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CATATAN GEOLOGI (GEOLOGICAL NOTES)

A NOTE ON THE OCCURRENCE OF CLAY-ASSOCIATED DOLOMITE FROM OFFSHORE SABAH

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Abstract

Petrographic study of samples from the Tiga Papan well no. 2 (TP-2), offshore Sabah, shows the occurrence of euhedral dolomite crystals floating in the clay matrix of calcareous argillaceous sandstones. Textural evidence suggests that the dolomite was probably derived from clay during late-stage burial diagenesis. Clay-associated dolomite is quite well-known in the literature and have features which are similar to those observed in this example.

Introduction

During the course of petrographic examination of core samples of Tiga Papan well no. 2 (TP-2) which is located in the offshore Sabah Basin (Fig. 1), the author has come across an interesting observation. Thin sections of core chips show the occurrence of euhedral dolomite crystals dispersed within the clay matrix of calcareous argillaceous sandstones. This paper describes the occurrence of the dolomite and its probable origin and significance.

Lithological Framework

The TP-2 well penetrated a sequence of mainly marine sediments of Middle Miocene to Pliocene age, with a total depth of 2010 m. Core samples were obtained from within the interval between 1617.18 and 1786.85 m depth (Fig. 2). The sequence is made up of shallow marine sandy limestones, calcareous argillaceous sandstones and calcareous siltstones. The sandstones which form the bottom part of the cored interval are overlain by interbedded calcareous argillaceous sandstones and well cemented sandy limestones. Occurring at the top of the cored interval is a thick unit of calcareous siltstones. A high abundance of calcareous nannoplankton and planktonic foraminifera in these rocks indicates an open marine environment of deposition probably within the middle to outer subtidal zone.

The calcareous sandstones in which much of the clay-associated dolomite is found, are made up of medium to very fine grained sand (50%) and contain abundant carbonate grains (15%) and clay matrix (15%). The carbonate grains include planktonic foraminifera, mollusc shells, echinodermal and algal fragments. Carbonaceous material, glauconite and authigenic pyrite are common accessory minerals.

Diagenesis in the sandstones involved three stages of cementation: (i) syntaxial calcite overgrowths on carbonate grains, (ii) void-filling sparry calcite cement and (iii) poikilotopic ferroan calcite cement (Fig. 3).

Description of the Dolomite

Dolomite is observed in all samples studied. It occurs as:-

- I. rhombs (20-30 μ) 'floating' in the interstitial clay matrix; by far the most common mode of occurrence (Figs. 4, 5, 6).
- II. interlocking mass of euhedral to subhedral crystals which exhibits the typical sucrosic texture. This forms the dolosparite 'matrix' in some samples (Fig. 7).
- III. rhombs, occurring singly or in clusters, in the pore spaces of porous sandstones (Fig. 8).
- IV. isolated rhombs replacing ferroan calcite cement (Fig. 9). This is more rarely observed, but important since it shows that the dolomite was formed in late-stage diagenesis.

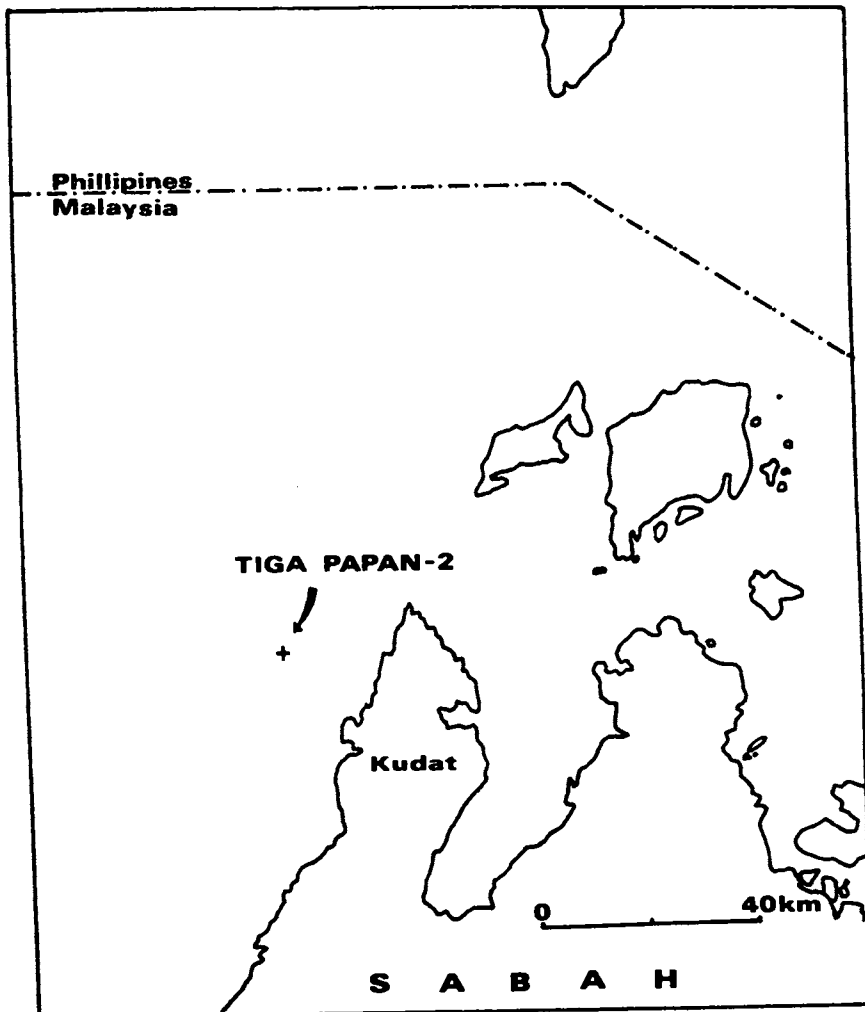


Fig. 1. Location of the Tiga Papan well no. 2.

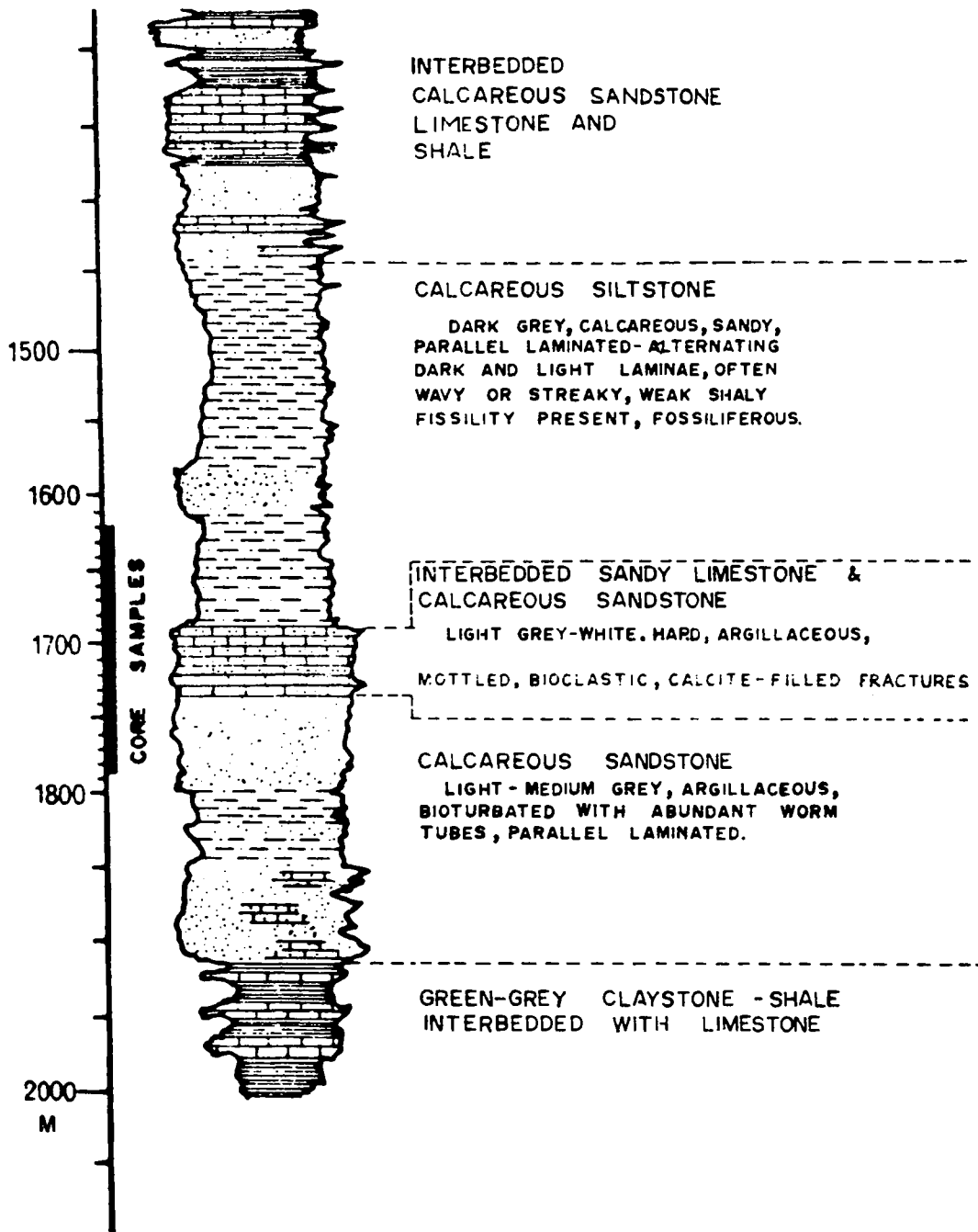
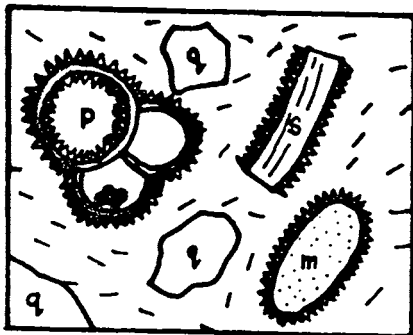
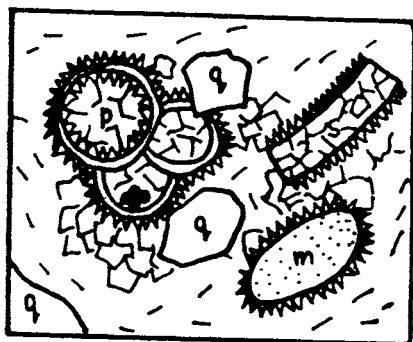


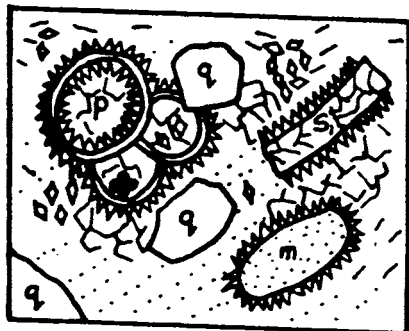
Fig. 2. Part of lithological sequence in TP-2 showing the position of the core samples.



- i) Early acicular calcite cement as syntaxial overgrowths on carbonate grains.
p - planktonic foram, s - shell fragment, m - micrite pellet, q - quartz grain, black spots - framboidal pyrite, dashed lines - clay matrix.



- ii) Compaction resulted in pressure solution and dissolution of carbonate grains. Subsequent precipitation of sparry calcite cement in voids and interstices.



- iii) Poikilotopic Fe-calcite cement in remaining pore spaces and partly replacing earlier-formed cements. Dolomite rhombs develop in clay matrix and calcite cement.

Fig. 3. Schematic representation of the main diagenetic textures in a typical TP-2 calcareous argillaceous sandstone.

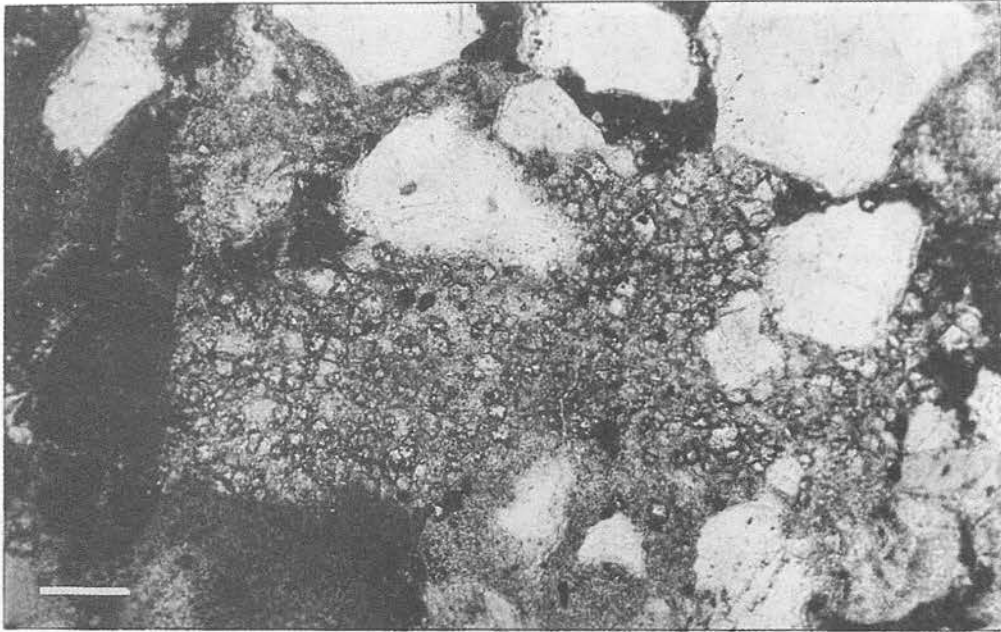


Fig. 4. Photomicrograph showing euhedral to subhedral dolomite crystals dispersed in clay matrix of calcareous argillaceous sandstone. The dark patches (left) are bioclasts. Scale bar 100 μ . Sample depth 1752.17 m, plane polarised light.

