apparently has a faulty memory. I did indeed mention the paleomagnetic evidence, such as the magnetic stripes, and I pointed out that linear magnetic anomalies are found in only a part of the midocean ridge system, and are not found everywhere.

Dr. Haile also is incorrect in stating that my own conclusions were based on a study of a few lavas. In actual fact, my own conclusions were based on three years of intense study in several parts of the world, including Central Asia. Specifically, the areas include Iceland, the eastern United States, the southwestern United States, Argentina, Brazil and southwestern Siberia. One excellent example is southwestern Siberia where we collected oriented rock samples (basalt) from a section almost 4,000 meters thick. The samples were studied by Opdyke and Irving, two of the best known paleomagnetic specialists in

the world. The spread in paleopole positions was well in excess of 12,000 kilometers, or one-quarter of the circumference of the earth. This means that the method was inapplicable in that particular group of samples.

I would differ with Dr. Haile on one other point; I did not make a "sweeping dismissal of a method that happens to give results inconsistent with one's favourite hypothesis." I made it clear at the meeting that I have no favourite hypothesis. Furthermore, my dismissal was hardly a sweeping one. It was a positive dismissal, because all of the work and research which I have done in paleomagnetism indicates that the method is not valid. I provided at that talk an alternate explanation for the linear magnetic anomalies of the ocean basins; in fact, I specifically gave two alternatives. My only dismissal was of the use of paleomagnetic data to reconstruct ancient pole positions.

I thoroughly enjoyed being with you and was flattered to have been asked. I have not been a member of the Society for many years, but I already feel very closely attached to it.

Most cordially,

A.A. Meyerhoff
(Signed)

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GEOTECHNICAL ENGINEERING SEMINAR 1981 - FINAL CIRCULAR

Details of the Seminar are as follows:

Date: Friday, 13th February 1981

Late Registration: From 8.30 - 8.50 a.m.

Venue: Hotel Merlin, Kuala Lumpur

Registration:

	Before 8th Feb 1981	After 8th Feb 1981
Members of the Society	M$10.00	M$20.00
Non-Members	M$30.00	M$40.00
Student Members of the Society	Free (without lunch)	

To facilitate planning, kindly register early.

To date, the following tentative papers have been offered:

1. An overview of engineering geologic problems in Malaysia.
2. Engineering geology in Brunei, 1966-76.
3. Suitability of Singapore rocks for various types of concrete works.
4. The thermal probe methods for measuring soil density.
5. Use of rice husk ash for soil stabilization.
6. Some methods of erosion protection of earth slopes used in Singapore.
7. Reconditioning of diamond-impregnated bits - the way to study on rock drillability.
8. Discontinuity analysis in rock mechanics.

9. Numerical simulation in hydrogeology.
10. Problems and application of seismic refraction method in Civil Engineering projects in Malaysia.
11. Geophysical surveys in Civil Engineering site investigations.
12. Offshore geophysical site investigation in the Malay Basin.

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New Library Additions

The following publications were added to the Society's collection:

1. IMM Bulletin nos. 886 & 888, 1980.
2. National Library of Singapore, Adult reference collections, accessions list, Aug. - Oct. 1980.
3. IMM Transaction/Section C, Sept. 1980.
4. The University of Kansas, Paleontological Contributions, Paper 99 & 100, 1980.
5. SEATRAD Bulletin vol. 1, nos. 2 & 3, 1980.
6. Proceedings of the second working group meeting biostratigraphic Datum-planes of the Pacific Neogene IGCP Project 114, Bandung, May 30-Jun 1, 1977. 1978.
7. Bulletin of the Geological Research & Development Centre, nos. 1 & 2, 1979.
8. SEATRAD Library, list of periodicals, Sept. 1980 and acquisition list, June-Sept. 1980.
9. Geosurvey Newsletter vol. 12, nos. 7-10, 1980.
10. Grondboor & hamer, nos. 1-5, 1980.
11. Cambrian trilobite faunas of SW China by Zhang Wentang, et al., 1980.
12. Records of the Geological Survey of New South Wales, vol. 19, pt. 2, 1980.
13. AGID News, no. 25, Oct 1980.
14. Report of evaluation on geothermal resources of Northern Thailand: San Kampaeng, Fang & Mae Chan geothermal systems by T. Ramingwang, et al., 1980.
15. Cenozoic basins of Thailand and their coal deposits: a preliminary report by M. Gibling & B. Ratanasthien, 1980.
16. Bulletin of the National Science Museum, series C, vol. 6, no. 3, 1980.
17. Procedure of the long-term forecast of oil exploration and production by N.A. Kalinin (in Russian), 1979.
18. Geology of natural gas by I.V. Visotskii (in Russian), 1979.
19. Geology of the surrounding and inland seas (in Russian), 1979.
20. Berliner geowissenschaftliche abhandlungen, band 17 (1979) and 20-24 (1980).
21. Aluminium (Australia), 1979.
22. A brief review of oil shale in New South Wales by C. Herbert, 1980.
23. Chlorite from mineral deposits of the Lobar region - characterization by Oinuma's method by E. Slansky, 1980.
24. The Armidale area by K.R. Fitzpatrick, 1979.
25. Abstracts of 8th Bureau of Mineral Resources symposium, Canberra, 1-2 May, 1979.
26. Officer basin seismic, magnetic and radiometric survey, Western Australia, 1972 by P.L. Harrison & I. Zadoroznyj, 1978.
27. Australian mineral industry annual review, 1978, preprint-Gold.
28. Australian mineral industry, Quarterly, vol. 32, no. 3, 1979.

