PP 169/12/87 ISSN 0126-5539

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

Jil. 14, No. 4 (Vol. 14, No. 4) Jul-Ogos 1988

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CATATAN GEOLOGI
(GEOLOGICAL NOTES)

GEOLOGICAL CONTROL ON THE BIRTH OF THE PULAU BATU HAIRAN MUD VOLCANO, KUDAT, SABAH

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Universiti Kebangsaan Malaysia, Sabah.

Abstract

The birth of the new island, so-called Pulau Batu Hairan due to mud volcanism is closely related to the geology of the northern part of Sabah. It has long been recognised that the northern part of Sabah has been affected by a major N-S compression, as indicated by the regional N-S fracture and E-W trending lineaments. The occurrence of N-S trending fractures on the surface of this mud volcano suggests that the area is still subjected to this N-S compression. These N-S fractures are thought to have breached the seal that confines this overpressured mud. This compression has probably a long history and is a major controlling factor in shaping up the geology of this region.

Introduction

According to local newspaper reports, the new island so-called Pulau Batu Hairan, emerged on the 15th April, 1988. It was initially small in size, but after a few days gradually grew to approximately the size of a football field. This new island is situated east of Banggi Island, roughly at latitude 7 degrees and 16 minutes north, and longitude 117 degrees 20 minutes east, about 70 km northeast of Kudat town (Fig. 1).

When the author arrived on the island on the 4th May, 1988, the island was estimated to be about 60-70 metres in diameter. The island is roughly rounded in shape and is about 2-3 metres in height (taking into account the fall and rise of the tide) (Fig. 2).

Much speculations, explanations and views by geologists on the origin of this island has been reported by the local and national newspapers a few days after the incident, which need not be repeated here. It is perhaps sufficient to say, that all concerned agreed that the island was caused by a mud volcano or mud extrusion (as some like to call it), evidence of which is abundant on the island and is a common occurrence on mainland Sabah, especially in the Dent Peninsula. What was apparently left out is the relationship of this mud volcanism to the geology of the surrounding area. This paper will attempt to discuss on this.

Geological and tectonic setting

In order to understand the development or origin of the mud volcano,

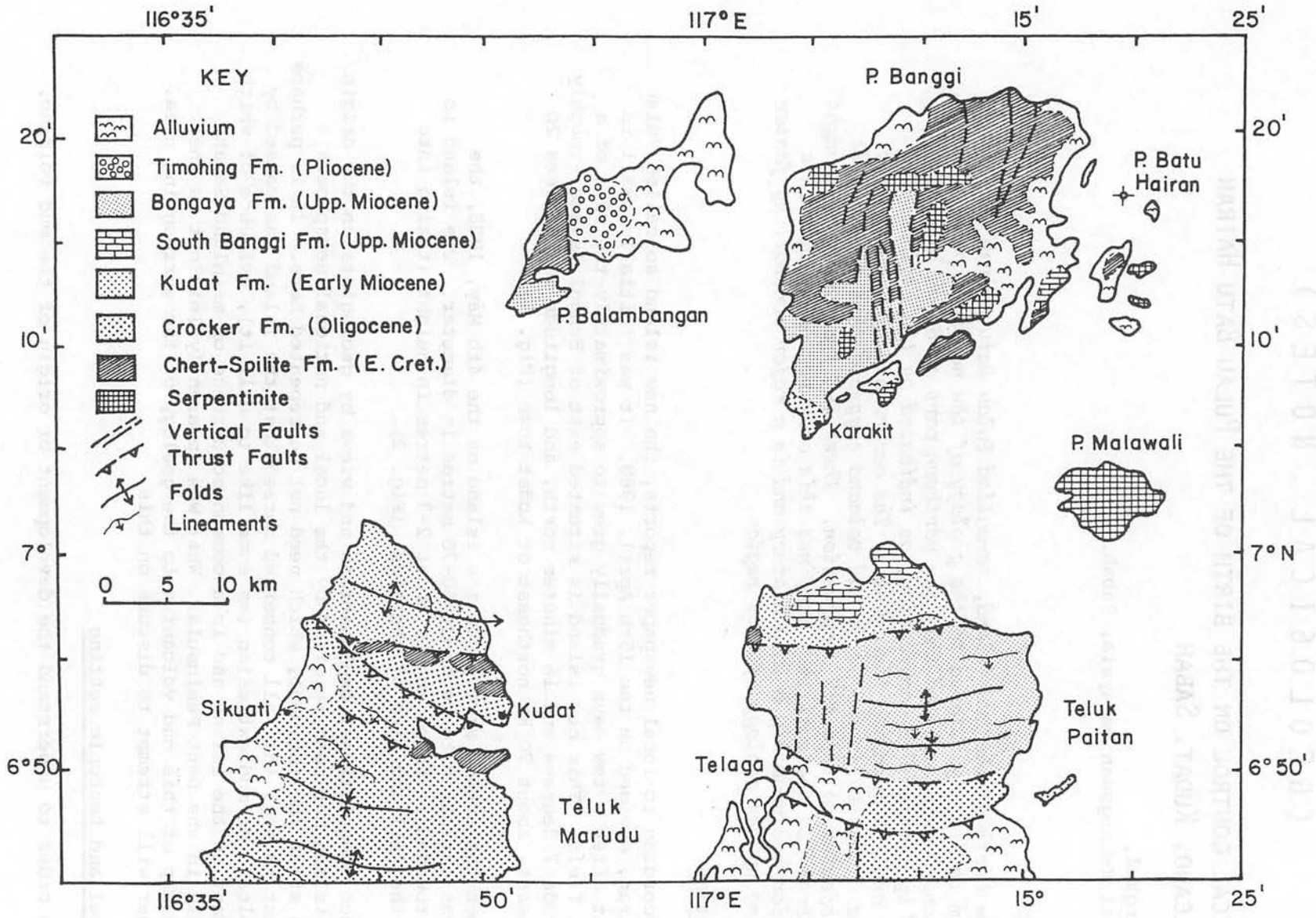

Fig. 1. Geological map of the northern part of Sabah based on old published maps with added structural and sedimentological information. The new island (P. Batu Hairan) lies west of Banggi Island.