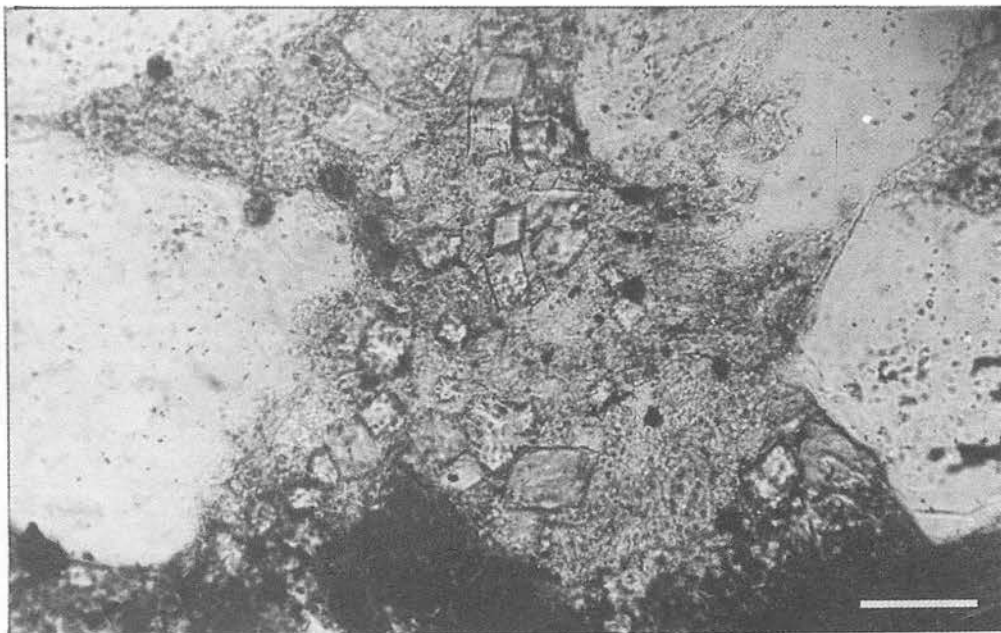


Fig. 5. Photomicrograph of well developed dolomite rhombs floating in clay matrix of sandstone. Note the variation in crystal size, representing progressive stages in crystal growth. Some rhombs show zoning. Ferroan calcite cement (dark areas) is also present. Scale bar 50 μ . Sample depth 1752.17 m, plane polarised light.

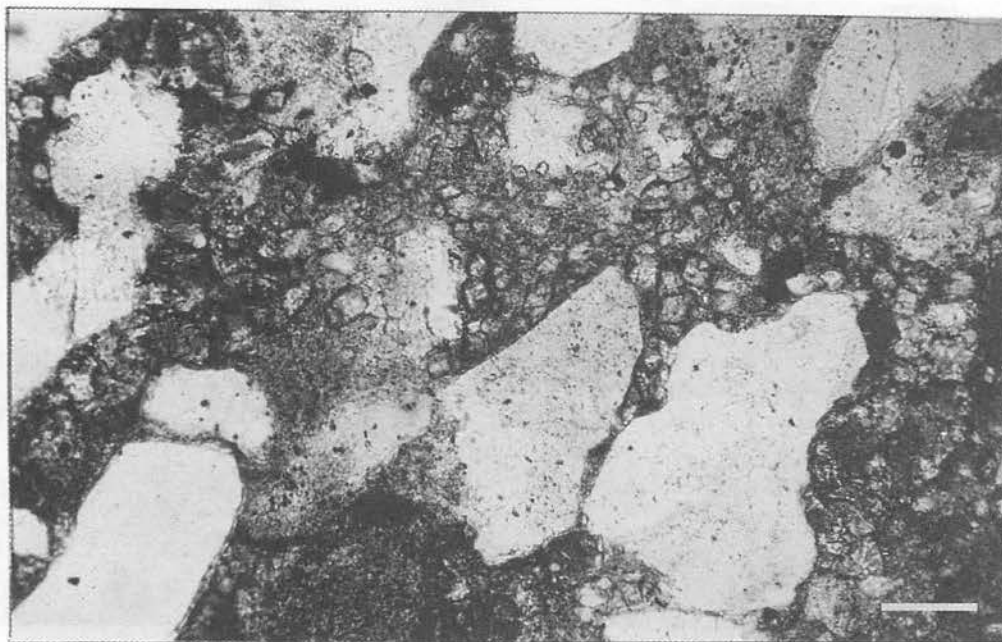


Fig. 6. Euhedral dolomite occurring in clay matrix of sandstone. Note the different sizes present. Scale bar 100 μ . Sample depth 1754.60 m, plane polarised light.

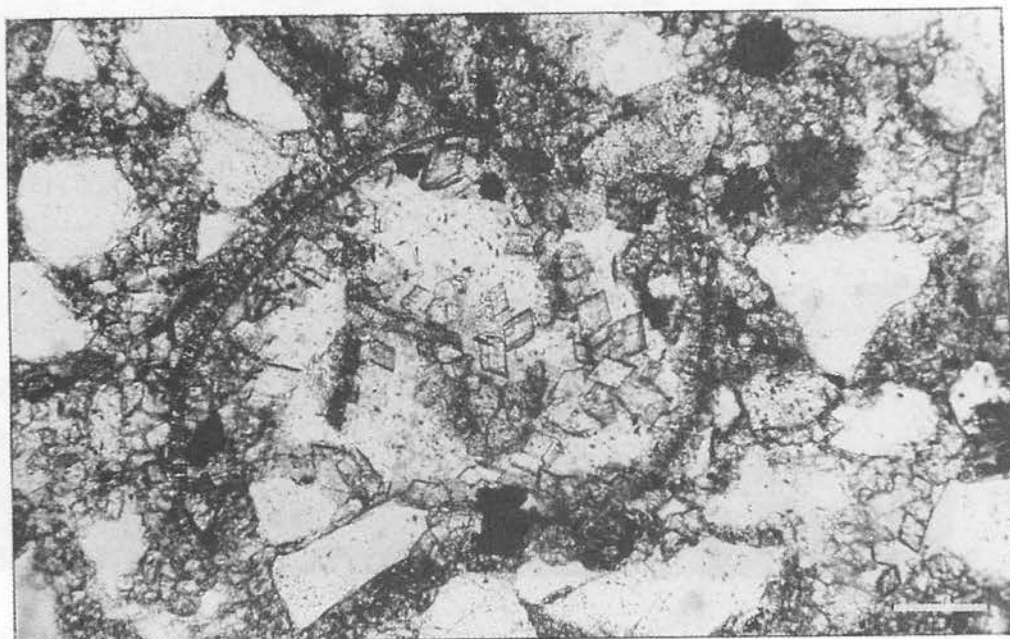


Fig. 7. This photomicrograph shows dolomite rhombs in the intraparticle (bioclast) pore space of a dolomitic argillaceous sandstone. Sucrosic dolomite forms the matrix in this sample. Scale bar 100 μ . Sample depth 1700.32 m, plane polarised light.

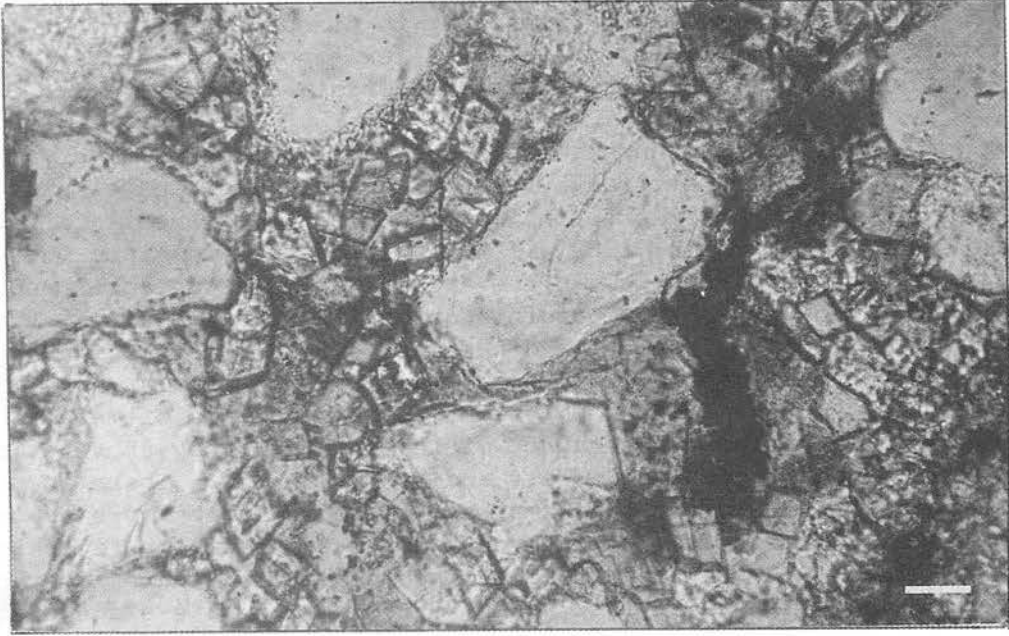


Fig. 8. Dolomite rhombs in the pore spaces of sandstone. The clay matrix could have been leached leaving the dolomite behind. The dark mineral is pyrite. Scale bar 25μ .
Sample depth 1700.32 m, plane polarised light.

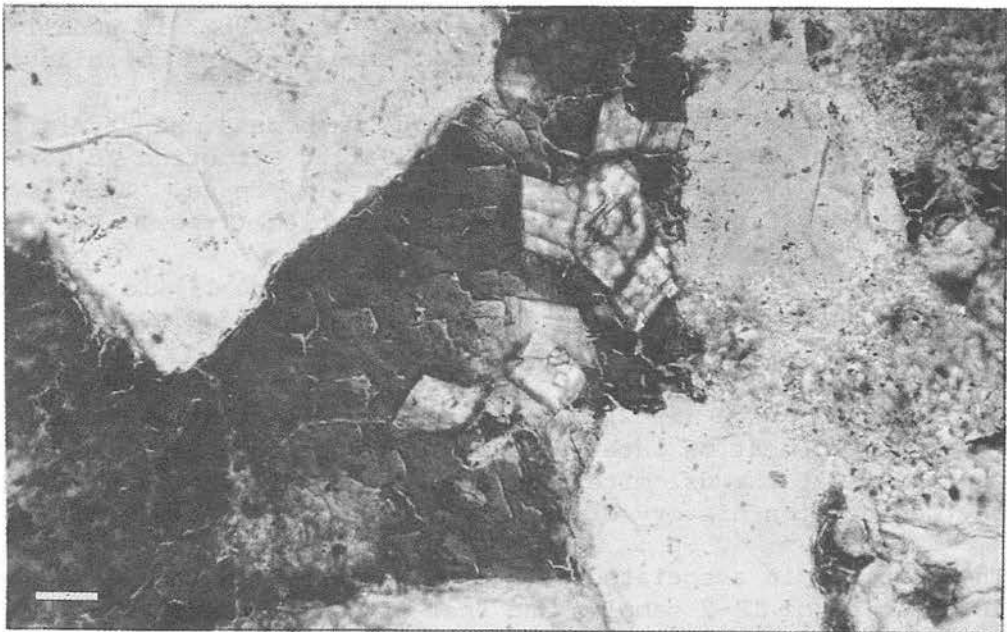


Fig. 9. Photomicrograph showing dolomite rhombs replacing ferroan calcite cement (dark area). Scale bar 50μ .
Sample depth 1754.6 m, plane polarised light.

Discussion

It is beyond the scope of this paper to discuss the theories on dolomitization. Nevertheless, there are a few important observations which may be of significance in understanding the origin of the dolomite in TP-2.

Since the dolomite occurs as well-developed rhombohedral crystals with no signs of abrasion, a detrital origin of the dolomite can be ruled out. The hypersaline model for the formation of penecontemporaneous dolomite (e.g. Patterson and Kinsman, 1982) is not applicable here since there is no evidence for evaporite deposits in the area. Mixing of meteoric and marine waters (Land, 1973) is another possible dolomitization process in the near-shore shallow marine environment and has been widely reported in both ancient and recent sediments (Ward and Halley, 1985; Baum *et al.*, 1985; Magaritz *et al.*, 1980). This model requires the presence of meteoric water probably during a period of emergence of the sediment body above or near sea level, or lowering of sea level (Ward and Halley, 1985). There is no evidence for such an environment from the samples examined. Furthermore dolomite formed by such a process typically occurs as an early diagenetic phase (Kaldi & Gidman, 1982) but for reasons discussed below, there is strong evidence for the dolomite in TP-2 being formed during late-stage diagenesis.

The widespread occurrence of dolomite in close association with clay matrix strongly suggests that the dolomite could have been derived from the clay matrix. Examples of clay-derived dolomite have been described by McHargue and Price (1982) from mainly the Pennsylvanian (Upper Carboniferous) and Devonian rocks of several localities in mid-continent U.S.A., where the dolomite occurs in carbonates in contact with marine shales (Fig. 3 in McHargue and Price, 1982). Although these examples are from much older rocks which were probably formed in a slightly different environment (they are limestones interbedded with shales), the following important features described by McHargue and Price are observed in TP-2 samples.

- (i) The dolomite described by McHargue and Price (1982) is usually ferroan. The TP-2 samples, after staining also show that the dolomite is ferroan.
- (ii) Dolomite rhombs 'float' in argillaceous carbonate mud matrix in the samples from the Upper Devonian Cedar Valley Formation in Iowa and the Middle Pennsylvanian Fort Scott Limestone in Kansas. This is also the most striking feature seen in the TP-2 samples (Type I, Fig. 5).
- (iii) The presence of void-filling dolomite spar (Type II) is observed both in TP-2 and the samples from the Pennsylvanian of U.S.A.
- (iv) The late diagenetic phase of dolomite formation as interpreted by McHargue and Price (1982) is also reflected in the TP-2 samples: minor replacement of late-stage ferroan calcite cement (as in Type IV) suggests that the dolomite formed as a late diagenetic phase during the cementation history of the rocks (Fig. 9).
- (v) The dolomite is associated with clay deposited in the marine environment in the case of TP-2 samples and that of McHargue and Price.
- (vi) The close association between the clay and dolomite is observed both in TP-2 and in the samples from U.S.A. The dolomite occurrence in TP-2 appears to correspond with the amount of clay matrix; dolomite is most abundant in argillaceous sandstones.

McHargue and Price (1982) emphasized that the ferroan dolomites associated with clay are formed during late-stage burial. The evidence for post-compactional late-stage diagenesis is clearly shown by the occurrence of dolomite rhombs replacing poikilotopic ferroan calcite cement. The latter is clearly a late diagenetic phase which fills up the intergranular spaces of the sandstones (Fig. 3).

Compaction in TP-2 is shown by broken shell fragments, deformed clay clasts and pressure solution between quartz grains and skeletal carbonate grains. This could have at least in part contributed to the dissipation of carbonate ions into the pore fluids. The TP-2 samples also contain abundant authigenic pyrite and detrital organic matter. This suggests a reducing diagenetic environment conducive for dolomite to form.

McHargue and Price (1982) noted the importance of burial diagenesis of clay involving the smectite-illite conversion in releasing cations like Fe^{2+} and Mg^{2+} for late-stage post-compactional dolomites. The process could have played an important role in the formation of the dolomite observed in TP-2 but some important points have to be considered. The types of clay present in the TP-2 samples, the volumes of clay and dolomite and their relationship with lithology and depth are some of the important features which need further studies. Examination of samples from adjacent wells in the area may also provide useful data on the spatial distribution of the dolomite.