29. Australian mineral industry, Quarterly, vol. 32, no. 1, 1979.
30. Tabletop, Western Australia, 1979.
31. Morris, Western Australia, 1979.
32. A study of laterite profiles in relation to bedrock in the Darling Range near Perth, Western Australia by R. Davy, 1979.
33. Bureau of Mineral Resources Journal of Australian Geology & Geophysics, vol. 4, no. 3, 1979.
34. Papers presented at the symposium on recent developments in extractive metallurgy, Aug. 1979.
35. Seminar on the processing of Pilbara iron ores.
36. Oklahoma Geology notes, vol. 40, nos. 3 & 4, 1980.

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MEMBERSHIP

The following people have joined the Society:

Full Membership

Bernard Charoy, C.R.P.G. C.O. No. 1, 54500, Vanoloeuvre les Nancy, France.
Philip L. Frank, Carigali-BP, P.O. Box 757, Kuala Lumpur.
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Muhammad Barzani, Flat B7, 6, Jln. 17/13, Petaling Jaya.
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Adi Suprapto, Huffco Indonesia, P.O. Box 47, Balikpapan, Indonesia.
Hugh Crocker, Esso Production, P.O.Box 857, Kuala Lumpur.
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Richard A. Cory, Esso Production, P.O. Box 857, Kuala Lumpur.
Abu Bakar b. Mohamed, Petronas, Kuala Lumpur.
Mohd. Badri Hj. Hassan, Petronas, Kuala Lumpur.
Dimyati b. Mohamed, Petronas, Kuala Lumpur.
Kuang Koo Sing, Petronas, Kuala Lumpur.

David G. Newton, K3A, 10th Floor, International Building, 360 Orchard Road, Singapore 0923.
S.A.A. Grodynski, K3A, 10th Floor, International Building, 360 Orchard Road, Singapore 0923.

Student Membership

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Pak Yew Pun, 3826, Jalan Hamzah, Kota Baru, Kelantan.
Muhammad Adib b. Abdullah Hudi, Jabatan Geologi, UM, Kuala Lumpur.
Saidin Karim, Jabatan Geologi, UM, Kuala Lumpur.
Encik Aris Yub, Jabatan Geologi, UM, Kuala Lumpur.
Mohd. Zaidi Mohd. Hasan, Jabatan Geologi, UM, Kuala Lumpur.
Sahibin b. Abd. Rahim, Jabatan Geologi, UKM, Kuala Lumpur.
Mazmy b. Hussain, Jabatan Geologi, UKM, Kuala Lumpur.
Engka Nagir b. Mohamad, Jabatan Geologi, UKM, Kuala Lumpur.
Md. Jamil b. Hj. Said, Jabatan Geologi, UKM, Kuala Lumpur.
Sahalan b. Abd. Aziz, Jabatan Geologi, UKM, Kuala Lumpur.
Ab. Rahman b. Che Hamad, Jabatan Geologi, UKM, Kuala Lumpur.
Hassan b. Din, Jabatan Geologi, UKM, Kuala Lumpur.
Madrim b. Tassan, Jabatan Geologi, UKM, Kuala Lumpur.
Baharuddin b. Mohamad, Jabatan Geologi, UKM, Kuala Lumpur.
Abdul Rashid b. Hamzah, Jabatan Geologi, UKM, Kuala Lumpur.
Markonah bt. Kusnin, Jabatan Geologi, UKM, Kuala Lumpur.
Mahadi b. Abu Hassan, Jabatan Geologi, UKM, Kuala Lumpur.
Askury Abd. Kadir, Jabatan Geologi, UKM, Kuala Lumpur.
Zukiflee b. Mohamad, Jabatan Geologi, UKM, Kuala Lumpur.
Shariff Abdul Kadir b. Shariff Omang, Jabatan Geologi, UKM, Kuala Lumpur.
Noral Hadi Yusof, Jabatan Geologi, UKM, Kuala Lumpur.
Nik Ahmad Zaki b. Nik Ismail, Jabatan Geologi, UKM, Kuala Lumpur.
Zahari b. Ibrahim, Jabatan Geologi, UKM, Kuala Lumpur.
Mohd. b. Kadir, Jabatan Geologi, UKM, Kuala Lumpur.
Adenan b. Kamarudin, Jabatan Geologi, UKM, Kuala Lumpur.
Ahmad Hafad b. Bajuri, Jabatan Geologi, UKM, Kuala Lumpur.