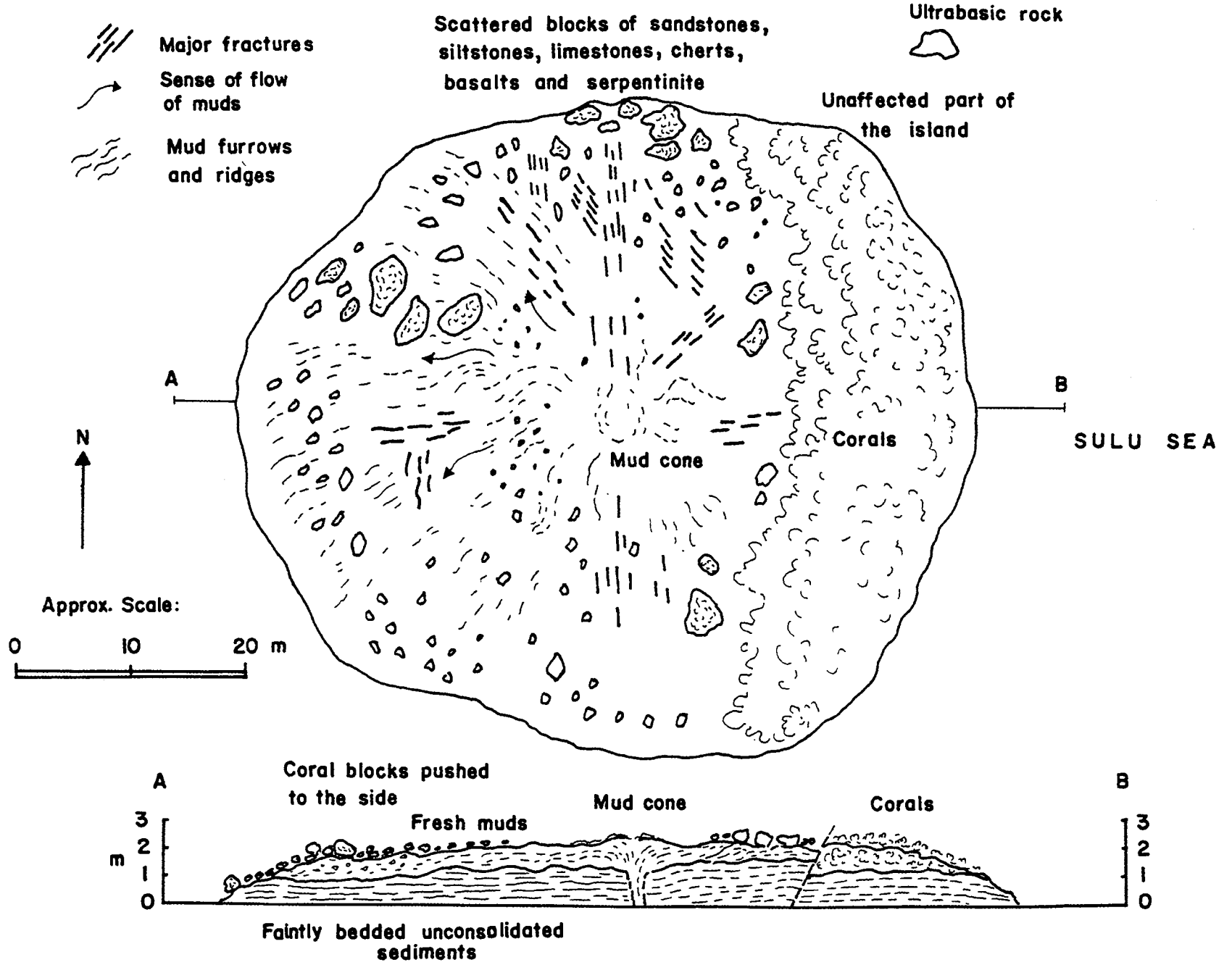

Fig. 2. A rough sketch of the new island with its approximate geological cross-section whowing its morphological and structural features.

a brief review of the geology and tectonic of the surrounding area is necessary.

The northern part of Sabah is located on the southern part of the Reed Bank-Palawan Block. The southward movement of this block as a result of the opening of the South China Sea since Oligocene times (Taylor and Hayes, 1982), is thought to have been the main controlling force affecting this region (Fig. 3).

The geological map of the surrounding area is mainly based on old published maps, with added structural and sedimentological informations (see Fig. 1). The geology of the northern part of Sabah has quite a complex history. The oldest rock unit is the Chert-Spilite Formation (consisting of basaltic and spilitic lavas and banded chert with rare sandstones and shales, deposited in a deep water environment) of Lower Cretaceous age (Basir Jasin *et al.*, 1985). Closely associated with this formation are

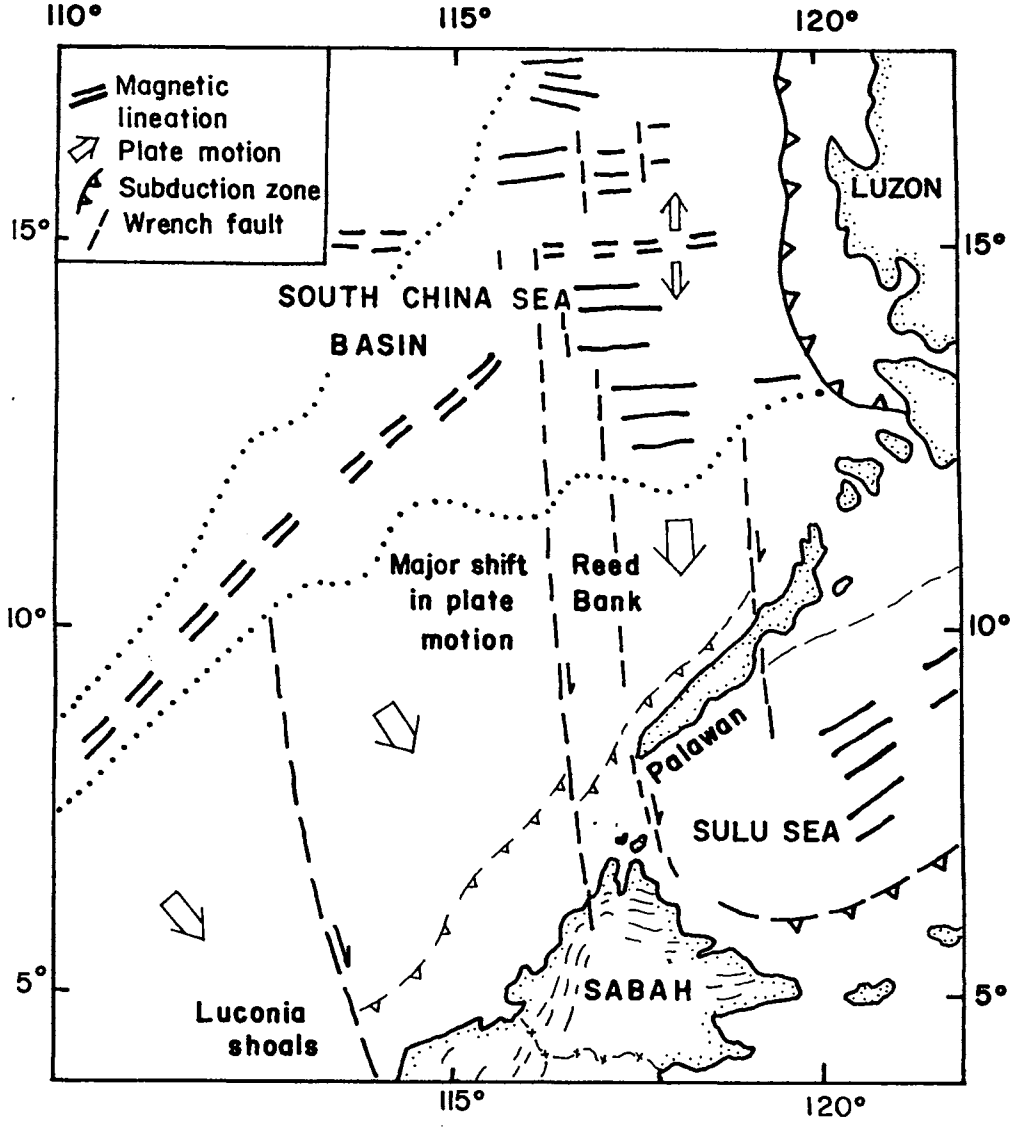

Fig. 3. The tectonic setting of Sabah. The northern part being affected by the southward movement of the Reed Bank-Palawan Block, due to the opening of the South China Sea Basin. Modified from Taylor and Hayes (1982).

igneous rocks (e.g. serpentinite) and metamorphic rocks (e.g. hornblende schists and gneiss) believed to represent remnants of underlying crystalline basement now exposed along thrusts or have been carried up as xenoliths, due to intensive imbrication of this formation.

Lying unconformably on top of the Chert-Spilite Formation is the Crocker Formation (a deep water flysch sediment consisting of rhythmic alternation of grey sandstone and varicoloured shale, including a limestone facies; the Banggi Limestone Member) and Kudat Formation (a lateral facies change of the Crocker Formation towards a shallower environment) of probable Oligocene to Early Miocene age which is tightly folded and imbricated.

The South Banggi and Bongaya Formations (continental, deltaic to shallow marine deposits consisting of sandstones, shales and limestones) of Upper Miocene age, which is gently folded lie unconformably on top of the Crocker and Kudat Formations. Younger deposits of coral limestones, marls and sandstones of probable Pliocene age (Timohing Formation) is believed to lie unconformably on these older rock units, followed by raised beaches and extensive flood plain alluvium (Fig. 4).