According to McHargue and Price (1982), clay-derived dolomite reduces effective porosity. If this is indeed the case, prediction of its distribution may prove useful in exploration for hydrocarbon in this area. Further studies in this aspect are also needed.

Conclusion

The dolomite in TP-2 calcareous sandstones occurs in close association with clay matrix and is interpreted as being derived from the clay matrix during late-stage burial diagenesis. This dolomite occurrence most probably represents dolomitization from clay, as described by McHargue and Price (1982).

This paper is only a beginning of a study on this subject. Detailed work is in progress.

Acknowledgements

My sincere thanks to Mr. V.V. Sastri who critically read the manuscript, and to PETRONAS for permission to publish. I am also grateful to Dr. Surinder Singh, Manager Laboratory Services Department of PETRONAS, for his comments.

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Manuscript received: 15 May 1986

RADIOCARBON AGE OF A 410-METRE HIGH REEF FLAT AT LUWUK, SULAWESI

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Raised coralline reef terraces rise stepwise from present sea-level to elevations exceeding 400 metres in the vicinity of Luwuk on the east arm of Sulawesi, Indonesia. The terrace risers range in height from several metres to a couple tens of metres. Figures 1 and 2 show the morphology of the Luwuk region.

In May 1985, a study of these terraces that included levelling using a Brunton compass and sampling datable material, mostly upright standing fossil coral colonies, was carried out. The highest terrace was determined at circa 410 m above mean sea level. This high surface consists of very gently rolling topography with a maximum relief of 3 metres. Shrubs and grass form the natural cover. Black, clayey soil represents a weathering product of the coralline limestone that protrudes as small knolls above the level clayey surface. A fresh-looking specimen of the limestone (field designation is Luwuk-6) was collected; some of its finer pores contain redeposited crystalline calcite that was removed in the laboratory when preparing the sample for dating. An unpublished regional field map drawn by geologists of the Geological Research and Development Centre at Bandung classifies this limestone as Quaternary reef deposits to which no formal name has been assigned. The eastern arm of Sulawesi is also characterised by the extensive occurrence of ultramafic and mafic rocks that have been interpreted to represent obducted oceanic material of Cretaceous age. Many earthquake epicentres are located there. The entire eastern arm forms part of the Vening Meinesz belt of strongly negative, isostatic gravity anomaly. The geomorphology, geology and geophysics of the region are consistent with those associated with tectonically active plate margins.

Through the kind intervention of Dr. M. Barbetti, the N.W.G. Macintosh Centre for Quaternary Dating of the University of Sydney determined the conventional radiocarbon age of sample Luwuk-6 (NWGH Centre redesignation SUA-2399) as 35,000 \pm 400 yr B.P.

On the Late Cenozoic sea-level curve proposed by Bloom *et al.* (1974), 35 to 36 kiloyears ago sea-level was probably 50 m below present datum. The 410-m high reef flat of Luwuk has experienced an average rate of uplift of 12.9 mm/year. This rate is consistent with the higher rates of tectonic uplift recorded for two other localities of similar geological setting, that is, the Tukangbesi islands in southwest Sulawesi and Selu island of the Tanimbar group (see summary in Tjia, 1981, p. 90).

The step-like morphology of the coral terraces near Luwuk suggests that uplift has been of episodic character. Recorded throws on surface faults by single-event earthquakes are only about 10 metres, and the average is less than half of this value for very strong earthquakes (magnitude of 6.5 and

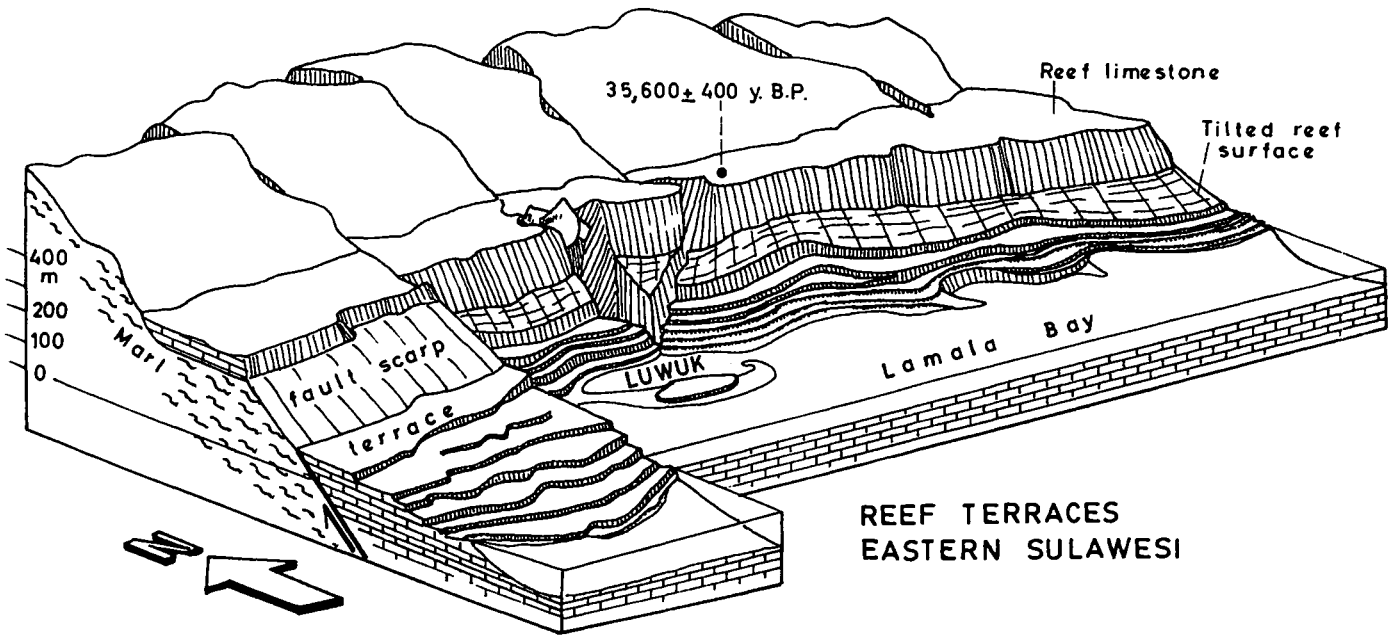


Fig. 1. Reef-terrace morphology in the vicinity of Luwuk, eastern Sulawesi. Note left-lateral offset by a north-striking fault.

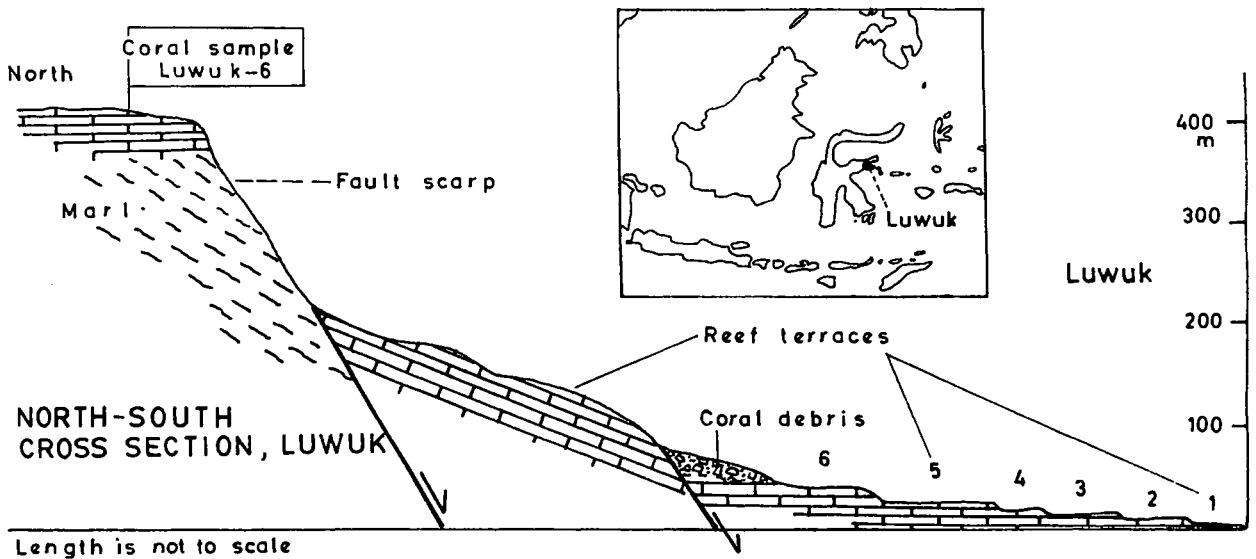


Fig. 2. North-south cross section across reef terraces at Luwuk. Large-scale normal faulting took place before terraces 6-1 developed. Inset is an index map.

and more). Many studies on this phenomenon have been carried out in Japan (see Research Group for Active Faults, 1980; Yoshikawa *et al.*, 1981).

If we accept that terrace uplift has been episodic and that very strong earthquakes have produced throws of less than 10 m, the spectacular terrace morphology of eastern Sulawesi (Figs. 1 and 2) appears to represent the result of many, high-magnitude earthquakes that occurred during the past 35 thousand years.

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2. Mineral distribution study for cassiterite and associated heavy minerals in Phuket, Thailand by Jaturong Praditwan, 1985.
3. Evaluation of tin and tantalum in tin shed products of Lun Sang Mine, Trang, Thailand by Kit Watanavorakitkul, 1986.
4. Evaluation of tin and columbium-tantalum in tin shed products of Patana Muang Rae tin mine, Kanchanaburi, Thailand by Kit Watanavorakitkul, 1986.
5. Chronique de la recherche miniere, no. 483, 1986.
6. Seatrad Bulletin, Vol. VII, no. 1, 1986.
7. Geological Survey of India, News, Vol. 16, no. 6, 1985 & Vol. 17, no. 1, 1986.
8. Annales Academiae Scientiarum Fennicae, no. 140, 1986.
9. Episodes, Vol. 9, no. 2, 1986.
10. Institution of the Mining & Metallurgy, Transactions, Section A, Vol. 95, April 1986.
11. Geology of the Panxi region, Sichuan Province, SW China.
12. Jurutera Galian, nos. 21 & 22, 1986.

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15. Geological Report of the Hiroshima University, no. 26, 1986.
16. Adult Reference Collections, accessions list, May-July, 1986.
17. Bulletin of the National Science Museum Vol. 11, no. 4, & 985 & Vol. 12, no. 1, 1986.
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23. Bulletin Science & Technology Malaysia, Vol. 5, no. 1, 1986.
24. Commonwealth Science Council, Newsletter, May-June 1986.

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5. Jasni Yaakub - Geologi Kawasan Kampung Kaung, Tamparuli, Sabah.
6. Ong Chu Yin - Geologi Kawasan Tenggara Ranau, Sabah.
7. Nik Suhaimi Nik Othman - Geologi Kawasan Batu Gajah, Perak.
8. Mohamad Basir Yusoff - Geologi Kawasan Barat Kuala Lipis Pahang Darulmakmur.
9. Ang Hock Seng - Geologi Kawasan Barat Ranau, Sabah.
10. Abdul Halim Yusof - Geologi Sepanjang Lebuhraya Dada Kering-Merapuh, Pahang Darulmakmur.
11. V. Srimugayogam - Geologi Am Kawasan Chemor-Kuala Kangsar, Perak.
12. Punniamoorthy Sullathurai - Geologi Am Kawasan Ipoh-Batu Gajah, Perak.
13. Abdul Jailani Che Johari - Geologi Kawasan Nenggiri, Kelantan.
14. Wong Chong Lin - Geologi Kawasan Genting Peras, Negeri Sembilan.
15. Choi Weng Hon - Geologi Kawasan Johol (Selatan Syit 104 dan Utara Syit 113), Kuala Pilah, Negeri Sembilan.
16. Koay Leong Thye - Geologi Kawasan Selatan Kuala Pilah, Negeri Sembilan Dengan Aspek-aspek Geologi Kejuruteraan.
17. Izman Hamid - Geologi Kawasan Barat Gambang Kuantan, Pahang Darulmakmur.
18. Shamsudin Jirin - Geologi dan Geofizik Kawasan Lanchang, Pahang.
19. Inbashekar Mariappen - Geologi Kawasan Ipoh-Chemor, Perak.
20. Abu Zarim Ismail - Geologi Kawasan Kemubu-Bertam, Ulu Kelantan, Kelantan.
21. Mazlan Md. Dewa - Geologi Sepanjang Jalanraya Selangau-Mukah, Sarawak.

QUOTABLE QUOTES: (Smile)

1. *"When I see a cavity, I only think of how to fill it up. You think about how it is formed and its history. You geologists belong to the past; we engineers belong to the future!"*

A German contractor talking about cavity problems in Kuala Lumpur.

2. *"The rocks have feelings. You must listen to them and talk to them!"*

A French geologist on rock slope stability at a damsite in Perak.

(Author's footnote: There is such a thing called micro-seismic activities where micro-seismic noises in rocks are "listened" to to monitor and forewarn of impending instability in rock slopes or underground structures.)

3. *"To be a successful engineering geologist, you have to talk like an engineer when you are with geologists, and talk like a geologist when in the company of engineers!"*

A successful British Consulting Engineering Geologist.

(Author's footnote: Sounds simplistic. The catch is, you would first have to master the two different languages - geology & engineering.)

Tan Boon Kong

UM GRADUATE AWARDED ICI SCHOLARSHIP

Miss Sriyane De Silva, who will be receiving her degree at the University of Malaya convocation in August this year has done the nation proud by winning the coveted ICI Scholarship to Oxford University.

Miss De Silva, 23, a student member of the Society who recently topped her class with a First Class Honours degree in Geology, is one of six overseas students awarded the scholarship. Together with the successful candidates from Hong Kong, Brazil, Mexico, Pakistan and Japan, she will enter Oxford University for the 1986/87 academic year. She will be at St. Peter's College for three years, during which she will study for her Masters and Doctorate in Geology.



Dr. J.D. Rushton, Chairman of the ICI Group of Companies, congratulating Miss De Silva.

NEW BOOKS & MAPS

The Geology of China

by

Yang Zunyi, Cheng Yuqi & Wang Hongzhen.

Oxford Monographs on Geology & Geophysics No. 3.

Clarendon Press, Oxford, 1986.