Associate Membership

Andrew Lee Choy, Exim Enterprise, 71 Petaling Garden, Kepong Baru.
Madam Cheong Chun Bee, 29 Lorong Abang Hj. Openg 2, Taman Tun Dr. Ismail, Damansara, Kuala Lumpur.
Khoo Chee Ming, 10, Jln SS15/5G, Subang Jaya, Selangor.

Institutional Membership

Gold Fields Mining & Development Ltd., Geological Division, P.O. Box 53, Krugersdorp 1740, Republic of South Africa.

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CHANGE OF ADDRESS

The following members have informed the Society of new addresses as indicated:

1. Dr. Jovan Stocklin, Geological Consultant, Erdbuehlstrasse 4, 8472 Seuzach, Switzerland.
2. Dr. Mahillah Bibi Rafek, Dept. of Geology, University of New Brunswick, Box 4400, Fredericton N.B., Canada E3B 5A3.
3. Dr. S.H. Chan, Division of Applied Geomechanics, CSIRO, P.O. Box 54, Mount Waverley, Victoria 3149, Australia.
4. Mr. J.B. Blanche, 'Tara', Laighill Place, Dunblane, Perthshire, Scotland, FK15 OBJ, U.K.
5. En. Ibrahim b. Amman, Pej. Penyiasatan Bentong, Pahang.
6. Mr. R.D. Stewart, Vice President & Director, Union Offshore Exploration Ltd., Praia do Flamengo 200 - 17°, Rio de Janeiro RJ, Brazil.
7. Mr. Hiroaki Todo, Apt. 212, The Envoy Apartments, 5633, Kenmore Avenue, Chicago, Illinois 60660, USA.
8. En. Zulkifli Mohd. Yusoff, 5A, Jln 8A, Ampang Jaya, Ulu Kelang.
9. En. Munabir b. Sahri, Petronas Miri, P.O. Box 401, Miri, Sarawak.
10. Mr. Richard A.S. Cayzer, 11 Arcola St., Aspley, Brisbane, Queensland, Australia 4034.
11. Mr. R.B. Tate, c/o New House Farm, Hatton, Warrington, Cheshire, UK.
12. En. Shamshuddin Jusop, ITC, Geological Institute, University of Gent, Krigslaan 271, Gent 9000, Belgium.
13. Mr. P.C. Cranfield, ALCON Ltd., GPD Box 2566, Bangkok 5, Thailand.
14. Mr. John Clema, Box 500, Adelaide, South Australia 5001.
15. En. Ahmad Tajuddin Haji Ibrahim, 94 Wingrove Garden, Newcastle Upon Tyne, NE4 9HR, England.
16. Mr. Claude Carrel, c/o Digom Exploration, S.N.E.A. (P.), 64018 Pau Cedex, France.
17. Mr. J.H. Bennie, c/o Offshore Exploration for Tin, P.O. Box 66, Phuket, Thailand.
18. Mr. M.G. Sharma, 949 Kampung Simee, Ipoh, Perak.
19. Mr. Kung Chin Leang, c/o Core Laboratories International Ltd. 24-A Lim Teck Boo Road, Singapore 1953.
20. En. Tyebally b. Fazle Hussein, Exploration Dept., Petronas, P.O. Box 2444, Kuala Lumpur.
21. Mr. R.W. Murphy, Esso Exploration, St. Clements House, Walton-on-Thames, Surrey, England.
22. Dr. John Chronic, 62191-40 W, 250 Amarillo, Texas 79106, USA.
23. Mr. Stephen J. Jones, EG & G International Inc., Block 2, Unit 3, Ground Floor, Ayer Rajah Industrial Estate, Ayer Rajah Road, Singapore 0513.
24. Mr. A.P. Whittle, Esso Eastern Inc., P.O. Box 1415, Houston, Texas 77001, USA.
25. Mr. Javed Azam, 12C, Tingkat 3, Flat PKNS, 17 Tingkat, Kampung Kerinci, Kuala Lumpur.

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PROFESSIONAL MEMBERSHIP

Those interested but have not received their application forms, please write to the Hon. Secretary, Geological Society of Malaysia, c/o Dept. of Geology, University of Malaya, Kuala Lumpur, Malaysia.

OUT SOON

BULLETIN 13

CONTENTS

BERITA-BERITA LAIN
(OTHER NEWS)

METRICATION IN THE TIN INDUSTRY

In compliance with the Government's decision on metrication, we are reproducing these conversion tables formulated by the Ministry of Primary Industries for the benefit of members in the tin industry.