The region experienced at least two major episodes of deformation (Tongkul, 1989). An earlier E-W compression (Oligocene-Mid. Miocene), responsible for deforming and imbricating the Chert-Spilite, Crocker and Kudat sediments, in an approximately N-S trend, and a later N-S compression (? Mid. Miocene-Upper Miocene) responsible for refolding and imbrication of these older sediments in a roughly E-W trend (Tongkul, 1989).

This later N-S compression is thought to have reactivated the earlier N-S trending faults in the older rocks to form extensional structures, where most of the younger Bongaya and South Banggi sediments were deposited. This gently folded sediments with an E-W trend indicate that the N-S compression continued up to Pliocene time.

A more detailed description of the geology of the area for the interested reader is referred to Wilson's (1961) memoir.

Observations on the new island

(a) Morphology

The eastern part of the island is a raised coral reef platform (Fig. 2). The surface of the island consists of unconsolidated sediments of about 0.5 metres in thickness (Plate 1). This unconsolidated sediments showing a faint bedding consists of various rock types in a sandy matrix (mostly from coral fragments). Due to the mud volcanic eruption, two-third of the island is covered by muds, and the corals are displaced to the sides of the island. Within this mud are scattered blocks of various rock types. The remaining unaffected part of the island consist of large blocks (more then 50 cm in diametre) of rocks overgrown by corals. Remnant of the mudcone can be roughly located at the centre of the island where the mud shows a higher topography (see Fig. 2).

(b) Matrix

The mud is dominantly grey in colour, though very dark in places with a high carbon content with associated chalcopyrite nodules and patches of

AGE	FORMATION	OROGENY
Recent	Coastal, deltaic and fluviatile alluvium	Stable
Pleistocene	Raised beaches and extensive flood plain alluvium	Uplift and extensional faulting/ subsidence
	unconformity	
Pliocene	Timohing: Coral limestone, marl and sandstone	
	Regional unconformity	N-S Compression gentle folding
Upper Miocene	Bongaya: Well-bedded and massive sandstone, shale and conglomerate; includes a reef limestone facies, the Balambangan Limestone Member	
	South Banggi: Calcareous sandstone and limestone	
Middle Miocence	Regional unconformity	E-W followed by a N-S compression Tight folding and imbrication
Lower Miocene	Kudat: Well-bedded and massive sandstone, shale and subordinate limestone	
Oligocene	Crocker: Rhythmic sequences of turbiditic sandstone and shale; includes a limestone facies, the Banggi Limestone Member	
Eocene to Lower Cretaceous	Regional unconformity	Crushing and imbrication (Oceanic crust)
	Chert-Spilite: Pillow basalt/spilite with radiolarian chert, quartzite and associated serpentinite	
	Metamorphic rocks; hornblende schist and gneiss	

Fig. 4. Probable stratigraphy of the northern part of Sabah.

red muds (Plate 2). These muds are characteristically squeezed and sheared showing slickensided surface (Plate 3). The mud has a high viscosity and apparently oozed out from the vent like a toothpaste. Imbedded within the mud are various types of rock fragments. The size of these rock fragments generally varies from 0.5-10 cm in diameter. Inspection of the mud matrix however shows that most of the fragments are 0.1-1 cm in size (Plate 4). These tiny fragments are mostly fine-grained sandstone and siltstone together with fragments of corals. These tiny fragments are similar to the unconsolidated sediments on the unaffected part of the island. It appears that most of the muds are contaminated by the unconsolidated sediment as they were extruded. Analysis of microfossil from uncontaminated mud sample was unsuccessful. Both the grey and red muds are devoid of any recognisable fossil. Thus the age of this mud matrix is uncertain.

(c) Rock fragments

Rock types found to be associated with the muds are sandstone, siltstone, limestone, chert, basalt and serpentinite of various sizes. Care was taken to ensure that the rock samples were originally imbedded within the mud, and not from the unconsolidated sediments.

Sandstones formed the dominant rock type. Hand samples show that they are mostly fractured. These fractures are filled by calcite veins. The sandstones are hard, mostly grey in colour and fine to medium-grained in size. Thin sections reveal that they are mostly badly sorted with angular grains, and partly cemented by calcite (calcareous). The main mineral grains are quartz, feldspar, and rock fragments of igneous and sedimentary types.

Siltstones are also very common. They are hard, grey to reddish in colour and slightly calcareous. They usually show primary sedimentary structures such as parallel or wavy laminations, and basal structures such as flute marks. Deep water trace fossils are also commonly seen at the base of the sandstones.

Limestones are relatively rare. They are of micritic type. Thin sections show that they are devoid of any recognisable fossil.

Cherts are also relatively rare. They are usually red or brownish red in colour and commonly fractured. These fractures are filled by microcrystalline quartz veins. Thin sections show that they are generally muddy, and commonly show traces of radiolarian tests.

Basalts or spilites are relatively rare compared to serpentinite. The basalts are generally darker in colour and harder while the serpentinite are shiny and greenish in colour. These igneous rocks are mostly weathered.

(d) Structure

On the surface of the dried mud can be found common short discontinuous parallel extensional fractures (see Fig. 2). These fractures has three main orientation, dominant N-S fractures, as well as N33OE and N6OE fractures. Subsidiary E-W fractures was also observed (Plate 5). A minor collapse structure, showing normal faults probably due to readjustment of the mud layer on an irregular coral surface can also be seen.

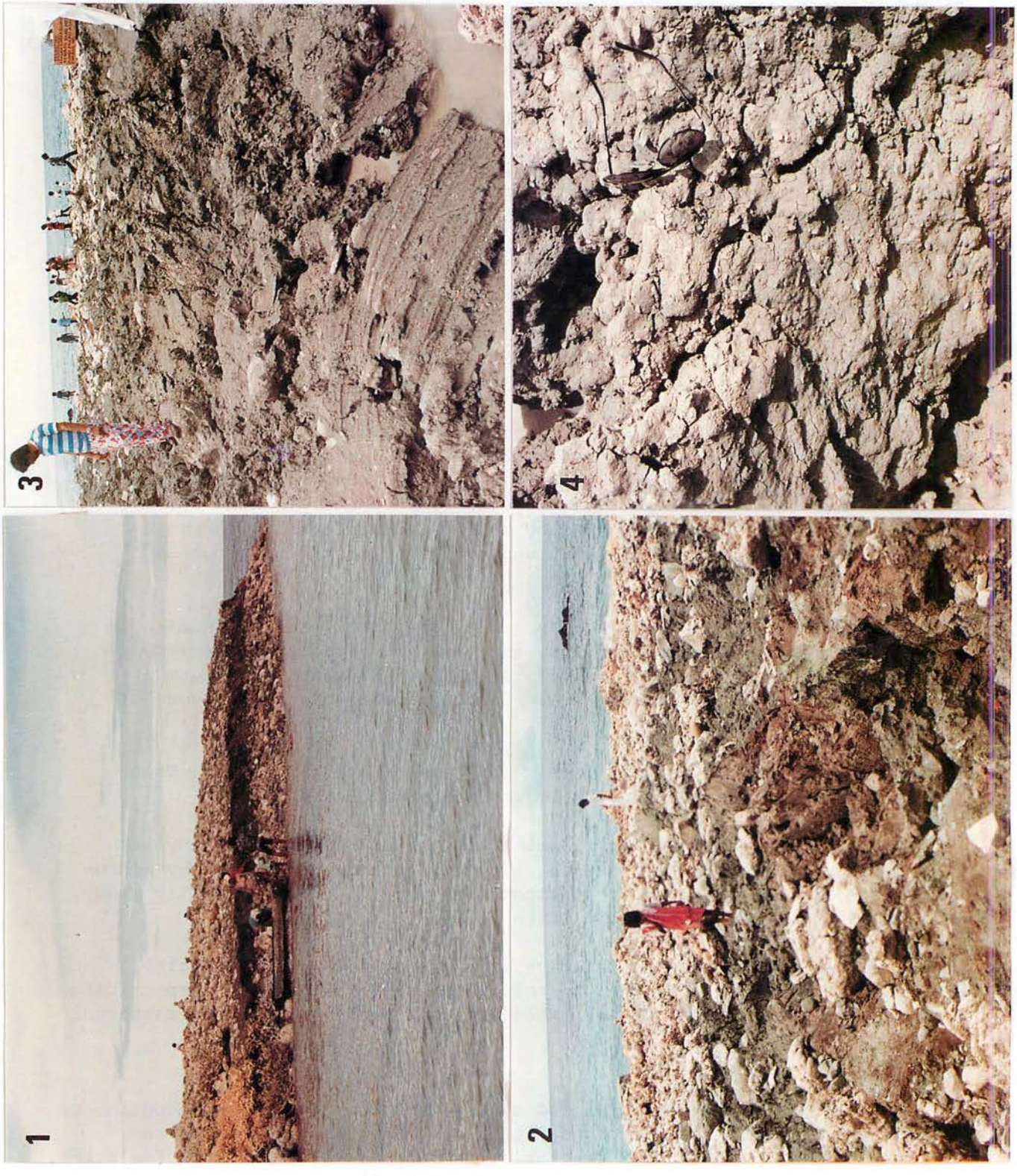
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Plate 1. Faintly-bedded unconsolidated sediments mostly made up of coral fragments on the surface of the new island, unaffected by mud.