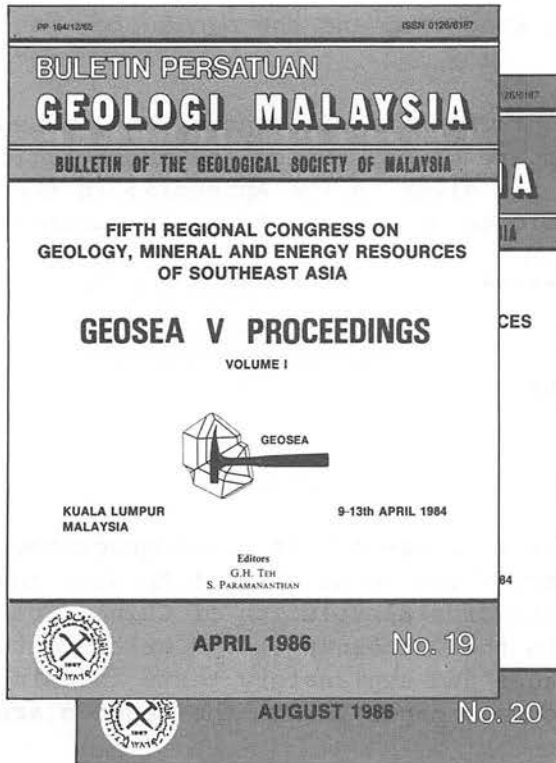
Handcover, 303 p, £55.

This volume is written with the object of providing an up-to-date survey of the geology of China on the basis of numerous publications and unpublished papers that have appeared since the founding of the People's Republic of China. Four and a half decades have elapsed since *The geology of China* by the late Professor Li Siguang (J.S. Lee) was published in 1939. Although a comprehensive survey of the geology of China is now in preparation elsewhere, the present work, the second attempt to introduce the subject in a foreign language, should prove to be useful to readers.

In this volume Chinese names are spelt throughout according to the Pinyin system, although some authors would retain the old Wade spelling for stratigraphical names; for instance, Chihsia Formation instead of Qixia Formation, and Shihhotse Formation instead of Shihezi Formation. The stratigraphical names in both the Pinyin and Wade systems are given in the index for the benefit of readers familiar with the old spelling. Also, place names of minority nationalities are spelt in accordance with the usage of the Cartographic Publishing House (Beijing), e.g. Alxa instead of Alashan, Qamdo instead of Changdu; and, when they are not available, they are transliterated in Hanyu Pinyin.

GEOLOGICAL SOCIETY OF MALAYSIA
GEOSEA V PROCEEDINGS

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



Some of the articles appearing include:-

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

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

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

Date:

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

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Regional stratigraphical tables of various regions and provinces and simplified stratigraphical correlation tables published independently by the Geological Publishing House (Beijing) and Science Press (Beijing) form the indispensable basic information for the authors. They are listed in the selected references, though they are not specifically mentioned in the text. All the sketch maps showing rock distribution and stratigraphical regions except the Sinian and the earlier ones are reproduced with minor changes by permission of the authors concerned and the Geological Publishing House.

The literature on the geology of China is voluminous, but, as space is limited, only selected references are given. Names and abbreviations of isotopic age-dating institutions are given in the Appendix; in the text the isotopic datings are usually followed by abbreviations in parentheses.

Atlas of The Palaeogeography of China
Chief Compiler,
Wang Hongzhen.

This is the first comprehensive treatise of the palaeogeography of China since the middle of the fifties, which is an attempt to show the palaeogeographical development and the crustal evolution of China from the Middle Proterozoic (ca 1850 my BP) to the Quaternary. The Atlas contains 123 coloured plates in 143 octavo pages and explanatory texts in Chinese (ca 200,000 words) and English (20 octavo pages). All the legends are in both Chinese and English.

The guiding thought in compiling the Atlas, consists in the doctrines of "Mobilism" in regard to global tectonics and of "Development Stages" in regard to crustal evolution. Accordingly, five Tectonic Domains are recognized in China and five Megastages in its geologic history. No attempt is made to restore the original position of the various continental massives in geologic times, but the important crustal consumption zones between the tectonic domains and the time of their termination are indicated on the maps.

The main contents comprise the palaeogeographic (mostly 1:12,000,000) palaeotectonic (1:18,000,000), palaeobiogeographic, palaeoclimatic maps, columnar stratigraphic sections and sedimentational as well tectonic profiles, etc. A geotectonic outline map (1:18,000,000) and serial profiles showing possible continental motions in various stages are also included.

Locality names of data material used in the maps and stratigraphic unit names that appear in the sections are included in the appendices for convenience of reference.

Price: US\$155.00

Published by: The Cartographic Publishing
House, Beijing,
China.

Distributed by: Export Department,
China National Publications Import & Export
Corporation,
P.O. Box 88,
137 Chao Nei Street,
Beijing,
China.

Metallogenetic Map of Endogenic Ore Deposits of China
(1:4,000,000) (English and Chinese Versions)

This map is a professional map including important ore deposits across the whole country of China first published to the world. The materials gathered for metallogenetic compilation are the up-to-date results and first hand observations of geological survey and mineral prospecting and exploration as well as the achievements of studies on regional geology and ore deposits. The Geotectonic Map of China (1977) compiled by Ren Jishun *et al.* under the guidance of Professor Huang Jiqing was adopted as the base map and properly further revised by the panel. A total of 624 endogenic ore deposits including twelve important metals as Fe, Cr, Ni, W, Sn, Mo, Cu, Pb, Zn, Sb, Hg and Au are displayed on the map. They are plotted in different marks and colours to represent different metals, types of deposits, forms of ore bodies and metallization epochs. The time-space evolution of the metallogeny of the endogenic ore deposits are approached with the view-point of development of geological history. Based on the geological settings and the regularities of time-space evolution, three metallogenetic megaprovinces, some metallogenetic provinces and sixty-six metallogenetic belts (or regions) are regionalized in the map.

The map is rich in content, beautiful in tint, rational in arrangement and clear in sequence.

To explain the content of the map more in detail, a Guide to the Metallogenetic Map of Endogenic Ore Deposits of China was written in both Chinese and English and is going with the map for publication. The guide (about 70,000 Chinese characters and 250,000 English marks) is composed of seven chapters i.e. (1) Introduction; (2) Basic principles and content of map-compilation; (3) Classification of the endogenic ore deposits of China; (4) Major conditions for deposition of endogenic ores; (5) Division of metallogenetic megaprovince, province and belt (region); (6) Some regularities of metallogenesis; and (7) Problems remained. The guide is the first attempt to comprehensively and systematically generalize the metallogenetic regularities of the endogenic ore deposits of twelve kinds of metals across the country. Being at the tri-junction of the Pal-Asian, the Marginal Pacific and the Tethys-Himalayan metallogenetic megaprovinces. China is quite rich in mineral resources and characterized by the presence of all genetic types of endogenic ore deposits, especially abundant in various ores within the marginal Pacific terrain. Therefore, the Marginal Pacific Megaprovince is not only a major terrain of ore deposits for China but also an important section in the Circum Pacific Metallogenetic Zone for the whole world. Hence, the publication of this map will not only shed light on the metallogenetic theory of China but also promote the research of the metallogenetic regularities of the Circum Pacific Metallogenetic Zone.

The map will be of significance to the strategic deployment of mineral prospecting, the scientific research and geological education in China, in Asia and even in the world.

Published by: The Chinese Cartograph Publishing House,
Beijing,
China.

Distributed by: Export Department of China National Publications
Import & Export Corporation,
P.O. Box 88,
137 Chao Nei Street,
Beijing,
China.

(Scale: 1:4,000,000; Price: US\$65.00)

Mining Techniques for Alluvial Tin Deposits

Editors: Abdullah Hasbi bin Haji Hassan and G.R. Wallwork

1985. 572 pages

Hard cover M\$60.00 or US\$35

ISBN 967-9962-01-6

In the Southeast Asian context in mining alluvial deposits, two major methods figure significantly namely, dredging and gravel pumping. This volume reviews these mining techniques and focus attention on new innovations and modifications which reflect the proceedings of the International Seminar on Mining Techniques for Alluvial Tin Deposits held at Ipoh, Malaysia from 8-11 October 1984.

In the first part of the book which deals with dredging, it became clear that the Southeast Asian tin dredging industry is facing a number of problems. On existing dredges the main problems are associated with wear, deformation and failure, and effects of these on capacity, production, power consumption and ultimately, cost. For the dredges of the future, the main problems are associated with the need to increase their capacity and to dig for deeper deposits. The participants are generally in agreement that there is an urgent need for research and development work to be carried out to solve the problems, and many are of the opinion that the various tin dredging companies should co-operate with each other. A proposal is made for the formation of the Southeast Asian tin dredging association to manage, co-ordinate and promote research on dredging.

With regard to gravel pumping, problems are concerned mainly with high operating cost due to the high cost of energy, machinery and spare parts. These are coupled with other associated problems including mine safety and the depletion of higher grade tin reserves. Here again it is recognized that there is a need for a concerted research effort in order to solve the

problems. In this instance however, research work would not require massive amount of funding and SEATRAD Centre, with co-operation of various national organizations in the member countries, is already carrying out meaningful research work in order to solve some of the problems. It is also encouraging to note that some practising miners are using their ingenuity in efforts to cut costs, and this is pointed out in some of the papers presented at the seminar.

This book presents an informative picture of the present methods of alluvial mining and should interest geologists, miners, mining engineers and academicians in the field.

Tectonostratigraphic Terranes of the Circum-Pacific Region
Edited by David. G. Howell
Earth Science Series, Number 1

Contents:

- a) Principles and Applications of Terrane Analysis
- b) Tectonostratigraphic Terranes, Pacific Northeast Quadrant
- c) Tectonostratigraphic Terranes, Pacific Northwest Quadrant
- d) Tectonostratigraphic Terranes, Pacific Southwest Quadrant
- e) Principles and Applications of Terrane Analysis
- f) Tectonostratigraphic Terranes, Pacific Northeast Quadrant
- g) Tectonostratigraphic Terranes, Pacific Northwest Quadrant
- h) Tectonostratigraphic Terranes, Pacific Southwest Quadrant
 - i) Suspect Terranes and Cambrian Tectonics in northern Victoria Land, Antarctica
 - J.D. Bradshaw, S.D. Weaver, M.G. Laird.
 - ii) Accretion and Dispersal Tectonics of the Southern New England Fold Belt, Eastern Australia.
 - Peter Cawood, Evan Leitch
 - iii) Suspect terranes in the Tasman Fold belt System, Eastern Australia.
 - Erwin Scheibner
 - iv) Provisional Terrane Map of the South Island, New Zealand.
 - D.G. Bishop, J.D. Bradshaw, C.A. Landis
 - v) The Relationship between the Tectonic Evolution of Southeast Asia and Hydrocarbon Occurrences
 - A.J. Barker
 - vi) Continental Terranes in Southeast Asia: Pieces of Which Puzzle?
 - Peter Stauffer

This exceptional 585-page volume discusses the circum-Pacific region as a rim of terrane accretion. It outlines the distribution and composition of terranes (as well as the processes of accretion and dispersion), allowing a better evaluation of resource potential for the circum-Pacific area. Included with this hard bound book is a folded copy of a total-basin map of the same name (the map is available separately for \$12 as Catalog: 858).

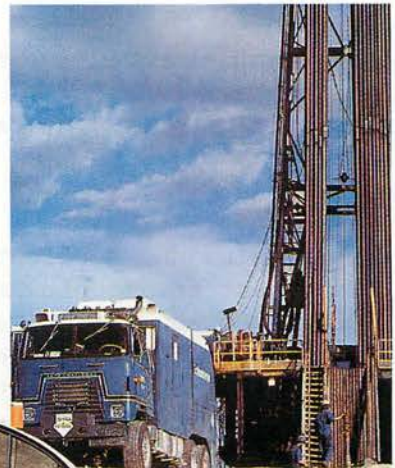
One Price: \$32/Catalog: 826

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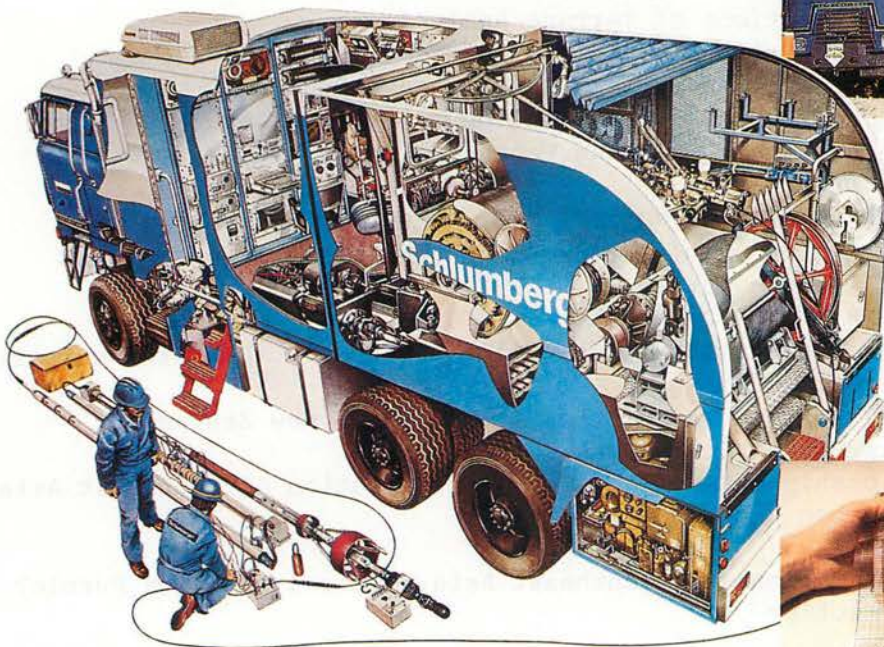
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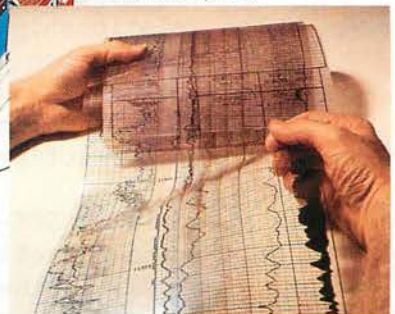


Cyber Service Unit on location.



Schlumberger crew checking a logging tool.

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



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EXPLORATION AND EVALUATION TECHNIQUES

IGCP PROJECT 220, CORRELATION AND RESOURCE EVALUATION OF TIN/ TUNGSTEN GRANITES IN SE ASIA AND THE WESTERN PACIFIC REGION

- MEETING OF WORKING GROUP 5 (SECOND AND FINAL CIRCULAR)

8 - 10 September 1986

To be held at Ipoh, Malaysia.