PIKULS TO KILOGRAMMES

pikuls		kg	pikuls		kg	pikuls		kg
0.1	=	6	31	=	1875	70	=	4234
0.2	=	12	32	=	1935	71	=	4294
0.3	=	18	33	=	1996	72	=	4354
0.4	=	24	34	=	2056	73	=	4415
0.5	=	30	35	=	2117	74	=	4475
0.6	=	36	36	=	2177	75	=	4536
0.7	=	42	37	=	2238	76	=	4596
0.8	=	48	38	=	2298	77	=	4657
0.9	=	54	39	=	2359	78	=	4717
1.0	=	60	40	=	2419	79	=	4778
2.0	=	121	41	=	2480	80	=	4838
3.0	=	181	42	=	2540	81	=	4899
4.0	=	242	43	=	2601	82	=	4959
5.0	=	302	44	=	2661	83	=	5020
6.0	=	363	45	=	2722	84	=	5080
7.0	=	423	46	=	2782	85	=	5141
8.0	=	484	47	=	2843	86	=	5201
9.0	=	544	48	=	2903	87	=	5262
10	=	605	49	=	2963	88	=	5322
11	=	665	50	=	3024	89	=	5383
12	=	726	51	=	3084	90	=	5443
13	=	786	52	=	3145	91	=	5504
14	=	847	53	=	3205	92	=	5564
15	=	907	54	=	3266	93	=	5625
16	=	968	55	=	3326	94	=	5685
17	=	1028	56	=	3387	95	=	5746
18	=	1089	57	=	3447	96	=	5806
19	=	1149	58	=	3508	97	=	5866
20	=	1210	59	=	3568	98	=	5927
21	=	1270	60	=	3629	99	=	5987
22	=	1331	61	=	3689	100	=	6048
23	=	1391	62	=	3750	200	=	12096
24	=	1451	63	=	3810	300	=	18144
25	=	1512	64	=	3871	400	=	24192
26	=	1572	65	=	3931	500	=	30240
27	=	1633	66	=	3992	600	=	36287
28	=	1693	67	=	4052	700	=	42335
29	=	1754	68	=	4113	800	=	48383
30	=	1814	69	=	4173	900	=	54431
						1000	=	60479

Conversion factor: 1 pikul = 60.4790 kg.

KATI PER CUBIC YARD TO GRAMME PER CUBIC METRE

kati/yd^3		gm/m^3	kati/yd^3		gm/m^3	kati/yd^3		gm/m^3
0.01	=	8	0.51	=	403	2.00	=	1582
0.02	=	16	0.52	=	411	3.00	=	2373
0.03	=	24	0.53	=	419	4.00	=	3164
0.04	=	32	0.54	=	427	5.00	=	3955
0.05	=	40	0.55	=	435	6.00	=	4746
0.06	=	47	0.56	=	443	7.00	=	5537
0.07	=	55	0.57	=	451	8.00	=	6328
0.08	=	63	0.58	=	459	9.00	=	7119
0.09	=	71	0.59	=	467	10.00	=	7910
0.10	=	79	0.60	=	475	11.00	=	8701
0.11	=	87	0.61	=	483	12.00	=	9492
0.12	=	95	0.62	=	490	13.00	=	10283
0.13	=	103	0.63	=	498	14.00	=	11074
0.14	=	111	0.64	=	506	15.00	=	11866
0.15	=	119	0.65	=	514	16.00	=	12657
0.16	=	127	0.66	=	522	17.00	=	13448
0.17	=	134	0.67	=	530	18.00	=	14239
0.18	=	142	0.68	=	538	19.00	=	15030
0.19	=	150	0.69	=	546	20.00	=	15821
0.20	=	158	0.70	=	554	21.00	=	16612
0.21	=	166	0.71	=	562	22.00	=	17403
0.22	=	174	0.72	=	570	23.00	=	18194
0.23	=	182	0.73	=	577	24.00	=	18985
0.24	=	190	0.74	=	585	25.00	=	19776
0.25	=	198	0.75	=	593	26.00	=	20567
0.26	=	206	0.76	=	601	27.00	=	21358
0.27	=	214	0.77	=	609	28.00	=	22149
0.28	=	221	0.78	=	617	29.00	=	22940
0.29	=	229	0.79	=	625	30.00	=	23731
0.30	=	237	0.80	=	633	31.00	=	24522
0.30	=	245	0.81	=	641	32.00	=	25313
0.32	=	253	0.82	=	649	33.00	=	26104
0.33	=	261	0.83	=	657	34.00	=	26895
0.34	=	269	0.84	=	664	35.00	=	27686
0.35	=	277	0.85	=	672	36.00	=	28477
0.36	=	285	0.86	=	680	37.00	=	29268
0.37	=	293	0.87	=	688	38.00	=	30059
0.38	=	301	0.88	=	696	39.00	=	30850
0.39	=	309	0.89	=	704	40.00	=	31641
0.40	=	316	0.90	=	712	41.00	=	32432
0.41	=	324	0.91	=	720	42.00	=	33223
0.42	=	332	0.92	=	728	43.00	=	34015
0.43	=	340	0.93	=	736	44.00	=	34806
0.44	=	348	0.94	=	744	45.00	=	35597
0.45	=	356	0.95	=	751	46.00	=	36388
0.46	=	364	0.96	=	759	47.00	=	37179
0.47	=	372	0.97	=	767	48.00	=	37970
0.48	=	380	0.98	=	775	49.00	=	38761
0.49	=	388	0.99	=	783	50.00	=	39552
0.50	=	396	1.00	=	791			