Plate 2. Grey and red muds mixed together forming the matrix with various size of rock fragments lying on top. The black ultrabasic rock outcropping in the background.

Plate 3. Squeezed and sheared mud surface indicating a high viscosity. The muds probably oozed from the vent like a toothpaste.

Plate 4. A close-up of the grey mud matrix consisting of small chip-size fragments of dominantly siltstones and fine-grained sandstones.

Plate 5. Short, discontinuous, parallel vertical extensional fractures orientated approximately in a N-S direction on the dried mud surface.

Relationship between the mud volcano, thrust faults and wrench faults

As discussed previously the northern part of Sabah experienced at least 2 episodes of deformation. The later N-S compression was responsible for most of the prominant structures today and reactivating older ones. The effect of this N-S compression is demonstrated up to now by the occurrence of the vertical fractures orientated N-S in the newly born island. The effect of this N-S compression is also currently observed in the Lahad Datu mud volcano, where the author did a recent study (Tongkul, 1988). Thus it may be concluded here that this N-S compression has a long history, and is a major controlling force in shaping the geology of the northern part of Sabah and indeed the eastern part of Sabah too.

The development of the mud volcano is intricately related to major thrust faults and vertical wrench faults, as a result of this N-S compression (Fig. 5).

Mud volcanism is basically the extrusion of overpressured shale from below. The origin of the overpressured shale here is difficult to determine precisely because of the complex geological history of this region. They can originate from different level in the stratigraphic succession. Observations on the nature of the mud matrix, suggest that they might have come from the lower part of the stratigraphic column (see Fig. 4), probably from the Chert-Spilite and Crocker Formations shale units. This is supported by the occurrence of grey and red muds devoid of any recognisable microfossils, together with fine-grained deep water sandstone/siltstone, radiolarian cherts, basalts/spilites and serpentinite fragments, typical of these formations. Overpressured grey and red shale units of the Crocker Formation is commonly observed on land. It is suggested that stacking of this thick sedimentary succession by repeated thrusting generated abnormally high pore pressure in the shale units. Overpressuring of this unit may also be due to sedimentary loading, resulting from rapid sedimentation of the overlying younger rocks. Oil and gas generated from organic materials within shales could also cause overpressuring.

Overpressured shales with low density, deep in the structural succession and overlain by denser material, constitute a metastable condition. The presence of vertical fractures orientated N-S breaking through E-W trending overthrust stack in this region, may have breached the seal that confines the buoyant, plastic, overpressured shale units. Similar breaching of this type are commonly observed in Eastern Indonesia (Barber *et al.*, 1986). Vertical fractures or wrench faults associated with seismic activity, commonly contributes to the development of mud volcanism. The Lahad Datu mud volcano (Tjia, 1978) and Brunei Bay mud volcano (Fitch, 1959) are associated with an earthquake activity. Release of pressure causes expulsion of pore fluids, water and probably gas along this fracture. Adjacent to the fracture or fault, mud or shale becomes liquefied and extrudes into the fault zone, rising through the overlying succession towards the surface as a mud volcano. The streaky and vari-coloured mud which came out of the mud volcano here, indicates that the mud has tapped several shale units within the stratigraphic succession. Undigested blocks of shale, as well as blocks of competent units broken up along the faults are incorporated in the mud. The different types of rock fragments obtained from this mud volcano also suggests that they came from different level in the stratigraphic succession. The calcareous sandstones and limestones may have come from the Banggi Limestone Member of the Crocker Formation or from the South Banggi Formation.

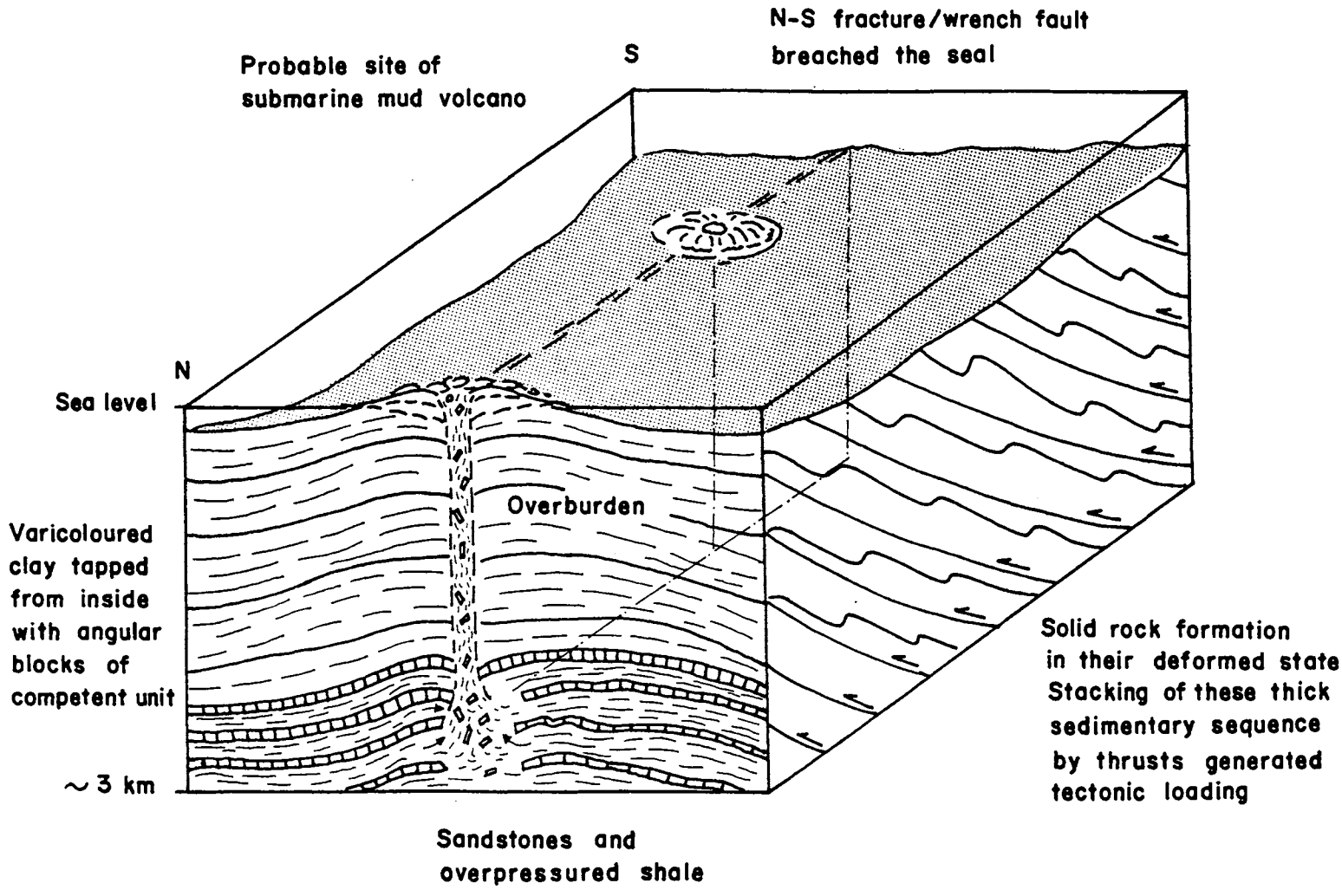

Fig. 5. Conceptual model showing the relationship between the mud volcano, thrust faults and wrench faults. Modified from Barber *et al.* (1986).