The Southeast Asia Tin Research and Development (SEATRAD) Centre with assistance and co-operation of the Geological Survey of Malaysia will be organizing a seminar on exploration techniques for tin/tungsten granites in SE Asia and the Western Pacific Region which will be held at the Royal Casuarina Hotel, Ipoh on 8-10 September 1986.

This seminar is the third in a series of IGCP sponsored seminars under the project on correlation and resource evaluation of tin/tungsten granites in Southeast Asia and the Western Pacific region.

Objectives

The aim of the meeting is to provide a forum for geologists in the region as well as experts from developed countries to exchange their knowledge and experience in the exploration and evaluation of tin/tungsten deposits.

Topics

Topics covered by general theme on which papers are invited are:

1. Geological characteristics
2. Metallogenic models of ore deposits and ore provinces
3. Exploration strategies and analytical methods
4. Remote sensing techniques
5. Exploration costs

Papers

The full text of papers should be submitted to the Convenor of Working Group 5 before 31 July 1986.

Participants

All interested participants are invited to attend. Each person wishing to attend the seminar should fill in the attached registration form and send it together with the registration fee to SEATRAD Centre.

Registration Fee

The registration fee for the seminar for participants is M\$200.00 and authors is M\$100.00 each. Payment of the fee will entitle registrants to:

- receive a volume of preprint papers covering the seminar topics
- attend the seminar sessions
- lunches during the three-day sessions
- tea/coffee during the breaks and
- field trip (transport is provided)

Payment should be made in bank draft in Malaysian Ringgit, payable to SEATRAD Centre. Please use one registration form per participant only. Photocopied forms for additional participants are acceptable.

In the event of a participant who wishes to cancel his registration for some reason or other, 50% of the registration fee paid will be refunded provided the cancellation is made before 31 July 1986. No reimbursement will be made for cancellations after 31 July 1986.

Field Trip

A one-day field trip to primary tin/tungsten deposits around Ipoh will be organized for interested participants on 10 September 1986. Transportation will be provided.

Accommodation

Since the seminar will be held at the Royal Casuarina Hotel, arrangements for accommodation at the hotel will be made for interested participants at the following special rates:

Single Room: M\$80.00 (nett)
Double Room: M\$80.00 (nett)

Transport

If you require transportation from the Ipoh airport to the hotel, please inform the organizing committee well in advance of your arrival.

Further Information:

The Director Southeast Asia Tin Research and Development (SEATRAD) Centre,
Tiger Lane,
31400 Ipoh,
Malaysia.

Telex: TINRDC MA44380 Tel.: (05) 559366
Cable: TINCENTRE, IPOH

FIRST CONFERENCE ON GEOLOGY OF INDOCHINA

Date: 5-7 December 1986.
Venue: Ho Chi Minh City, Vietnam.
Organized by: General Department of Geology of Vietnam.
In collaboration with: Geological Society of Vietnam.

This is the Second and Final Circular of the CGI-1. The Organizing Committee is pleased to inform that many papers have been received from Vietnamese and foreign geoscientists in response to the First Circular.

Language

English, French, Russian and Vietnamese will be official languages of the Conference. Anyhow, participants are encouraged to present their papers in English.

Papers and Presentation

Full paper not exceeding 6,000 words including abstracts of 200-300 words to be submitted to the Conference Secretariat before June, 1986 for selection and publication in the Conference Proceedings. The author is fully responsible for the scientific content of his paper. Figures of paper for presentation must be prepared under the form of 3 x 4 cm slides and transparencies. Time allowed for presentation of each paper is 20 minutes plus 5 minutes for questions and answers.

Transport

Foreign participants will be met at Ho Chi Minh City International Airport by CGI-1 representatives and accompanied to hotels in town.

At Hanoi International Airport, participants will also be met by CGI-1 representatives who will be responsible for arrangement of hotel accommodation and connecting flight to Ho Chi Minh City.

Passport and Visa

Participants from countries having diplomatic relations with Vietnam will apply for entry visa at the Vietnamese Embassies. Others can obtain visa at the Vietnamese Embassy in Thailand, Bangkok with one-month notice to CGI-1 Secretariat.

Registration Fees

Participating member US\$100.
Accompanying member US\$50.

Contact Address

CGI-1 Secretariat,
General Department of Geology,
6, Pham Ngu Lao St.,
Hanoi,
VIETNAM.

Seminar Course

Organizations inside and outside Vietnam are requested for their financial support to the Pre-Conference Seminar/Course. The support is under the form of providing airfare, accommodation, etc for the participants mostly from the developing countries. Participants who wish to receive support are requested to indicate in their registration. After consultation with the donor and national body of participant's country, the Organizing Committee will inform the participants about the form of assistance.

1. Small Scale Mining and Geological Exploration Seminar

Organizer: Department of Mineral Resources Management, General Department of Geology, Vietnam.
Supported by: Centre D'etudes Superieures Des Matieres Premieres, France (CESTMAT).
Coal Mining Enterprise N-917, General Department, Geology, Vietnam.
Chairmen: Prof. Dr. Jean Claude Samama, France.
Nguyen Tien Phuong, Vietnam.
Date: 1-4 December, 1986.
Venue: Ho Chi Minh City.
Main topics: Strategy, policy, management, economic assessment, experience in development of small scale mining.
Fee: US\$30

2. Hydrogeological Exploration Methods in Deltaic Areas Seminar

Organizer: Center of Geography and Natural Resources of the National Center for Scientific Research of Vietnam.
Supported by: Hydrogeological Division N-8, General Department of Geology, Vietnam.
Committee of Economic Localizing of Ho Chi Minh City.
Association of Hydrogeologists of Vietnam.
Chairmen: Prof. Dr. Nguyen Thuong Hung, Vietnam.
Date: 1-4 December, 1986.
Venue: Conference Hall, Committee of Economic Localizing, 175, Hai Ba Trung St., Ho Chi Minh City.
Main topics: General aspects of hydrogeology in deltaic areas, mathematical modelling, isotopic remote sensing methods, pollution control
.....
Fee: US\$30

3. Geochemical Exploration Course

Organizers: Institute of Geology and Mineral Resources, GDG, Vietnam
International Association of Geochemistry and Cosmochemistry.
Sponsored by: UNESCO, Geological Division N-6, General Department of Geology, Vietnam.
Chairmen: Dr. Nguyen Khac Vinh, Vietnam.
Acad. L.V. Tauson, USSR.
Date: 29 November - 4 December, 1986.
Venue: Headquarters of Sub-Institute of Geology, Geological Division N-6, General Department of Geology.
2 Nguyen Binh Khiem St., Ho Chi Minh City.
Main topics: Structural dynamic characteristics of geochemical fields, methods of geochemical prospecting, geochemical data processing

Excursion

Three scientific excursions to some interesting geological and mining areas are planned to be organized after the Conference. Beside geological topics, some sight-seeing will also be included to the field trips. The excursions will be guided in English and each participant will be provided with trip explanatory brochure in English. The cost of the trip includes travelling, food and lodging.

Trip I:

Quang Ninh Triassic coal basin. Date: 8, 9, 10, 11 December, 1986.
Cost: US\$430 - Travel: Ho Chi Minh City to Hanoi by air, Hanoi to Quang Ninh by bus, Ha Long bay sight-seeing by boat. Trip ends in Hanoi on 12 December, 1986. Visit to Paleozoic, Triassic stratigraphic sections, open pit mine of Deo Nai

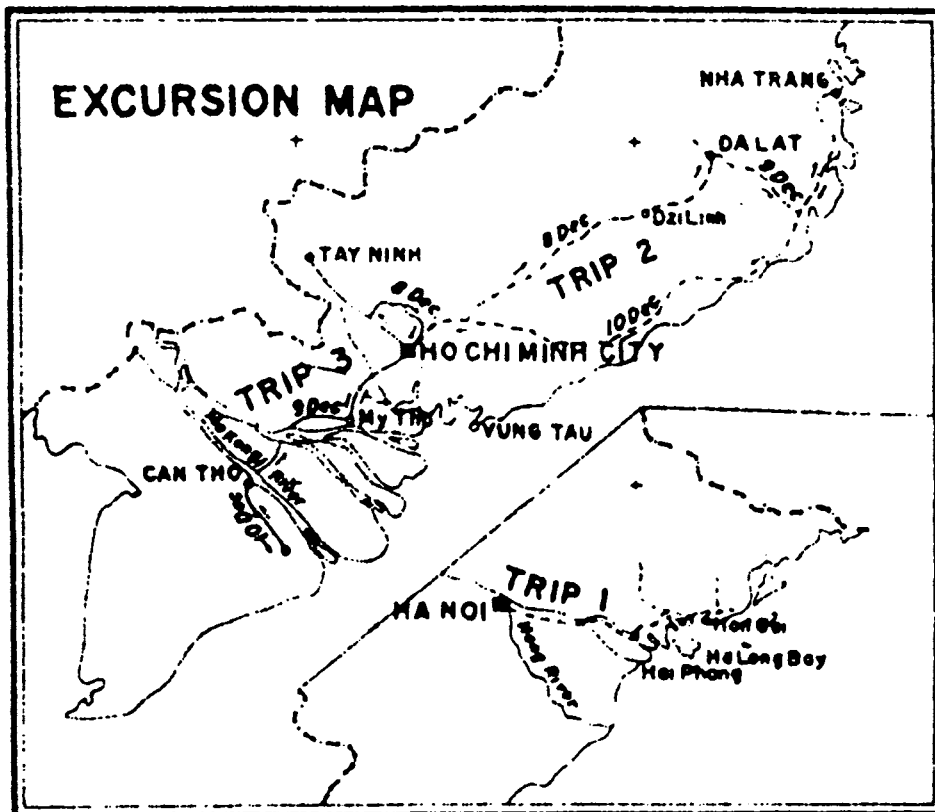
Trip II:

Dzi-linh-Dalat area. Date: 8, 9, 10, December, 1986. Cost: US\$160
- Travel by bus. Nights at resort cities of Dalat and Nha Trang. Geological topics: Cenozoic basalts and lateritic bauxite. Neogene diatomite deposits, Jurassic metasediments, Mesozoic granitoids, and ezite, porphyrite, mineralizations of Sn, Mo, W, Au, Pb, Zn related to granitoids. Trip ends in Ho Chi Minh City on 10 December, 1986.

Trip III:

Lower Mekong basin: Date: 8, 9, 10 December, 1986. Cost: US\$160.
Travel by bus. Night at Can Tho City. Geological topics: Quarternary formations, caolinization in ancient alluvium; groundwater aquifers of 100 m, 300 m, 500 m, artesian hot water in Bac Lieu. Touristic topics: Snake Breeding Farm in My Tho, "Underground village" of Cu Chi

Trips for accompanying persons: During the seminar and Conference period, daily trips to coastal city of Vung Tau and around Ho Chi Minh City will be organized. Cost of each trip (US\$30..) includes travel lunch and guide.



GOLD 100 - INTERNATIONAL CONFERENCE OF GOLD

September 1986, 15-18.

Scope of the Conference

The Conference marks one hundred years of gold mining on the Witwatersrand, and aims to bring together people interested in various facets of the gold industry. The parallel sessions will allow the delegates to be exposed to a broad field of interest including aspects of the following topics:

- Economics and Marketing of Gold
- Mining Technology
- Industrial Uses of Gold
- Extractive Metallurgy of Gold

The Conference will be held in parallel or plenary sessions over a period of four days. A programme of one-day and extended technical tours is planned for after the Conference, in addition to an affiliates programme during the Conference. Several evening social events are also included in the Conference programme.

GOLD 100 offers a unique opportunity for persons with a technical, economic, or investment interest in gold, gold mining, or gold metallurgy to increase their knowledge and expertise. The following topics should be of interest:

Economics and Marketing of Gold

To gold traders, stockbrokers, investment analysts and advisor, bankers, economists, gold and gold-share investors, institutional investors.

Gold Mining Technology

To mining engineers, mine managers, those engaged in mining research and development, mining geologists, assayers.

Extractive Metallurgy of Gold

To production metallurgists, plant managers, research and development scientists, design engineers.

Symposium on the Industrial Uses of Gold

To industrial and commercial research workers and those interested in the development of new uses for gold in the electronics, dental, and decorative sectors.

Plenary Addresses

Opening Address

President of the Chamber of Mines.

The South African economy with particular reference to the importance of the gold-mining industry

Mr. Barend du Plessis, Minister of Finance, Pretoria.

The history and structure of the gold-mining industry in South Africa

Mr. Willie Malan, Anglovaal, Johannesburg.

Gold: its time and its place

Professor D.A. Pretorius, University of the Witwatersrand, Johannesburg.

Development of gold-mining technology - past, present, and future

Professor Micklos Salamon, Colorado School of Mines, U.S.A.

Industrial relations and Labour developments in South Africa

Professor Nic Wiehahn, School of Business Leadership (UNISA), Pretoria.

Gold in the international monetary system

(Speaker to be advised)

The extractive metallurgy of gold

Mr. Jack Holmes, Anglo American Corporation, Johannesburg.

Recent research results relating to the industrial uses of gold

Dr. Geoff Gafner, Intergold.

The role of gold in the financial system

Mr. Robert Guy, N.M. Rothschild & Co., London.

An overview of the supply and demand for gold

Mr. George Milling-Stanley. Consolidated Gold Fields, London.

For further information

The Conference Secretary (C29)

GOLD 100,

Private Bag X3015,

Randburg, 2125,

South Africa.

LANDPLAN III - A SOUTHEAST ASIAN SYMPOSIUM - SECOND CIRCULAR.

THE ROLE OF GEOLOGY IN URBAN DEVELOPMENT

Hong Kong, 15-50 December 1986.

Organized by The Geological Society of Hong Kong.

With the support and cooperation of International Union of Geological Sciences (IUGS), Association of Geoscientists for International Development (AGID), Unesco, University of Hong Kong, Hong Kong Polytechnic.

List of some of the papers accepted to date for LANDPLAN III

A. Geological framework for urban planning:

1. Urban geological mapping-techniques used in the detailed geological survey of Kowloon and Hong Kong.
2. Geological survey and ground investigation in Tuen Mun, Western New Territories, Hong Kong.
3. Geology and urban development of Kuala Lumpur.
4. The application of geologic information in urban land use planning - a case study of Sukabumi Regency, West Java.
5. Geology of Dhaka and environmental problems.
6. Main geological problems in urban environments in China.
7. Rational utilization of urban geological environment, with particular reference to Shanghai and Nanjing.
8. Assessment of environmental engineering geology of a city in hilly country: engineering geological mapping of Nanjing.
9. Compilation of engineering geological maps for urban construction in coastal areas: engineering geological maps of a district of Hangzhou.
10. Role of geology in development of the Shenzhen Special Economic Zone.
11. A geological approach to the development of Bombay Geological mapping in the urban environment of Lonavala City, Maharashtra, India.
12. Engineering geological thematic maps for landuse planning in the Netherlands.