Conversion factor: 1 kati/yd^3 = 791.035 gm/m^3

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SEATRAD CENTRE SEMINAR "COMPLEX TIN ORES AND RELATED PROBLEMS"

The SEATRAD Centre will be organizing a seminar on "Complex Tin Ores and Related Problems" which will be held on 9-11 April 1981 in Bandung, Indonesia. The seminar will be open to participants from all countries. It is anticipated that a field trip to one of the Indonesian tin islands (Bangka or Belitung) shall be organized the week following the seminar probably from 12-18 April 1981.

The Southeast Asia Tin Research and Development (SEATRAD) Centre is a regional organization formed by the Governments of Indonesia, Malaysia and Thailand with assistance from the United Nations, to conduct, coordinate and promote research and training in the various fields of tin production including geology, prospecting, mining, mineral processing and smelting.

Enquiries on the matter should be addressed to:

The Director
SEATRAD Centre
14 Tiger Lane, Ipoh, Malaysia.

Tel: 517124 and 517833. Teleg. TINCENTRE, IPOH.

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ELEVENTH INTERNATIONAL CONGRESS ON SEDIMENTOLOGY HAMILTON, ONTARIO, CANADA - AUGUST 22-28, 1982

The next International Congress on Sedimentology of the International Association of Sedimentologists will be held August 22-28, 1982, at McMaster University, Hamilton, Ontario, Canada. The Congress is also sponsored by Geological Association of Canada and Canadian Society of Petroleum Geologists.

The Scientific Program will be divided into themes (broad, interdisciplinary topics) and symposia (more specialized). Themes include: Archean sedimentology, sedimentology of siltstone and mudstone, deposition and diagenesis of evaporites, weathering and soils, deep burial diagenesis and maturation of organic matter, low temperature geochemistry, sedimentary ore deposits, geomorphology of depositional landforms, effects of organisms on sedimentary models, environmental sedimentology, sedimentology and plate tectonics, regional sedimentology. A list of 26 additional symposia topics is included in the first circular. The official languages of the Congress will be English and French.

Field excursions are planned for before and after the Congress. They will range across Canada and part of the northeastern U.S.A. A list of 25 excursions is included in the first circular.

The First Circular is being mailed to all members of the International Association of Sedimentologists. Non-members may obtain a copy by writing to:

Prof. Peter H. Stauffer
(IAS National Correspondent for Malaysia)
Dept. of Geology
University of Malaya
Kuala Lumpur, Malaysia

or

IAS Congress 1982
Dept. of Geology
McMaster University
Hamilton, Ontario L8S 4M1
Canada

The Organizing Committee urges all those who are interested in the Congress and who wish to participate in any way to obtain a copy of the First Circular. Special low registration rates will be available to students and to those who register before 31 December 1981.

The Second Circular, with details regarding submission of abstracts, registration in field excursions, accommodation, etc., will be sent only to those who return the questionnaire included in the First Circular.

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PHS

Second International Symposium on the Cambrian System August 9-13, 1981 Colorado School of Mines, Golden

Symposium

Planning is progressing well for the Second International Symposium on the Cambrian System which will be held in Golden, Colorado, USA., August 9-13 1981. The Symposium will bring together scientists from around the world to discuss the status of present knowledge and current research on the Cambrian System, and to examine selected outcrops of Cambrian rocks in the United States and Canada.

Approximately 100 scientists from 15 countries have formally responded. Many offered tentative titles for reports and all showed a strong interest in the objectives of the Symposium.

Technical Sessions

Technical sessions will be held August 10-13 1981, in the Cecil H. and Ida Green Graduate and Professional Center, Colorado School of Mines, Golden, Colorado. Sessions will include both invited and volunteered reports. The program will be divided into several topical sessions. A tentative list of session topics is described below.

In addition, poster display boards will be made available for displays of photographs or other graphic materials, and tables or museum-type display cases will be available for exhibition of paleontological specimens.

Session A. Biogeography and Paleoecology
Session B. Biostratigraphy and Intercontinental Correlations
Session C. Cambrian-Ordovician Boundary
Session D. Depositional Environments
Session E. Economic Resources
Session F. Paleobiology
Session G. Paleomagnetism and Isotopic Dating
Session H. Precambrian-Cambrian Boundary

Publications and Presentations

Short papers equivalent to 2000 words, inclusive of illustrations, which summarize reports presented at the Symposium will be published and made available at the time of the meetings.

Technical session participants will be allowed 20 minutes for oral presentation of reports.