The process above may be abrupt and catastrophic, because to support the blocks, the mud must either be fluid moving at high velocity or must have a high viscocity. It is uncertain whether there was a violent eruption here. The extrusion of mud like a toothpaste with striated and slickensided surface, indicate that the mud has a high viscocity. This is probably due to loss of fluid components, as the mud travelled upwards.

The quantities of mud and rocks that are involved in the mud volcano is uncertain, since it occurred below the sea. It is thought that a huge quantity of mud and rock fragments are involved so as to form a new island to rise to more than 2 metres within a few days. A similar underwater mud volcanism was reported by Higgins and Saunders (1969) in the Chatham Island Volcano, Trinidad. They estimated that the island rose 8 metres above sea level in two days during the 1964 eruption, carrying the sea floor up with it, and extruded 255,000 cubic metres of mud and rocks, amounting to 520,000 metric ton. The resulting island was eroded to sea level within 8 months, leaving a shoal covered with rounded boulders of the included blocks from which the clay had been eroded. Thus it is most probable that the new island will also be eroded to sea level in a short time leaving a pile of loose blocks. The faintly-bedded unconsolidated sediments on the uplifted sea floor of the new island probably indicate that the mud volcano has a long history; several episodic eruptions occurred before, followed by erosion and deposition. The continuing N-S compression in this region may in the future initiate another mud volcanism on the same site.

Regional significance of the mud volcano

Mud volcanism is a common feature observed in Sabah, especially on land. The distribution of some of these mud volcano are structurally controlled, especially in the western part of Sabah, the rest however occur randomly. The location of the newly formed mud volcano is too distant to be related to other existing mud volcano. However, as discussed earlier it is related to a N-S fracture or fault zone in this region. It is thus possible that other underwater mud volcanos with a similar trend are present nearby.

Most of the active mud volcano observed onland has a low viscocity, whereby, only small-size (1-5 cm) rock fragments are seen to accompany. The newly born or ressurrected mud volcano island is perhaps one example of a highly viscous type, whereby larger blocks of different types were carried along.

McManus and Tate (1986) suggested that there is a genetic link between mud volcanism and many of the chaotic deposits in Sabah. The newly formed mud volcano supports this suggestion. Mud volcanism is probably one of the main process which contributed to the formation of chaotic deposits in Eastern Sabah, together with tectonic and slumping processes.

Conclusion

From the above discussion it could be shown that the origin of the mud volcano is not an isolated phenomena, but intricately related to the geology of the region. The materials extruded from the mud volcano is directly related to the types of rocks in the region. Mobilized muds provide a mechanism for transporting exotic blocks from deep in the complex towards the surface.

Acknowledgements

My colleagues at the Jabatan Sains Bumi, UKM Sabah contributed directly or indirectly to the ideas presented in this paper. This research was funded by R & D Grant 4-07-03-13.

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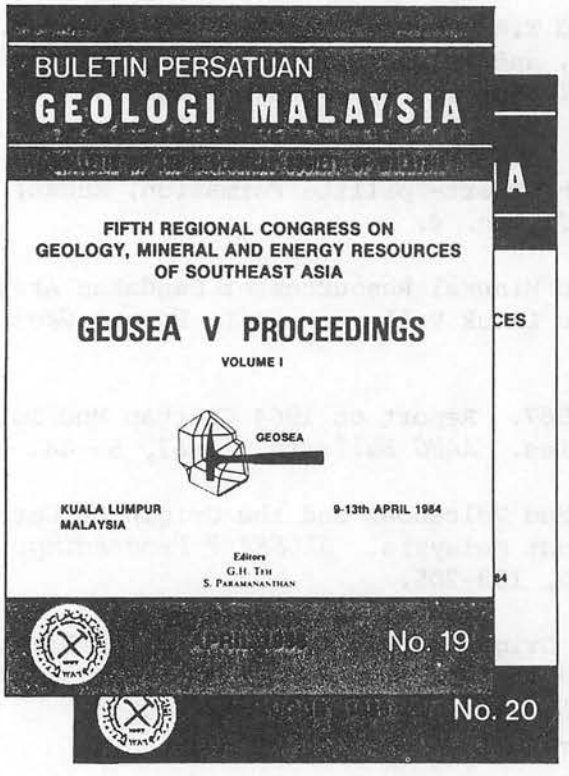

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8. Kumpulan Stratigrafi/Sedimentologi - Azhar Hussin
9. Kumpulan Geologi Struktur - H.D. Tjia
10. Kumpulan Geologi Petroleum - Nik Ramli
11. Wakil Kawasan Ipoh - Aw Peck Chin
12. Wakil Kawasan Penang - Leong Lap Sau
13. Wakil Pantai Timur - Zakaria Hussin
14. Wakil Sabah - Lim Peng Siong
15. Wakil Sarawak - Chen Shick Pei
16. Wakil ke IGCP - G.H. Teh
17. Wakil ke SIRIM, COSTAM dan MSA - Presiden atau yang dinamakan mewakilinya

******

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

1. Chan Pheng Hock, 42-B Jalan Court, 96800 Kapit, Sarawak.
2. Wong Sea Ching, 53 Jalan Senja 25/108, Taman Sri Muda, Shah Alam.

Associate Member

1. David G. Bowen, Core Laboratories, 24 Lim Teck Boo Road, Singapore 1953.

Student Members

1. Mohamad Johari Mohamad Ibrahim, B-24, Universiti Kebangsaan Malaysia, Kampus Sabah, Beg Berkunci 62, 88996 Kota Kinabalu, Sabah.
2. Anyi Ngau, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.

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PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

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

1. Fauzi Zainuddin, Malaysia Mining Corp., 32nd Floor, Menara PNB, 201-A, Jalan Tun Razak, 50400 Kuala Lumpur.
2. Chu Yun Shing, No. 8, Jalan 1/7A, Bandar Baru Bangi, 43000 Kajang, Selangor.
3. P. Yeo, c/o Sylvian Soon, 15 Rigney Ave., Kingsford, NSW 2032, Australia.

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PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The Society has received the following publications:

1. Tamworth - Hastings 1:250,000 Metallogenic Map, 1987.
2. Contributions from the Institute of Geology & Palaeontology Tohoku Univ. 91, 1988.
3. The Science Reports of the Tohoku University, vol. 58, no. 1 (1987), & no. 2 (1988).
4. Science Reports of the Institute of Geoscience, University of Tsukuba, no. 1-9, 1988.
5. Petromin, June 1988.
6. Geological Survey of India News. vol. 18, nos. 3 & 4, 1987.
7. Acta Micropalaeontologica Sinica, vol. 4, no. 4, 1987 & vol. 5, no. 1, 1988.
8. Journal of Stratigraphy, vol. 11, no. 4, 1987 & vol. 12, no. 1, 1988.
9. Acta Palaeontologica Sinica, vol. 26, 6, 1987 & vol. 27, no. 1 & 2, 1988.
10. Journal of Geosciences, Osaka City University. vol. 30, 1987, vol. 31, 1988.
11. IMM Bulletin 978 & 979, 1988.
12. U.S. Geol. Survey B. 1727: B (1988), 1722: C (1988), 1732: B (1988), 1712: D (1988), 1798 (1988).
13. Earthquakes & volcanoes, 19(3), 1987.
14. AAPG Explorer, June 1988.
15. Bulletin of the National Science Museum, vol. 14, nos 1 & 2, 1988.
16. The Science Reports of the Tohoku University, vol. 59, no. 1, 1988.
17. Journal of Hebei College of Geology, vol. 10, no. 4, 1987.
18. Contributions from the various organizations of Ministry of Geology & Mineral Resources, PRC, 1986.
19. Annales Academiae Scientianun Fennicae, 149, 1988.
20. Rare earth elements analysis by XRF technique by Kartiwa Sumadi, 1988.
21. Mineral distribution study for cassiterite and associated heavy minerals in Suratthani, Nakhon Sri Thammarat, Trang, Songkhla & Yala Provinces, Southern Thailand by Jaturong Praditwan, 1988.
22. Investigation for improving Pinyok processing plant by Kit Watanavorakitkul, 1988.