B. Engineering geology and site investigations:

13. Engineering geological aspects of Kuala Lumpur area influence of engineering geology on foundation practices in Manila.
14. Geotechnics and environmental geology of Chiang Mai University campus, Thailand.
15. Engineering geological problems in the construction of Chengdu.
16. Geotechnical experience with large urban site formation in Hong Kong.

C. Slope stability:

17. Preliminary stability assessment of cut slopes in Hong Kong.
18. Landslide-related geotechnical engineering problems in Malaysia.

19. Landslides and hillside development - recent case studies in Kuala Lumpur.
20. Mass movements and related processes as natural hazards - a review from Sri Lanka.
21. Groundwater controlled landslides and slope movements in India and Thailand.
22. The influence of unsaturated soils in slope stability.
23. The development of boulders on a hillslope site in Hong Kong.
24. Determining areas of rockfall risk.

D. Seismicity and earthquake risk:

25. Active faults in South China.
26. Risk zoning for earthquake-related ground failure, Suva harbour, Fiji.
27. Seismicity evaluation study in Olongapo City, Philippines.
28. Earthquake risk in the coastal region of Pakistan.
29. The decision of seismic resistance for a city.
30. Regional seismic risk evaluation in Southeastern France.
31. New seismic risk zonation of France.

E. Environmental management:

32. Geomorphological terrain evaluation for solid wastes disposal in tropical and sub-tropical climates.
33. Land treatment of wastes: design and operating features.
34. Biogeochemistry of urbanization - Bombay, a case study.
35. Hydrogeochemistry of Madras aquifer, India.
36. Pollution dispersal in central Ganga Basin, India.
37. Sedimentology and geochemistry of sea-floor sediments in Tolo Harbour, Hong Kong.

F. Hydrogeology and groundwater resources:

38. Effect of urbanization on near-surface hydrological processes in humid-equatorial environment.
39. Groundwater resources of Cagayan de Oro City, Mindanao, Philippines.
40. Types of groundwater supply and environmental hydrogeological problems in urban development in Southeast China.
41. Problems of environmental geology in development of karst water resources in North China.
42. Evaluation of the safe yield and management programmes of groundwater resources in Boshan, China.
43. A study on the formation and evolution of groundwater in Tianjin's coastal plain region.

G. Use of underground space:

44. The use of underground space in Hong Kong.

45. Engineering geological studies for underground structures along the Mass Transit Railway Corporation Island Line, Hong Kong.
46. Utilization and stability of karst caves.

H. Geological education:

47. Education of geologists for urban planning and construction.
48. Geology as a component of environmental education. The preservation of geological monuments in and around cities.

Seminars and training courses

Workshops and training courses will be held during the symposium on the following topics:

- A. Geological mapping in the urban environment.
- B. Geotechnical area studies and terrain evaluation for urban development.
- C. Weathering profiles and subsurface excavations in tropical areas.
- D. Geological aspects of slope stability.
- E. Site investigation and laboratory testing.
- F. Marine studies for harbours, reclamations and foundations.
- G. Applications of geology in environmental protection.
- H. Education of geologists for employment in civil engineering.

Persons wishing to attend any of these should indicate interests and priorities on the registration form enclosed, unless this has already been done. Early return is advised as places will be limited.

Programme

The symposium will be held in the Rayson Huang Auditorium, Shaw Building, University of Hong Kong, from 17 to 20 December. Workshops/training courses will be held at the University, the Hong Kong Polytechnic or appropriate offices or laboratories in central Hong Kong on 15 and 16 December. One day, 18, 19 or 20 December, will be devoted to field/site visits. Registrants will be notified later of precise locations of venues, programmes, timetables and transport arrangements - see under "Final Circular".

Registration fee

The registration fee, to include attendance at selected workshops and training courses, all documentation, abstracts and proceedings of the symposium, daily refreshments and conference reception and dinner, is \$U\$80 or HK\$624, payable in either currency. Field and site visits will be at a small additional cost. Local transport not included. The registration fee should be paid by October 31 (see under "Final Circular"). Anyone who will have difficulty in arranging payment by this date should inform the Conference Secretary of the circumstances.

Hotel accomodation

Accomodation will be booked, on request, at either of the following:

Hotel Furama Intercontinental	HK\$517.50
Harbour View International House	HK\$363

The prices quoted are room charges per night. They include service charge and government tax and are for double occupancy - for those willing to share a room the cost will thus be halved.

Requests for hotel accomodation should reach the organizing committee before 30 September and be accompanied by a deposit equivalent to one night's accomodation, which is liable to forfeit in the event of cancellation or no-show.

Final circular

A final circular will be sent in early November to all who comply with the requests under "Registration Fee", above. This will give full details of the programme, schedules, venues, arrival formalities and transportation in Hong Kong.

Correspondence

All correspondence should be addressed to the Conference Secretary, Geological Society of Hong Kong, c/o Dept. of Geography & Geology, University of Hong Kong, Hong Kong.

PERSATUAN GEOLOGI MALAYSIA
Geological Society of Malaysia

PETROLEUM GEOLOGY
SEMINAR '86



Hotel Ming Court, Kuala Lumpur

8-9th December 1986

PACIFIC RIM CONGRESS 87 - AN INTERNATIONAL CONGRESS ON THE GEOLOGY STRUCTURE, MINERALIZATION AND ECONOMICS OF THE PACIFIC RIM - CALL FOR PAPERS

Gold Coast, Australia
26-29 August 1987

This major international congress will bring together from around the Pacific Rim a broad spectrum of geoscientists with knowledge of the geology, structure and orebody development in that area, to provide a total up-to-date understanding from basic mechanics to description of ore bodies, exploration methods and exploration problems. It will provide a forum for geologists from all nations of the region to present their knowledge of the area and its economic potential together with the economic and political realities of their region.

All technical sessions, poster displays and trade exhibitions will be held in a single venue, the Conrad International Hotel and Jupiters Casino Complex on Queensland's Gold Coast. This is Australia's largest and most comprehensive conference facility. There will be plenary sessions and several concurrent technical sessions on various aspects of geology, mineralization, economics and politics of the region.

The decision to hold further triennial congress on the geology of the Pacific Rim will depend upon the delegates at this congress.

Sessions are planned on the following topics:

1. PLATE TECTONICS - plate boundaries, crustal structure and ocean floor morphology and structure and seismicity of the Pacific Rim.
2. VULCANOLOGY AND REGIONAL GEOLOGY - island arc systems of the Pacific Rim, igneous activity, magmagenesis, geological evolution, tectonic environments and terrains, and associated sedimentary processes.
3. RELATIONSHIP OF SUBDUCTION ZONE AND MINERALIZATION - metallogenesis, metallogenic provinces of the Pacific Rim, relationship to modern plate boundaries, modern geo (hydro) thermal systems, mineralizing models, mineralization on ocean floors.
4. DESCRIPTION OF INDIVIDUAL DEPOSITS - base and precious metalliferous resources of the Pacific Rim - past, present and future, gold, tin and base metal deposits of the Pacific Rim and their relationship to subduction or ocean floor deposits, structural controls on mineralization and structurally controlled deposits.
5. EXPLORATION TECHNIQUES AND METHODOLOGIES - geophysics, geochemistry, laboratory studies, analytical procedures and problems related to the special environments of the Pacific Rim.
6. ECONOMIC AND INVESTMENT - individual nations, investment incentives, tax structures, currency regulation, labour and residency requirements.
7. POLITICAL - land ownership, custom rules, courts of appeal, government structure on a national basis.

Congress Timetable

Last date for receipt of synopsis	July 31, 1986
Advice of provisional acceptance	Aug 31 1986
Camera-ready copy required	Jan 15, 1987
Advice of final acceptance	Feb 28, 1987
Distribution of registration brochure and form	Mar 10, 1987
Close of registration	June 30, 1987

Note: Late registration will carry a surcharge of 20% of the basic fee.

Congress Proceedings

Bound preprints of extended abstracts or abbreviated papers to be a maximum of 4000 words, will be given to delegates at the congress.

Tours

A series of pre and post conference tours will be organised and will include places of interest for vulcanologists, seismologists and geological tourists. It is hoped that mines or potential mine sites on Fiji, Vanuatu, Borneo, Indonesia, Philippines, East Australia and New Zealand will be able to be announced in the registration brochure. Tours of active volcanic centres such as New Guinea and New Zealand are planned.

Special interest tours to mines such as Mt. Isa and Weipa and locations such as the Great Barrier Reef are planned.

Most tours in Australia will be pre-congress and most tours in the Pacific will be post-congress, thus enabling visitors to see Australia and the Pacific.

Venue

The congress will be held at the Conrad International Hotel and Jupiters Casino Complex on the Gold Coast of Southern Queensland. It is the largest and most diverse conference facility in Australia and will handle more than 2,000 delegates.

Further Information

c/o Aus. IMM Congress Secretariat:
P.O. Box 731 Toowong 4066 Qld,
Australia

Phone: (07) 371 7900 National
(617) 371 7900 International

TUNNELLING '88

The Institution of Mining and Metallurgy is pleased to announce the holding of 'Tunnelling '88', the fifth international symposium and exhibition in the series, from 17 to 22 April, 1988, at the Kensington Rainbow Exhibition Centre, London, England.

Details of the symposium and its associated events will be given in the First Circular, available in February/March, 1986, from The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England.

BICENTENNIAL GOLD 88

Melbourne, Australia - 16-20 May 1988

Invitation

The Organising Committee of BICENTENNIAL GOLD 88 extends a warm and cordial invitation to all interested persons to attend this conference and associated excursions which occur during the celebration of Australia's Bicentennial year.

Theme

The theme for BICENTENNIAL GOLD 88 is "Gold and the Explorationist". A significant thrust of this conference will be to act as a forum for new regional and deposit studies as well as techniques in the search for gold.

Time Table

This is the first of three circulars and is designed to provide advance information on the timing, venue, technical programme, excursions, likely registration costs, and broad requirements of contributors who are considering presenting a paper.

1985 April	First circular and notification of interest
1986 April	Second circular and call for papers
1987 April	Third circular and registration
1987 September 30	Deadline for abstract submission
1988 January 31	Deadline for excursion and conference registration
1988 May 16-20	BICENTENNIAL GOLD 88

Technical Programme

Preamble - technical sessions will be held at the Regent Hotel, Collins Street, Melbourne during the period Monday 16 May to Friday 20 May 1988. There will be no concurrent sessions. The Organising Committee wishes to ensure that all papers presented are original, well prepared, and are likely to stimulate new insights into gold mineralisation. The number of papers to be accepted is strictly limited. English is the official language and papers presented in that language only will be accepted.

Format - in accordance with the theme of the conference the technical programme will be subdivided as follows:

1. Regional studies of significant gold provinces outlining geological and/or structural framework, together with possible regional controls on gold mineralisation. This session to include regional reviews on placer gold deposits.
2. Case history studies on individual mines or mining centres; local geology, structural studies, alteration, geochemistry, mineralogy, and local controls on gold mineralisation.
3. Laboratory studies including isotopes, fluid inclusions, thermodynamics and mineragraphic contributions.
4. Exploration techniques for both primary and alluvial deposits including new concepts in geochemistry, geophysics and remote sensing.
5. Conceptual models of ore genesis which will emphasise future directions in gold exploration, gold-forming environments, and derivation of gold-bearing fluids.

Leading international experts will be invited to present papers at each of these se-sions. It is intended to have a complementary poster presentation and both oral and poster presentations will be considered for subsequent publication.

Excursions

A. Technical

Several pre- and post-conference excursions are planned and it is hoped that these will include examples of operating hard-rock and placer deposits in Victoria; various Palaeozoic, Proterozoic and Archaean occurrences in other parts of Australia (e.g. Roxby Downs, Kalgoorlie, Paddington, Telfer, Kidston); and young circum-Pacific Tertiary precious metal occurrences (Papua New Guinea, Fiji, New Zealand).

B. Tours

Tour Hosts Pty. Ltd., the official tour operator, will arrange interesting and enjoyable one-day tours and pre- and post-congress extended tours. Overseas delegates will be able to make the most of their visit to Australia and incorporate natural attractions such as the Great Barrier Reef and Ayers Rock.

Costs

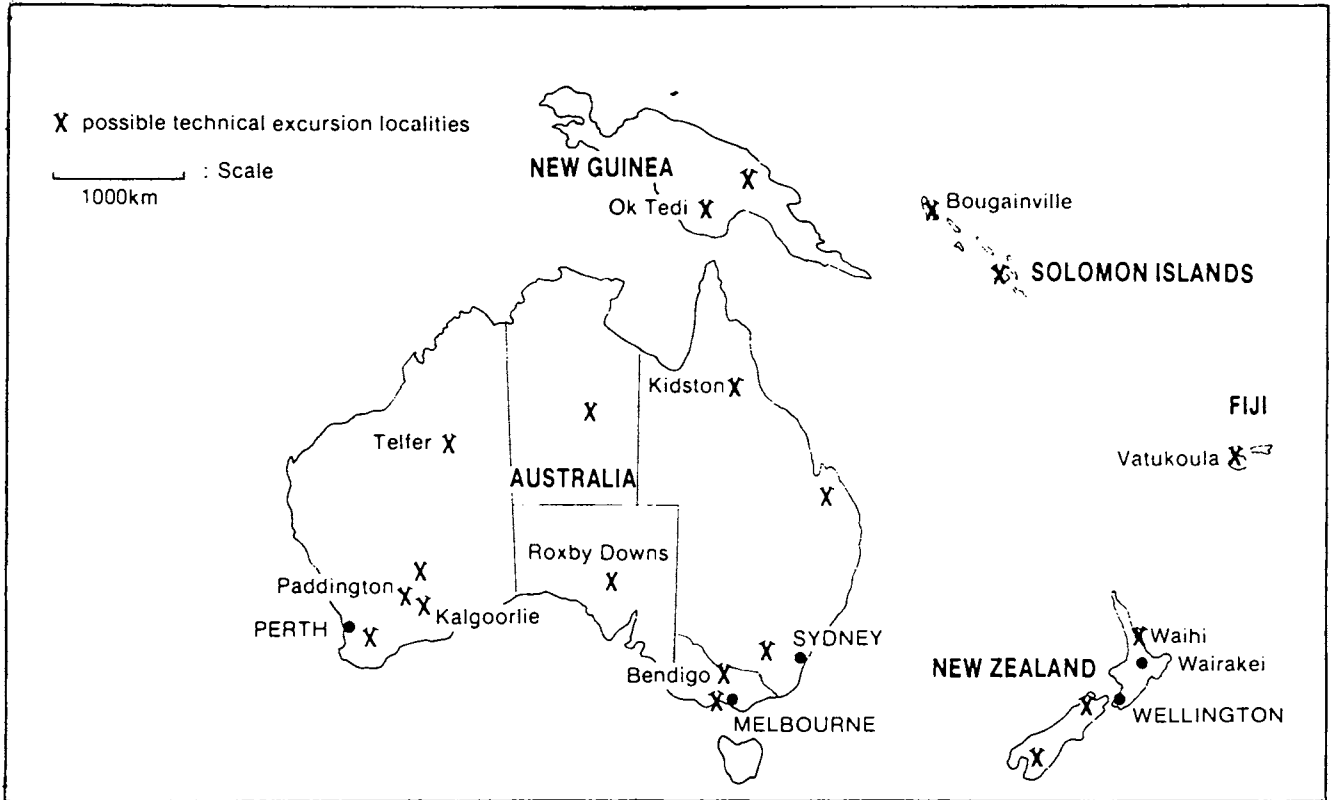
As yet a final registration fee has not been established, but it is anticipated that it will be approximately Aust\$300.00. There will be a reduced charge for bona fide students.