When manuscripts are submitted for reports intended for oral presentation, authors should indicate the topical session for which they wish the paper to be considered. Manuscripts should be sent to: The

Organizing Committee, Second International Symposium on the Cambrian System, U.S. Geological Survey, Box 25046 M.S. 919, Denver Federal Center, Denver, Colorado 80225. Deadline for all manuscripts is March 1, 1981. The Organizing Committee will forward copies of manuscripts to session chairmen and notify authors regarding acceptance on about April 1, 1981.

Field Excursions

Trip A. Cambrian stratigraphy and paleontology of the Great Basin, Western United States (July 30 - August 9, 1981).
Trip B. Cambrian of the Southern Canadian Rock Mountains, Alberta and British Columbia (Trip B-1, August 14-18; Trip B-2, August 19, 20, 1981).
Trip C. Cambrian stratigraphy and paleontology of Central Texas and Southwestern Oklahoma (August 14-19 1981).
Trip D. Cambrian stratigraphy and paleontology of the Upper Mississippi Valley, Minnesota and Wisconsin (August 15-17, 1981).

Payment of Fees

Fees for preregistration, regular registration, board and room and field trips are listed in the Registration Form. Please note that deposits are due February 1, 1981, to hold reservations for living accommodations on campus and for field trips. Total field trip fees are due by June 1, 1981. All fees are in US dollars.

Preregistration (before June 1, 1981) for the technical sessions is encouraged for all participants. Preregistration is required of all participants in the premeeting field trip to the Great Basin.

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LIST OF THESIS TITLES OF UNIVERSITI TEKNOLOGI MALAYSIA, PETROLEUM ENGINEERING STUDENTS (1979/1980)

1. Optimisation routines by Mohd. Norani b. Abd. Rahman.
2. Determination of waterinflux functions - survey of existing theories by Shamsudin b. Mohd. Yusoff.
3. The viability of a more general approach to decline-curve analysis by Koh Lee Song.
4. Flow of liquids through non-consolidated porous media by Mahbob b. Hj. Manan.
5. Numerical simulation of a dry gas reservoir (areal model) by Md. Padzil b. Hasan Ahmad.
6. Well-bore hydraulics by Md. Wakif b. Sukahar.
7. Determination of water-flood recovery as a function of the mobility ratio by Mohamad Nasir b. Hj. Abd. Rahman.
8. Mathematical theories of flow through fractures - an assessment by Mohd. Hata b. Sukiran.
9. Flow of gases through non-consolidated porous media by Mohd. Zazali b. Salim.
10. Oil production by solutinn-gas drive; the material balance approach by Mohammad Ekrami b. Daud.
11. Petroleum appraisal in the Upper Paleozoic sediments; Kuantan area by Munabir b. Sahri.

12. Sweep efficiency in a laminar sand pack as a function of the mobility ratio by Mohd. Rashid b. Abd. Ghani.
13. Numerical reservoir simulation of a dipping solution gas drive reservoir for a two-phase, two-dimensional flow model by Ng Kin Seng.
14. A study of the data on the flow of fluid in pipes by Rai b. Muslim.
15. Current status of liquified natural gas transportation by Shubli b. Adnan.
16. A process of simulation; an example to solution gas drive reservoir solve using relaxation method by Wan Zakaria b. Wan Taib.
17. Numerical reservoir simulation two-phase (oil-water); two dimensional flow in a volumetric reservoir by Zainal b. Din.
18. Petroleum appraisal in the Mesozoic sediments, Kuantan area by Ahmad Dalimi b. Kaser.

AAH

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CALENDAR

A bracketed date, e.g. (Mar-Apr 1979), denotes entry in that issue carried additional information.

1981

Apr 8 - 10 : International Symposium on the Hellenic arc and trench (H.E.A.T.). Prof. S.S. Augusthithis, National Technical University, Department of Mineralogy-Petrography-Geology, 42, October 28th Street, Athens T.T. 147, Greece. (Sep-Oct 1980).

Apr 9 - 11 : SEATRAD Seminar on "Complex Tin Ores and Related Problems", Bandung, Indonesia. The Director, SEATRAD Centre, 14 Tiger Lane, Ipoh, Perak, Malaysia. (May-Jun 1980 & this issue).

Mar 29 - Apr 4 : International Conference on Arid Soils - Properties, Genersis and Management, Jerusalem, Israel. International Conference on Arid Soils, P.O. Box 3054, 122 Hayarkon St., Tel Aviv, Israel. (May-Jun 1979).

May : International Symposium on "Concept and Method in Palaeontology" Barcelona. Dr. Jordi Martinelli, Department de Paleontologia, Facultar de Geologia, Univ. Barcelona, Gran Via de las Corts Catalones, 585, Barcelona-7, Spain (May-Jun 1980).

May 13 - 15 : Industrial Minerals (Forum), Albuquerque, New Mexico, USA. (G.S. Austin, New Mexico Bureau of Mines & Mineral Resources, Campus Station, Socorro, N.M. 87801, USA. Tel. 505-835-5125).