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WARTA GEOLOGI – NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

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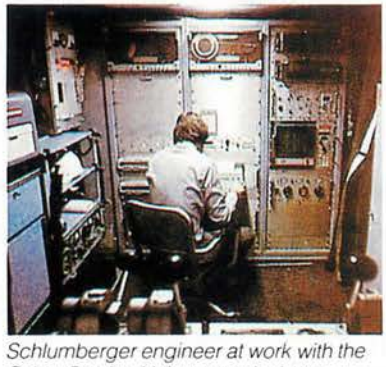

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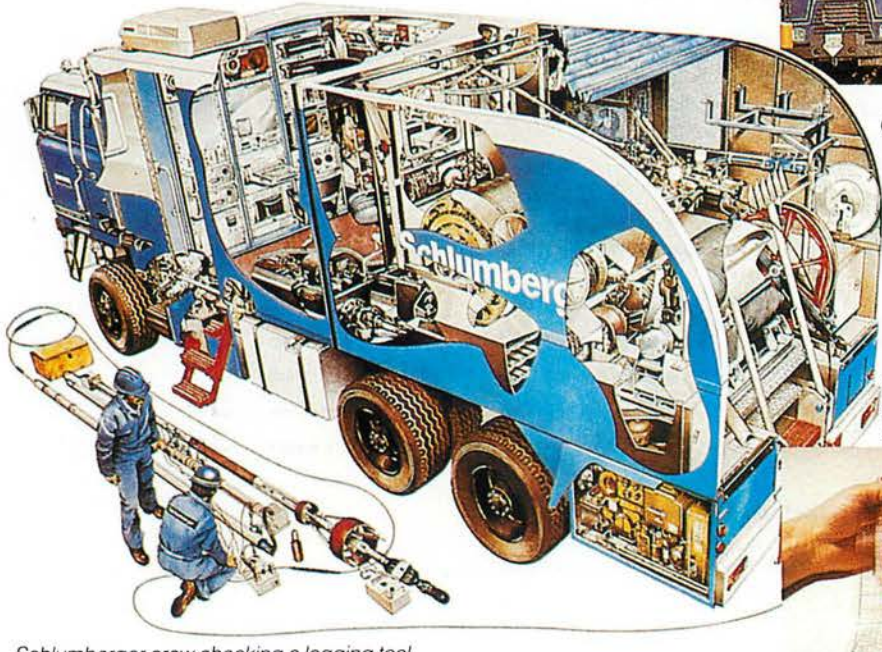

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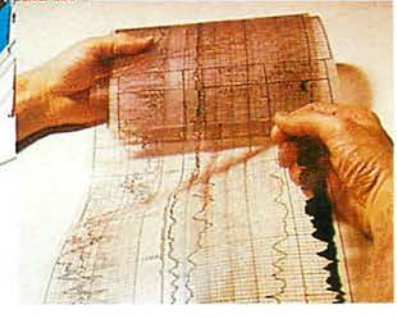

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Wellog (Malaysia): making full use of data.

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BERITA-BERITA LAIN
(OTHER NEWS)

KEMAJUAN PENERBITAN BUKU GEOLOGI - LAPORAN KHAS

Dari segi skop ilmu dan keperluan pembelajaran, geologi merupakan salah satu bidang utama yang diajar di universiti-universiti setempat. Meskipun demikian, dari segi penerbitan, buku-buku geologi dalam bahasa Malaysia paling sedikit diterbitkan. Masalah utamanya bukan saja berpunca daripada kekurangan penulis-penulis dalam bidang ini, malah juga kekurangan editor yang mampu dan sanggup mengurus serta manyunting buku-buku tersebut.

Setakat ini hanya 14 judul buku geologi atau buku yang berkaitan dengannya sahaja yang telah diterbitkan. Antara judul-judul awal ialah *Asas Sains Tanah* (berkaitan dengan pertanian), terbit 1981, *Geomorfologi Pengenalan Kepada Pandangan Darat* (berkaitan dengan geografi), terbit 1981, dan *Sains Tanah* (berkaitan dengan pertanian), terbit 1982. Judul geologi sebenarnya hanya dapat diterbitkan dalam tahun 1984, ialtu *Struktur Geologi Ringkas* (terjemahan).

Jadual berikut ini menggambarkan sepintas lalu kemajuan dan kedudukan projek penerbitan buku-buku geologi Dewan Bahasa dan Pustaka berdasarkan subbidang khususnya.

Daripada jadual di bawah, ternyata kemajuan penerbitan buku-buku dalam bidang geologi amat tidak memuaskan, lebih-lebih lagi bagi karya asli. Jadi adalah diharapkan para cendekiawan tanah air khususnya pensyarah dalam bidang geologi tampil manyumbangkan jasa baktinya demi untuk meletakkan bahasa Malaysia sebagai bahasa ilmu, di samping mengisi ketandusan buku-buku pengajian tinggi.

Kemajuan Projek Penerbitan Buku Geologi

Bil.		Tajuk	Kedudukan
1.	Geologi Am	Prinsip-prinsip Geologi (T)	Pracetak
2.	Pemetaan Geologi	Peta-peta Geologi (T)	Terbit 86
		Latihan Pengenalan Kepada Peta-peta Geologi (KA)	Terbit 86
		Pembacaan Peta Geologi (KA)	Pracetak
3.	Fotoudara/Forogeologi	Fotogeologi dan Pemetaan Rantau (T)	Terjemahan
4.	Geologi Ekonomi		
5.	Geofizik	Bumi Sifat Fizik dan Kimia (KA)	Terbit 87
		Proses Eksogen (KA)	Terbit 87
		Bahan Bumi (KA)	Penulisan
		Proses Endogen (KA)	Penulisan
6.	Geokimia	Prinsip-prinsip Geokimia (T)	Penyuntingan
		Kaedah Geokimia Gunaan (KA)	Precetak
7.	Geologi Kejuruteraan	Geologi Kejuruteraan (T)	Terjemahan
		Geologi untuk Juruteraan (T)	Terjemahan

8.	Geologi Perlombongan		
9.	Geologi Petroleum	Sepintas Lalu Mengenai Minyak Di Lepas Pantai (US)	Terbit 85
		Geologi Petroleum dan Gas Asli Jilid 1 (US)	Terbit 87
		Geologi Petroleum dan Gas Asli Jilid 2 (US)	Terbit 86
10.	Geomorfologi	Geomorfologi Pengenalan Kepada Pandangan Darat (T)	Terbit 81
		Geomorfologi Tropika (T)	Terbit 87
		Geomorfologi (KA)	Terbit 88
11.	Geologi Struktur	Struktur Geologi Ringkas (T)	Terbit 84
		Unsur-unsur Geologi Struktur (T)	Terjemahan
12.	Sains Tanah: Genesis dan Pengelasan Tanah	Asas Sains Tanah (KA)	Terbit 81
		Sains Tanah (KA)	Terbit 82
		Panduan Asas Analisis Mineralogi dan Mikromorfologi Tanah (KA)	Terbit 85
13.	Mineralogi	Pengenalan Mineralogi (KA)	Penulisan
		Pengenalan Kepada Geologi Bijih (T)	Terjemahan
		Mineralogi Optik (KA)	Penyuntingan
		Mineralogi (T)	Terjemahan
14.	Kristalografi		
15.	Paleontologi	Pengenalan Fosil (KA)	Penulisan
		Unsur-unsur Paleontologi (T)	Terjemahan
16.	Petrologi/Petrogenesis	Petrografi: Pengenalan Kepada Kajian Batuan (T)	Terjemahan
		Petrologi Batuan Igneus (T)	Terjemahan
17.	Stratigrafi		
18.	Geologi Statistik		
19.	Hidrologi	Hidrologi Air Bawah Tanah (T)	Terjemahan
20.	Pedologi		
21.	Sedimentologi		
22.	Tektonik		
23.	Geologi Sejarah		
24.	Geologi Samudra		