Conference Organisation

All conference enquiries should be directed to the conference managers:

Australian Convention and Travel Services Pty. Ltd. (ACTS)
GPO Box 1929,
Canberra ACT 2601,
AUSTRALIA.

Telephone (062) 49 8015
(International +61 62 49 8015)
Telex: AA62260 (UNIHSE-ACTS)



GEOLOGICAL SOCIETY OF MALAYSIA

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

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M\$125.00 (US\$53.20)

OIL & GAS CONSULTANTS INTERNATIONAL, INC. (OGCI) PETROLEUM TRAINING 1986

Singapore

Formation Evaluation - Basic & Intermediate Concepts.
July 14-25, 1986. Ming Court Hotel, US\$1,625.00

Formation Evaluation - Advanced Concepts.
September 22-26, 1986. Ming Court Hotel, US\$1,040.00

Basic Reservoir Engineering
September 15-15, 1986. Ming Court Hotel, US\$1,040.00

Production Logging
September 29 - October 3, 1986. Ming Court Hotel, US\$1,040.00

Geological Applications of Logging Measurements.
Applied Sedimentology in Hydrocarbon Exploration.
Geology of Southeast Asia.
September 11-15, 1986.

Practical Well Testing.
July 21-25, 1986.

Applied Reservoir Engineering.
July 28 - August 8, 1986.

Exploration Methods for Sandstone Reservoirs.
August 25-29, 1986.

Exploration for Carbonate Reservoirs.
September 1-5, 1986.

Basic Petroleum Technology.
November 18-20, 1986.

For Registration:

call 918-742-2334
or
write 4554 South Haward, Tulsa, OK 74135, U.S.A.
or
Telex 49-7438 OGCI TUL

AUSTRALIAN MINERAL FOUNDATION 1986 - UPDATE OF 1986 PROGRAMME

Index to 1986 Courses - Chronological Listing

<i>Course number</i>			
437/86	Nodal* Gas Lift Optimization and Plunger Lift	7-11 July	Adelaide
438/86	Introduction to Computing and Information Technology	7-10 July	Melbourne
439/86	Application of Mineralogy to Geological and Ore-processing Problems	14-18 July	Sydney
440/86	Joint Ventures	16-18 July	Sydney
441/86	Applied Reservoir Engineering	21 July-1 Aug	Adelaide
477/86	Industrial Health & Safety Assurance Systems — Concepts and Implementation†	28 July-1 August	Perth
442/86	Introduction to Exploration for Oil and Gas	4 August	Darwin
443/86	Introduction to Exploration for Minerals	4-5 August	Darwin
444/86	Drill Stem Test Interpretation	4-8 August	Adelaide
445/86	Evaporite Facies Workshop	11-15 August	Adelaide
478/86	Industrial Health & Safety Assurance Systems — Concepts and Implementation†	11-15 August	Hobart
446/86	Basic Natural Flow and Artificial Lift	18-22 August	Brisbane
447/86	Mineral Economics: Decision Making Methods and the Mineral Industry	20-29 August	Adelaide
448/86	Drilling Engineering	25-29 August	Adelaide
479/86	Carbonate Depositional Environments: Modern & Ancient†	1-5 September	Adelaide
449/86	Basic Surface Production Operations	8-12 September	Adelaide
480/86	Well Log Analysis for Geophysicists†	8-12 September	Adelaide
450/86	Geochemistry of Ore Formation	11-19 September	Adelaide
451/86	Stoping Systems — Planning and Design	15-19 September	Brisbane
452/86	Petroleum Engineering	15-19 September	Brisbane
481/86	Cased Hole Logging and Reservoir Performance Monitoring†	15-19 September	Adelaide
453/86	Basic Reservoir Engineering	22-26 September	Adelaide
454/86	Sampling of Particulate Materials — Theory and Practice	29 Sep-3 Oct	Adelaide
455/86	Automatic Control Systems for Mineral Processing Circuits	6-10 October	Brisbane
456/86	Hazard Analysis Training for the Petroleum Industry	7-10 October	Adelaide
482/86	Cost-Effective Blasting in Open Pit Mines†	10-11 October	Newman
457/86	Hazard Analysis Training for the Chemical and Explosives Industries	14-17 October	Adelaide
458/86	Geological Applications of Logging Measurements	20-24 October	Adelaide
459/86	Gas Conditioning and Processing	20-31 October	Sale
460/86	Management Aspects of Technical Computing	22 October	Melbourne
461/86	Production Operations — Well Completion, Stimulation and Workover	27 Oct-7 Nov	Adelaide
483/86	Simulation of Production/Processing Facilities†	3-7 November	Adelaide
462/86	Seismic Field Techniques	10-14 November	Adelaide
487/86	Concrete Technology†	24-28 November	Adelaide
463/86	Effective Seismic Data Processing	17-21 November	Adelaide
464/86	Introduction to Plasma Metallurgy	24-25 November	Sydney
401/86	Slurry Pipelining — A Practically Oriented Course††	26-28 November	Sydney
465/86	Introduction to Plasma Metallurgy	27-28 November	Perth
466/86	Management Training for Senior Geologists	26 Nov-5 Dec	Adelaide
467/86	Reservoir Development for Geologists and Engineers	1-12 December	Adelaide

†Denotes additional course.

††Course has been rescheduled.

KALENDAR (CALENDAR)

- September 8 - 13, 1986
ANISOTROPY AND INHOMOGENEITY OF THE LITHOSPHERE AND ASTHENOSPHERE (Meeting), Bechyne, Czechoslovakia. (Dr. V. Babuska, Geophysical Institute, Bocni II, 14131 Prague 4, Czechoslovakia)
- September 8 - 13, 1986
UNDERGROUND MINING SCIENCES AND TECHNOLOGY (International Symposium), Nottingham, U.K. (Dr. M.J. Richards, Mining Engineering Department, University of Nottingham, University Park, Nottingham NG7 2RD, U.K.)
- September 8 - 13, 1986
RECENT CRUSTAL MOVEMENTS OF THE EARTH (7th International Symposium), Tallinn, Estonian S.S.R. (Prof. Yu. D. Boulanger, International Symposium CRCM-86, Soviet Geophysical Committee, Academy of Sciences of the U.S.S.R., Molodezhnaya, 3, 117296, Moscow, U.S.S.R.)
- September 8 - 15, 1986
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS (Congress), Karlovy Vary, Czechoslovakia. (A. Zaporozec, AIH, 3817 Mineral Point Road, Madison, WI 53705, U.S.A.)
- September 14 - 19, 1986
AVALANCHE FORMATION, MOVEMENT AND EFFECTS (International Symposium), Davos, Switzerland. (Symposium 1986, EISLF, Weissfluhjoch, CH-7260 Davos-Dorf, Switzerland)
- September 15 - 19, 1986
GOLD 100 (International Conference), Johannesburg, South Africa. (The Conference Secretary (C.29), Mintek, Private Bag X3015, Randburg, 2125 South Africa)
- September 22 - 25, 1986
METEORITICAL SOCIETY (49th Annual Meeting), New York, U.S.A. (Martin Prinz, Department of Mineral Sciences, American Museum of Natural History, New York, NY 10024, U.S.A.)
- September 22 - 27, 1986
UNDERGROUND WATER TRACING (5th International Symposium), Athens, Greece. Languages: English, German and Greek. (5th SUWT, Institute of Geology and Mineral Exploration, 70 Messoghion Street, 115 27 Athens, Greece)
- September 22 - 28, 1986
BENTHOS '86 (3rd International Symposium on Benthic Foraminifera), Geneva, Switzerland. (D. Decrouez, Department of geology and invertebrate palaeontology, Museum d'Histoire naturelle de Geneve, CP 434, 1211 Geneve 6, Switzerland)
- September 23 - 27, 1986
SOIL MECHANICS AND FOUNDATION ENGINEERING (8th Danube European Conference), Nuremberg, F.R.G. (Prof. U. Smolczyk, Deutsche Gesellschaft fur Erd-und- Grundbau, e.V. Kronprinzenstrasse 35 A, D-4300, Essex 1, F.R.G.)
- September 26 - 28, 1986
SEPM (3rd Annual Midyear Meeting), Raleigh, North Carolina. (SEPM, P.O. Box 4756, Tulsa, OK 74159, U.S.A.)
- September 28 - October 1, 1986
GOLD '86 (International Symposium), Toronto, Canada. (E. Craigie, Selco Division of BP Resources Canada Ltd., 55 University Avenue, Suite 1700, Toronto, Ontario, Canada M5J 2H7)
- October, 1986
EXPLORATION GEOCHEMISTRY OF CHINA (3rd Symposium), Gullin, P.R. China. Languages: Chinese and English. (Professor Xie Xuejing, 3rd Chinese Exploration Geochemistry Symposium, Institute of Geophysical and Geochemical Exploration, Langfang, Hebei 102801 P.R. China)
- October 2 - 4, 1986
COMPUTERS IN THE PETROLEUM INDUSTRY: INTEGRATED APPROACHES (15th Annual Geochautauqua), Calgary, Alberta, Canada. (Michael Marchand, Geochautauqua 86, c/o Canterra Energy Ltd., Box 1051, Calgary, Alberta, Canada T2P 2K7)
- October 5 - 11, 1986
WORLD ENERGY (13th Congress), Cannes, France. (R. Rutley, World Energy Conference, 34 St. James' Street, London SW1A 1HD, U.K.)
- October 6 - 10, 1986
SEDIMENTOLOGY OF ARGENTINA (Meeting), La Plata, Argentina. (L. Spalletti, Centro de Investigaciones Geologicas, calle 1 n° 644, 1900 La Plata, Argentina)
- October 7 - 14, 1986
SEA-LEVEL CHANGES AND APPLICATIONS (Symposium), Qingdao, P.R. China. IGC Project 200. Language: English. (Prof. Zhao Songling, Institute of Oceanology, Academia Sinica, 7 Nan-hai Road, Qingdao, P.R. China)
- October 14 - 18, 1986
ORIGIN AND EVOLUTION OF PLANETARY AND SATELLITE SYSTEMS (International Symposium), Potsdam, German Democratic Republic. (Prof. Dr. H. Stiller, Zentralinstitut fur Astrophysik, Potsdam, German Democratic Republic)
- October 20 - 25, 1986
INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY (Meeting), Buenos Aires, Argentina. (C.A. Di Salvo, Moreno 584, 9 piso, 1091 Buenos Aires, Argentina)

October 26 - 29, 1986

PETROLEUM GEOLOGY OF NW EUROPE (3rd Conference), London, U.K. (Petroleum Geology of NW Europe Conf. '86, Conference Co-ordinates, 70 Richmond Road, Twickenham, Middlesex TW1 3BE, U.K.)

October 29 - 31, 1986

AMERICAN ASSOCIATION OF STRATIGRAPHIC PALYNOLOGISTS (Annual Meeting with Congres Internationale du Microflore Paleozoique), New York, U.S.A. (Dan Habib, Graduate School of the City University of New York, 33 West 42nd Street, New York, NY 10036, U.S.A.)

November 1986

ENGINEERING IN COMPLEX ROCK FORMATIONS (International Symposium), Beijing, P.R. China. Languages: English and Chinese. (Secretary of the ECRF Symposium, Institute of Geophysics, Academia Sinica, P.O. Box 928, Beijing, P.R. China)

November 1986

GEOLOGY OF SOMALIA AND SURROUNDING REGION (First Congress), Mogadishu, Somalia. Organized and sponsored by IUGS. (G.O. Gatto, Institute of Mineralogy, University of Padova, Corso Garibaldi 37, I-35100 Padova, Italy)

November 2 - 6, 1986

SOCIETY OF EXPLORATION GEOPHYSICISTS (56th Annual Meeting), Houston, Texas, U.S.A. (Convention Assistant, Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, OK 74101, U.S.A.)

November 9 - 14, 1986

COASTAL ENGINEERING (International Conference), Taipei, Taiwan. (B.L. Edge, Cubit Engineering Limited, 207 East Bay Street, Suite 311, Charleston, SC 29401, U.S.A.)

November 10 - 11, 1986

EXPLORATION GEOCHEMISTRY (International South European Symposium), Athens, Greece. Co-sponsored by AEG. (Organizing Committee, International South European Symposium in Exploration Geochemistry, Institute of Geology and Mineral Exploration, 70 Messoghion Street, 115 27 Athens, Greece)

November 10 - 13, 1986

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), San Antonio, Texas, U.S.A. (Meetings Department, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, U.S.A.)

December 1 - 5, 1986

RESEARCH IN GEOPHYSICS AND GEOPHYSICAL EXPLORATION IN AFRICA (International Conference), Kano, Nigeria. Co-sponsored by International Lithosphere Program. (AGERA Conference, c/o Department of Physics, University of Jos, Jos, Nigeria)

December 5 - 7, 1986

GEOLOGY OF INDOCHINA (Conference), Ho Chi Minh City, Vietnam. (Conference Secretariat CGI, General Department of Geology, 6 Pham Ngu Lao St., Hanoi, Vietnam)

December 8 - 12, 1986

AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, California, U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.)

1987

January 9 - 9, 1987

MAGMATISM IN THE OCEAN BASINS (Meeting), Leicester, U.K. (A.D. Saunders, Department of Geology, The University, Leicester LE1 7RH)

January 19 - 23, 1987

HOW VOLCANOES WORK (Hawaii Symposium), Hilo, Hawaii. (Robert Decker, U.S. Geological Survey, MS-910, 345 Middlefield Road, Menlo Park, CA 94025, U.S.A.)