May 18 - 22 : Fourth International Coral Reef Symposium, Manila, Philippines. Marine Sciences Center, Univ of Philippines, P.O. Box 1, Diliman, Quezon City, Philippines. (May-Jun 1980).

May 26 - 27 : Indonesian Petroleum Association - Tenth Annual Convention, Jakarta. Thomas A. Miller, Chairman Lecture

Committee, 10th Annual IPA Convention, P.O. Box 63/ JKT, Jakarta, Indonesia. (Sep-Oct 1980).

Jun 24 - 26 : ICAM 81 - International conference on Applied Mineralogy in the mineral industry, Johannesburg, South Africa. Pre- and post-conference field excursions. (L.F. Haughton, ICAM 81, Nat. Inst. for Metallurgy, Prive Bag X31Q5, Randburg, 2125, South Africa). (Jan-Feb 1980).

June : Groundwater '81. International conference and exhibition at the Hilton Hotel, Kuala Lumpur. The Technical Editor, Groundwater '81, P.O. Box 143, Chatswood, NSW 2067, Australia. (Sep-Oct 1980).

Aug : United Nationas Conference on New and Renewable Sources of Energy, Nairobi, Kenya. Information Officer, UN Conference on New & Renewable Sources of Energy, DESI/ DPI - Room 1072-C, United Nations, New York, NY 10017, USA. (Jul-Aug 1980).

Aug 7 - 16 : 4th International Conference on basement tectonics. (Conference with field excursions), Oslo, Norway. Major theme: origin, propagation and significance of basement fractures. (I.B. Ramberg, Dept. of Geology, University of Oslo, Box 1047, Blindern, Oslo, 3, Norway).

Aug 9 - 14 : Second international symposium of the Cambrian system, Golden, Colorado, USA. Sponsored by the Cambrian Subcommission of the IUGS Commission on Stratigraphy and the U.S. Geological Survey. (The Cambrian Symposium, Paleontology and Stratigraphy Branch, U.S. Geological Survey, Box 25046, Mail Stop 919, Denver Federal Center, Co. 80225, USA). (Nov-Dec 1980).

Aug 16 - 25 : XIIth Congress and General Assembly - International Union of Crystallography, Carleton University, Ottawa, Canada, Mr. Charbonnean, XIIth I.U. Cr. Congress, National Research Council of Canada, Ottawa, Ontario, Canada K1A OR6. (Jul-Aug 1980).

Sep 1 - 6 : Second International Conference, Graptolite working group for the Internationational Palaeontological Association, (Conference and field excursions), Cambridge, U.K. (P.R. Crowther, Dept. of Geology, University of Cambbridge, Sedgewick Museum, Downing Street, Cambridge CB2 3EQ, U.K.).

Sep 7 - 12 : 7th International Clay Conference, Bologna and Pavia, Itay. Conference with pre- and post-meeting field trips. (F. Veniale Istituto di Mineralogia e Petrografia, Universita di Pavia, Via Bassi 4, 27100 Pavia, Italy).

Oct 7 - 9 : ASEAN Council on Petroleum (Meeting), Manila, Philippines. (ASCOPE '81 Organizing Secretariat), Philippine National Oil Co., 7901 Makati Ave., Makati, Metro Manila, Philippines, Telex: 63667 PNOC PM).

Nov 18 - 23 : GEOSEA IV - Geology, Mineral and Energy Resources of Southeast Asia; Philippine International Convention

Center, Manila, Philippines. The Secretary, Geological Society of the Philippines, Bureau of Mines Bldg., Pedro Gil St., Malate, Manila, Philippines. (Jul-Aug. 1980.

Nov 23 - 26 : Asian Mining '81, Singapore. The Secretary, IMM, 44, Portland Place, London W1N 4BR, England. (May-Jun 1980).

1982

May 12 - 14 : 9th International Geochemical Exploration Symposium, Saskatoon, Canada. (L.A. Clark, Saskatchequan Mining Development Corp., 122 3rd Ave. North, Saskatoon, Sask., Canada S7K 2HG).

Aug 20 - 23 : IV International Symposium on the Ordovician System, Oslo, Norway. One pre-meeting excursion in Norway and three post-meeting e-cursions in Sweden. (D.L. Bruton, Paleontologisk Museum, Sars gate 1, Oslo, 5, Norway).

Aug 22 - 28 : Circum Pacific Energy and Mineral Resources Conference, Honolulu, Hawaii, USA. (M.T. Halbouty, 5100 Westheimer Road, Houston, Texas 77056, USA).

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PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Tujuan Persatuan Geologi Malaysia adalah untuk memajukan sains bumi, terutama sekali di Malaysia dan negara negara jiran. Barang siapa yang ingin menjadi ahli Persatuan adalah dipersilakan mendapatkan borang-borang daripada Setiausaha Kehormat.

The aim of the Geological Society of Malaysia is to promote the advancement of geological sciences particularly in Malaysia and the neighbouring countries. Anyone interested in becoming a member of the Society should obtain the necessary forms from the Hon. Secretary.