T = Terjemahan
KA = Karya Asli
US = Ubahsuai

Safian Sulaiman
Buletin Ilmu
Keluaran 11 Mac-Jun 1988

PERSIDANGAN SAINS & TEKNOLOGI NUKLEAR
(THE NATIONAL CONFERENCE ON NUCLEAR SCIENCE AND TECHNOLOGY)
ARAH PENYELIDIKAN DAN PENDIDIKAN SEMASA

17-18 Januari, 1990
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan.
Anjuran Universiti Kebangsaan Malaysia dengan kerjasama Unit Tenaga Nuklear

Introduction

Nuclear techniques were introduced in Malaysia in 1970s initially in Radiotracer and Medical Sciences; and then extended to Food Irradiation. Recently, the techniques were applied in almost all industries. The set up of Nuclear Energy Unit equipped with TRIGA MK II reactor has provided a tremendous impetus to the development of research activities using the nuclear techniques in various fields. Since UKM is one of the first institutions that use these techniques in Malaysia, so it is desirable for UKM to compile up-to-date informations for national uses.

Objective

To get information and look into the achievements of the nuclear techniques in various fields of research.

To collect and stimulate interaction between the researchers and the users of the nuclear techniques.

To look into the development of the nuclear techniques, to make aware of the various benefits and applications of the techniques to the society.

To review the present development of education and training in nuclear science.

Scope

Experimental and theoretical aspects of nuclear science and technology; in pure and life sciences, medicine, agriculture, technology, industry, educational and training.

Participation

All researchers and users of the nuclear techniques from institutions of higher learning, research institutes and industries in Malaysia.

Working papers

Working papers are invited from researchers who actively involved in using the nuclear techniques.

Language

Presentation in Bahasa Malaysia is preferable.

Registration fee

$70.00 - which entitles participant to working papers, food and refreshment during the conference. ($20.00 for student).

Accomodation

Could be arranged if needed.

Enquiry

For further information, please contact:

Jabatan Sains Nuklear,
Universiti Kebangsaan Malaysia,
43600 Bangi, Selangor Darul Ehsan.
(Att. Dr. Che Rosli Che Mat or Hj. Md Soot Hj. Ahmad

Tel: 03 8250001 ext. 2984/2985

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PNG Chamber of Mines and Petroleum
First PNG Petroleum Convention

Port Moresby, 12th-14th February, 1990

Much industry attention has been directed at PNG in recent years following the discovery of oil in substantial quantities in the PNG Highlands. A large number of exploration companies are now operating in the Country. A convention to take stock of and report on progress is being organised to coincide with the start of the decade in which Papua New Guinea seems likely to join the ranks of the oil exporting countries.

The Convention, which is being sponsored and organised by the PNG Chamber of Mines and Petroleum, is intended to have a strong technical bias. Papers on wide aspects of petroleum geology, drilling and engineering have been sought and offered. We expect to develop a technical programme of about 40 papers to be presented over three days and are planning a number of field trips both before and after the main technical meeting. A trade exhibition will be held in the Convention centre. In addition there will be a full social programme for delegates and accompanying spouses.

The Convention is to be held on 12th-14th February 1990 at the Islander Hotel in Port Moresby. We are now seeking preliminary registration with this First Circular. Accommodation and facilities in Port Moresby are limited, and whilst this will be the largest convention yet held in the city we anticipate that numbers may have to be restricted and offered on a first-come basis.

Further details may be obtained from:

PNG Petroleum Convention Organising Committee,
P.O. Box 7059, Boroko,
Papua New Guinea

Tel: (+ 675) 25 2836
Fax: (+ 675) 21 7107
Telex: NE 23486

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THE 2ND ASIA/PACIFIC MINING CONFERENCE AND EXHIBITION

14-17 March 1990, Jakarta, Indonesia.

The 2nd Asia/Pacific Mining Exhibition will serve as a strong catalyst for business by introducing specialised equipment manufacturers and suppliers to key decision makers of companies involved in regional mining.

The concurrent Mining Conference, to be held from 14th to 17th March, 1990 will address issues related to economic and technical aspects of mineral exploration, mining and mineral processing in the region. It will be structured to provide ample information and stimulation for industry engineers, geoscientists, management personnel, government officials and specialists engaged in economics and marketing.

The four day conference programme will feature highly qualified international speakers, who will deliver topical papers on technical and non-technical matters related to the development of metals, industrial minerals and solid fuels in the Asia/Pacific region. The last conference attracted over 400 delegates from 26 countries.

The conference is organised in conjunction with the major mining exhibition in the region, and thus the combined events serve as a regional mining, processing and equipment showcase for international manufacturers and regional suppliers as well as a forum for exchange of information on mineral development.

In February 1988 in Thailand, Asia/Pacific Mining '88 attracted 153 companies from 21 countries, generated off-the-floor orders worth US$250,000 during the four days and another US$5.7 million worth of orders for mining equipment and services were projected to be finalised over the next 12 months.

The Second Asia/Pacific Mining Conference & Exhibition is sponsored by the Asean Federation of Mining Associations (AFMA) formed by the Indonesian Mining Association, the Chamber of Mines of the Philippines and the Mining Industry Council of Thailand, which represents mining professionals and the major mineral producers in their countries. Associations from other countries in the region, including India and China, cooperate actively with AFMA in assuring the success of this event, which will also be supported by the Institution of Mining and Metallurgy (UK) and the Australian Institute of Mining and Metallurgy.

Organised by:

Cahners Exposition Group
(Singapore) Pte. Ltd.,
1 Maritime Square,
#13-02, World Trade Centre,
Singapore 0409
Tel: 2711013
Fax: 2744666
Tlx: RS 39200 CEGSP

In conjunction with:

PT Indo Fair Dinamika,
Jl Kamboja 62, Tomang Raya,
Jakarta 11001,
Indonesia
Tel: 592266/598917
Fax: 6003277
Tlx: 63845 TOPPAN IA

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

1989

August 1989 - June 1991
SOIL SCIENCE AND WATER MANAGEMENT (Wageningen, The Netherlands). A 2-year MSc course organized by Agricultural University Wageningen. Course starts every other year. Language: English. For Information: The Director of Studies of the MSc Course in Soil Science and Water Management, P.O. Box 37, 6700 AA Wageningen, The Netherlands.

August 1989 - October 1989
GEOCHEMICAL PROSPECTING METHODS (Prague, Czechoslovakia). Certificate course organized every second year by the Geological Survey of Czechoslovakia and sponsored by Unesco, IAGC and Czechoslovakia. Language: English. For Information: GEOCHIM Unesco CSSR, Geological Survey of Prague, Malostranské nam. 19, 11821 Prague 1, Czechoslovakia.

September 1989 - October 1989
GROUNDWATER TRACING TECHNIQUES (Graz, Austria). Five-week course organized every other year by the Institute of Technical Geology, Petrography and Mineralogy and sponsored by Unesco. Language: English. For Information: Institute of Technical Geology, Petrography and Mineralogy of the University of Technology, Rechbauerstrasse 12, A-8010 Graz, Austria.

September 1989 - October 1989
REMOTE SENSING AND DIGITAL IMAGE ANALYSIS (Sioux Falls, South Dakota, U.S.A.). U.S. Geological Survey training course for non-U.S. natural scientists on manual interpretation and digital analysis of remotely sensed data. For Information: Training Section, Office of International Geology, U.S. Geological Survey, 917 National Center, Reston, VA 20092, U.S.A.