January 21 - 31, 1987

GRANITES AND ASSOCIATED MINERALIZATIONS (International Symposium), Salvador, Bahai, Brazil. Languages: English, French and Portuguese. (ISGAM, Augusto J. Pedreira, SMECPM: Rua Ceara, 3-Pituba, 40,000, Salvador, Bahai Brasil)

January 27 - 30, 1987

CANADIAN REEF RESEARCH (Symposium), Banff, Alberta, Canada. (Canadian Reef Research Symposium, The University of Calgary, Conference Office, Faculty of Continuing Education, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4)

February 1987

QUATERNARY SEDIMENTS OF THE ARABIAN GULF AND THE MESOPOTAMIAN PLAIN (International Conference), Kuwait. (Secretary-General 1987, Dept. of Geology, Kuwait University, Box 5969, Kuwait)

February 2 - 6, 1987

ASH: A NEW RESOURCE, (Symposium), Pretoria, South Africa. (Dr. R.A. Kruger, CSIR-Frd, POB 395, Pretoria 0001, South Africa)

April 6 - 10, 1987

HYDROLOGY IN PERSPECTIVE (International Symposium), Rome, Italy. Co-sponsored by Unesco, WMO, and IAHS. (International Association of Hydrological Sciences, GIBI s.a.s. Studio Congressi, Via Marco Besso, 40, 00114 Rome, Italy)

April 13 - 16, 1987

EUROPEAN UNION OF GEOSCIENCES (IV Biennial Conference), Strasbourg, France. (Prof. Dr. W. Lowrie, Inst. fur Geophysik, MPP P 5, ETH Honggerberg 8093 Zurich, Switzerland)

April 23 - 26, 1987

INTERNATIONAL GEOCHEMICAL EXPLORATION (12th Symposium) and METHODS OF GEOCHEMICAL PROSPECTING (4th Symposium), Orleans La Source, France. (The Organizing Committee, 12th IGES - 4th SMGP, BRGM, B.P. 6009, 45060 Orleans Cedex, France)

April 27 - May 1, 1987

DRILLEX '87 (International Conference and Exhibition on Drilling - The Minerals Industry and Geotechnical Engineering), Stoneleigh, Warwickshire, U.K. (IMM, 44 Portland Place, London W1N 4BR, U.K.)

April 28 - May 7, 1987

ZECHSTEIN: STRATIGRAPHY-PALEOGEOGRAPHY-GEOCHEMISTRY (International Symposium), Hannover/Kassel, F.R.G. (J. Lepper, Niedersächsisches Landesamt für Bodenforschung, P.O. Box 51 01 53, D-3000 Hannover 51, F.R.G.)

May 3 - 7, 1987

ENGINEERING GEOLOGICAL ENVIRONMENT IN MOUNTAINOUS AREAS (International Symposium), Beijing, P.R. China. (Geological Society of China, Ministry of Geology, Pai Wan Chung, Fuchengmenwai, Beijing, P.R. China)

May 18 - 22, 1987

AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Maryland, U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.)

May 25 - 27, 1987

COASTAL LOWLANDS: GEOLOGY AND GEOTECHNOLOGY (International Symposium), The Hague, The Netherlands. (Dr. H.J.W.G. Schalke, P.O. Box 85947, 2508 CP The Hague, The Netherlands)

May 25 - 27, 1987

GEOLOGICAL, MINERALOGICAL ASSOCIATIONS OF CANADA (Joint Annual Meeting), Saskatoon, Canada. (Dr. W.O. Kupsch, Department of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0)

May 28 - 30, 1987

PERMANENT SEISMOGRAPHIC OBSERVATORIES AND NETWORKS (Centennial Anniversary Symposium), Berkeley, California, U.S.A. (Prof. B.A. Bolt, Seismographic Stations, University of California, Berkeley, CA 94720, U.S.A.)

May 21 - June 5, 1987

WORLD MINING CONGRESS (13th), Stockholm, Sweden. (Organizing Secretary, 13th World Mining Congress, University of Lulea, S-951 87 Lulea, Sweden)

June 1987

INTERNATIONAL MINING AND EXPLORATION EXHIBITION '87 (Meeting), Sydney, Australia. (Thomson Exhibitions, 47 Chippen Street, Chippendale, NSW 2008, Australia)

June 7 - 10, 1987

AAPG and SEPM (Annual Meeting), Los Angeles, Calif., U.S.A. (AAPG Headquarters, Box 979, Tulsa, OK 74101, U.S.A.)

July 31 - August 9, 1987

INTERNATIONAL UNION FOR QUATERNARY RESEARCH (12th Congress), Ottawa, Ontario, Canada. (Dr. Alan V. Morgan, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1)

August 1987

PACIFIC NEOGENE PALAEOCEANOGRAPHIC AND BIOSTRATIGRAPHIC EVENTS (Meeting), Berkeley, Calif., U.S.A. (Dr. C. Brunner Department of Paleontology, University of California, Berkeley, CA 94720, U.S.A.)

August 9 - 22, 1987

IUGG (XIX General Assembly), Vancouver, Canada. (R.D. Russell, Department of Geophysics and Astronomy, University of British Columbia, Vancouver, B.C., Canada V6T 1W5)

August 12 - 20, 1987

INTERNATIONAL UNION OF CRYSTALLOGRAPHY (Congress), Perth, Western Australia. (E.N. Masien, Crystallography Centre, University of Western Australia, Nedlands, 6009, Australia)

August 17 - 20, 1987

DEVONIAN SYSTEM (CSPG 2nd International Symposium), Calgary, Alberta, Canada. (Devonian Symposium, Canadian Society of Petroleum Geologists, 505-206 7th Avenue SW, Calgary, Alberta, Canada T2P 0W7)

August 20 - 30, 1987

PACIFIC SCIENCE ASSOCIATION (16th Congress), Seoul, South Korea. Section B: Solid Earth Sciences (Prof. Bong Kyun Kim, Department of Geological Sciences, College of Natural Sciences, Seoul National Univ., Seoul, South Korea)

August 24 - 28, 1987

ANTARCTIC EARTH SCIENCES (5th International Symposium), Cambridge, U.K. (Dr. M.R.A. Thomson, British Antarctic Survey, High Cross, Madingley Road, Cambridge, U.K. CB3 0ET)

August 30 - September 4, 1987

INTERNATIONAL SOCIETY FOR ROCK MECHANICS (6th International Congress), Montreal, Canada. (Prof. B. Ladanyi, Dept. Civil Engineering, Ecole Polytechnique, Box 6079, Stn. A, Montreal, Canada H3C 3A7)

August 31 - September 3, 1987

SOIL MECHANICS AND FOUNDATION ENGINEERING (9th European Conference), Dublin, Ireland. Languages: English and French. (Dr. Trevor Orr, Civil Engineering Department, Trinity College, Dublin 2, Ireland)

September 1 - 5, 1987

AFRICAN GEOLOGY (14th Colloquium), Berlin, (West), F.R.G. (Dr. G. Matheis, Technical University of Berlin, SFB 69, Ackerstrasse 71, D-1000 Berlin 65, F.R.G.)

September 7 - 11, 1987

CARBONIFEROUS STRATIGRAPHY AND GEOLOGY (11th International Congress), Beijing, P.R. China. (Prof. Yang Jingzhi, Nanjing Institute of Geology and Palaeontology, Chi-Ming-Ssu, Nanjing, P.R. China)

September 7 - 12, 1987

ANTARCTIC GLACIOLOGY (4th International SCAR Symposium), Bremerhaven, F.R.G. (Heinz Kohnen, Alfred Wegener Institute for Polar Research, Columbus Center, D-2850 Bremerhaven, F.R.G.)

September 11 - 14, 1987

SEPM (4th Annual Midyear Meeting), Austin, Texas. (SEPM, P.O. Box 4756, Tulsa, OK 74159, U.S.A.)

September 14 - 18, 1987

CIRCUM-PACIFIC PHANEROZOIC GRANITES (International Symposium), Tucuman, Argentina. Jointly with 10th Argentine Geological Congress. Languages: English and Spanish. (Dr. Carlos W. Rapela, Centro de Investigaciones Geologicas, Universidad Nacional de La Plata, Calle 1 no 644, 1900 La Plata, Argentina)

October 11 - 15, 1987

SOCIETY OF EXPLORATION GEOPHYSICISTS (57th Annual Meeting), New Orleans, La., U.S.A. (Marvin R. Hewitt, Amoco Production Co., Box 591, Tulsa, OK 74102, U.S.A.)

October 26 - 29, 1987

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Phoenix, Arizona, U.S.A. (Meetings Department, GSA Headquarters, Box 9140, Boulder, CO 80301, U.S.A.)

December 7 - 11, 1987

AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, California, U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.)

1988

March 8 - 11, 1988

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

March 20 - 23, 1988

AAPG/SEPM (Annual Meeting), Houston, Texas, U.S.A. (Convention Department, AAPG Headquarters, Box 979, Tulsa, OK 74101, U.S.A.)

May 16 - 20, 1988

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

May 16 - 20, 1988

AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Maryland, U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.)

May 29 - June 3, 1988

WATER RESOURCES (6th IWRA World Congress), Ottawa, Ontario, Canada. (P.J. Reynolds, President, Canadian Committee - IWRA, 3 Valley View Road, Ottawa, Ontario, Canada K2H 5Y6)

June 7 - 10, 1988

EUROPEAN ASSOCIATION OF EXPLORATION GEOPHYSICISTS (50th Congress), Den Haag, The Netherlands. (E. van der Gaag, European Association of Exploration Geophysicists, P.O. Box 162, NL-2501 AN The Hague, The Netherlands)

June 20 - July 9, 1988

SEISMIC PROBING OF THE CONTINENTS AND THEIR MARGINS (Meeting), Canberra, Australia. (Dr. J.H. Leven, BMP, Box 378, Canberra, ACT 2601, Australia)

October 1988

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

October 30 - November 1988

SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Anaheim, California, U.S.A. (Convention Assistant, Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, OK 74101, U.S.A.)

October 31 - November 3, 1988

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Denver, Colorado, U.S.A. (Meetings Department, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, U.S.A.)

December 5 - 9, 1988

AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, California, U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.)

1989

July 9 - 19, 1989

INTERNATIONAL GEOLOGICAL CONGRESS (28th), Washington, D.C., U.S.A. (International Geological Congress, P.O. Box 1001, Herndon, VA 22070, U.S.A.)

October 29 - November 2, 1989

SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Dallas, Texas, U.S.A. (Convention Assistant, Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, OK 74101, U.S.A.)

November 9 - 12, 1989

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), St. Louis, Missouri, U.S.A. (Meetings Department, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, U.S.A.)

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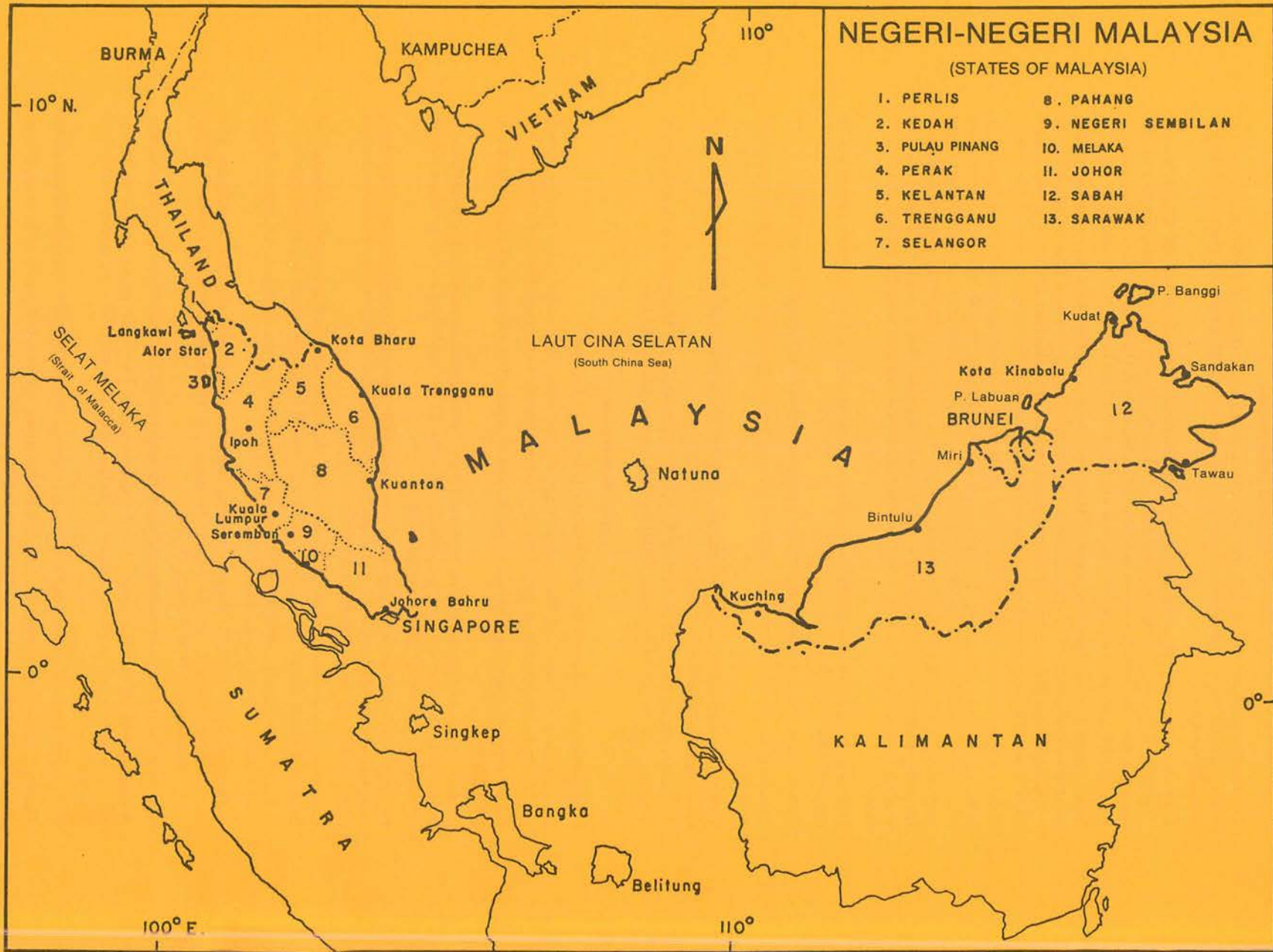
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