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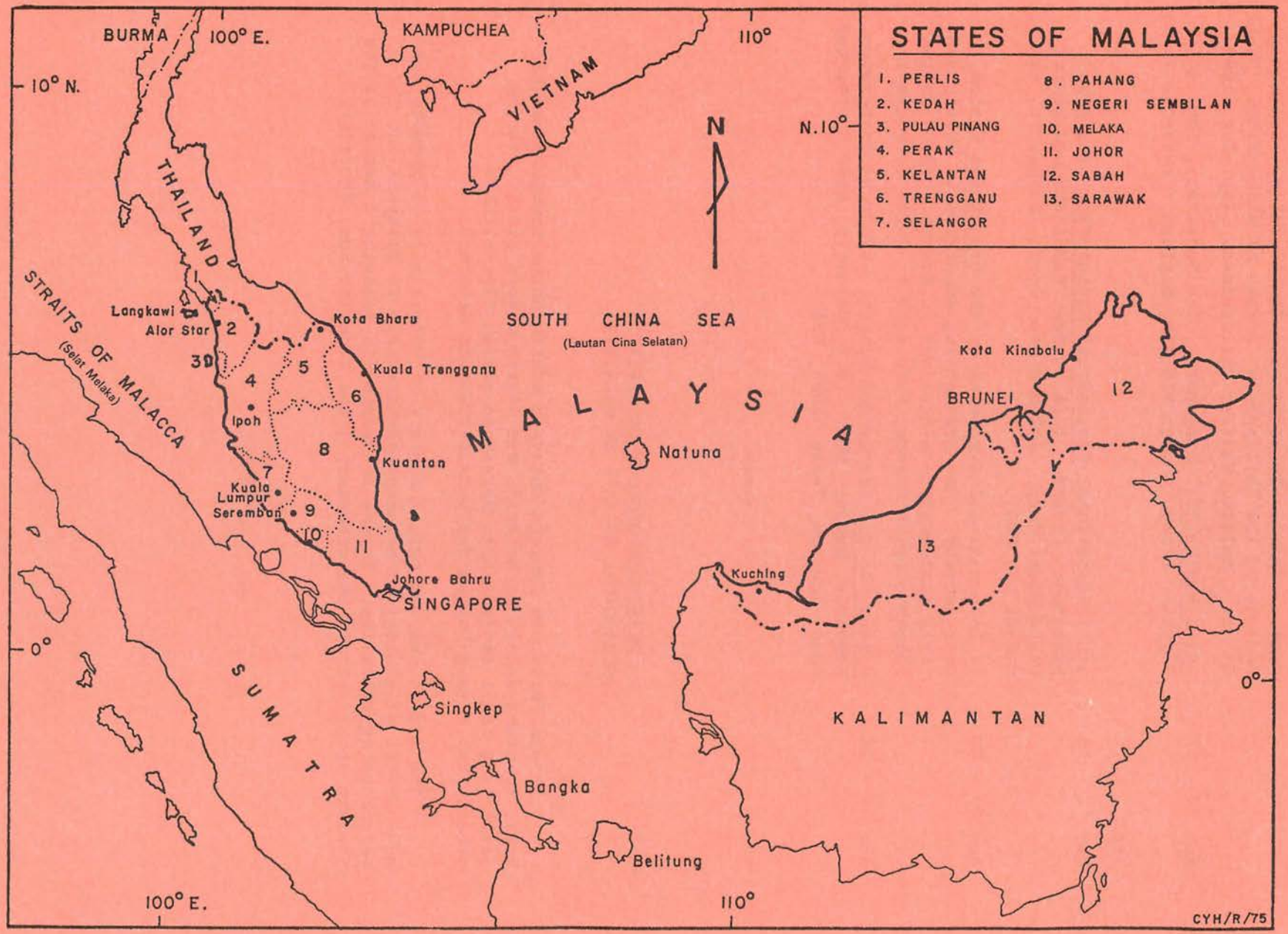
STATES OF MALAYSIA
1. PERLIS
2. KEDAH
3. PULAU PINANG
4. PERAK
5. KELANTAN
6. TRENGGANU
7. SELANGOR
8. PAHANG
9. NEGERI SEMBILAN
10. MELAKA
11. JOHOR
12. SABAH
13. SARAWAK
BURMA
KAMPUCHEA
VIETNAM
THAILAND
SOUTH CHINA SEA
(Lautan Cina Selatan)
MALAYSIA
STRAITS OF MALACCA
(Selat Melaka)
SUMATRA
KALIMANTAN
BRUNEI
SINGAPORE
Langkawi
Alor Star
Kota Bharu
Kuala Trengganu
Ipoh
Kuantan
Kuala Lumpur
Seremban
Johore Bahru
Natuna
Kota Kinabalu
Kuching
Singkep
Bangka
Belitung
10° N.
N.10°
100° E.
110°
0°
N
CYH/R/75