September 1989 - November 1989
DRILLING OF GEOTHERMAL WELLS (Mexicali, Mexico). Annual 12-week seminar organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For Information: Organizacion Latino-americana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

September 1989 - November 1989
GEOTHERMAL RESERVOIR ENGINEERING (Mexicali, Mexico). Annual 9-week course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For Information: Organizacion Latino-americana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

September 1989 - November 1989
GEOTHERMAL ENERGY (Kyushu, Japan). Annual short course organized by the Government of Japan and sponsored by Unesco. Language: English. For Information: Japan International Cooperation Agency (2nd Training Division, Training Affairs Department), P.O. Box 216, Shinjuku Mitsui Building, 2 - 1, Nishi-shinjuku, Shinkuku-ku, Tokyo 160, Japan.

September 1989 - July 1990
PETROLEUM EXPLORATION GEOLOGY (Headington, Oxford, U.K.). An annual diploma course designed by Oxford Polytechnic to prepare post-graduate geologists for the duties of geologists in oil exploration teams. For Information: M. Hoggins, Department of Geology and Physical Sciences, Oxford Polytechnic, Headington, Oxford OX3 OBP, U.K.

September 1989 - August/November 1990
AEROSPACE SURVEYS FOR: 1) GEOCHEMICAL SURVEY; 2) WATER RESOURCES SURVEY; 3) APPLIED GEOMORPHOLOGY AND ENGINEERING GEOLOGY (Enschede, The Netherlands). Annual post-graduate courses, organized by the International Institute for Aerospace Survey and Earth Sciences (ITC), with Unesco. Language: English. For Information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

September 1989 - August 1990
MINERAL EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerospace Survey and Earth Sciences with Unesco. Language: English. For Information: ITC Student Registration Office (ME), P.O. Box 6, 7500 AA Enschede, The Netherlands.

October 1989 - August 1989
HYDROLOGY AND HYDROGEOLOGY (Belgium). Language: French. For Information: Professeur Dr. ir. A. Monjoie, Directeur des Laboratoires de Géologie de l'Ingénieur, d'Hydrogéologie et de Prospection géophysique - Batiment B19, Faculté des Sciences Appliquées, Université de Liége - SART TILMAN, B-4000 Liege, Belgium.

October 1989 - November 1989
TECTONICS, SEISMOLOGY AND SEISMIC RISK ASSESSMENTS (Potsdam, D.D.R.). One-month training course organized annually by East German Academy of Sciences in collaboration with Unesco. Language: English. For Information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR-500 Postdam, German Democratic Republic.

October 1989 - July 1990
ENGINEERING HYDROLOGY (Galway, Ireland). Annual diploma and post-graduate courses organized by the Dept. of Engineering Hydrology, University College, Galway, Ireland. Sponsored by Unesco-IHP and the World Meteorological Organization. For Information: Prof. J-E. Nash, Department of Engineering Hydrology, University College Galway, Galway, Ireland.

October 1989 - September 1990
WATER AND WASTE ENGINEERING FOR DEVELOPING COUNTRIES (Loughborough, England, U.K.). Twelve-month MSc. programme organized annually for engineers and scientists from developing countries by WEDC. For Information: John Pickford, WEDC, University of Technology, Loughborough, Leics, LE11 3TU, U.K.

October 1989 - September 1990
HYDRAULIC ENGINEERING AND HYDROLOGY (Delft, The Netherlands). Diploma courses organized annually by the International Institute for Hydraulic and Environmental Engineering and sponsored by Unesco for professionals from developing countries. Language: English. For Information: International Institute for Hydraulic and Environmental Engineering (IHE), Oude Delft 95, P.O. Box 3015, 2601 DA Delft, The Netherlands.

October 1989 - September 1991
FUNDAMENTAL AND APPLIED QUATERNARY GEOLOGY (Brussels, Belgium). Annually organized training course leading to a Master's degree in Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. Language: English. For Information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

November 1989 - December 1989
REMOTE SENSING APPLICATIONS FOR EARTH SCIENCES (Enschede, The Netherlands). Annual short course organized by International Institute for Aerospace Survey and Earth Sciences (ITC), with Unesco. Language: English. For Information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

November 1989 - June 1990
GEOTHERMICS (Pisa, Italy). Certificate course organized annually by the Istituto Internazionale per le Ricerche Geotermiche and sponsored by Unesco, UNDP and Italy. Language: English. For Information: Istituto Internazionale per le Ricerche Geotermiche, I Via Buongusto, 56100 Pisa, Italy.

November 1989 - October 1990
ENGINEERING GEOLOGY (Delft, The Netherlands). Annual post-graduate course organized by the International Institute for Aerospace Survey and Earth Sciences (ITC). Language: English. For Information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

1990

January 1990 - July 1990
GENERAL AND APPLIED HYDROLOGY (Madrid, Spain). An annual, 6-month course sponsored by Unesco. Language: Spanish. For Information: Centro de Estudios y Experimentacion de Obras Publicas y Urbanismo, Alfonso XII, Num. 3, Madrid 7, Spain.

January 1990 - July 1990
GROUNDWATER HYDROLOGY (Barcelona, Spain). An annual 6-month, post-graduate course sponsored by Unesco. Language: Spanish. For Information: Curso Internacional de Hidrologia Subterranea, Calle Beethoven, 15, 3°, 08021 Barcelona, Spain.

February 1990
METALLOGENY (Quito, Ecuador). Annual 3-week training course for Latin Americans organized by Central University of Quito, the Autonomous University of Madrid (Spain), and Unesco. Language: Spanish. For Information: Director, Curso Internacional de Metalogenia, Escuela de Geologia, Minas y Petroleos, Division de Post-grado, Universidad Central, Apartado Postal 8779, Quito, Ecuador.

February 1990 - March 1990
GEOCHEMICAL PROSPECTING TECHNIQUES (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. Language: French. For Information: Musée royal de l'Afrique centrale, Steenveg op Leuven, 13, B-1980 Tervuren, Belgium.

February 1990 - April 1990
INTRODUCTION TO DIGITAL IMAGE PROCESSING (Enschede, The Netherlands). Annual course organized by the International Institute for Aerial Survey and Earth Sciences, Enschede, The Netherlands, with Unesco. Language: English. For Information: Student Registration Office, ITC, P.O. Box 6, 7500 AA Enschede, The Netherlands.

February 1990 - June 1990
MINERAL EXPLORATION (Leoben, Austria). Diploma course organized annually by the University of Mining and Metallurgy in Leoben and sponsored by Unesco. Language: English. For Information: University for Mining and Metallurgy, Post-graduate course on mineral exploration, Montanuniversität, Leoben, A-8700, Austria.

February 1990 - July 1990
HYDROLOGY (Budapest, Hungary). An annual six-month, post-graduate course organized by the Research Centre for Water Resources Development (Budapest) and sponsored by Unesco. Language: English. For Information: VITUKI International Post-Graduate Course on Hydrology, H-1453 Budapest, Pf. 227 Hungary.

February 1990 - August 1990
HYDROLOGY (Padova, Italy). An annual, 6-month, postgraduate course sponsored by Unesco. Language: English. For Information: Professor A. Ghetti, Centro Internazionale di Idrologia "Dino Tonini," via sette Chiese, 35043 Monselice, Italy.

October 1990 - September 1992
GEOLOGICAL EXPLORATION METHODS (Nottingham, U.K.). Two-year MSc course starting every other year with emphasis on applied methodology, data acquisition and interpretations). For Information: Dr. M.A. Lovell, Department of Geology, University of Nottingham NG7 2RD, U.K.

December 1990 - January 1991
METHODS AND TECHNIQUES IN EXPLORATION GEOPHYSICS (Hyderabad, India). Diploma course organized every second year by the National Geophysical Research Institute of the Council of Scientific and Industrial Research, Hyderabad, India, and sponsored by Unesco. Language: English. For Information: The Director, International Training Course on Methods and Techniques in Geophysical Exploration, National Geophysical Research Institute, Hyderabad, 500 007 (A.P.) India.

KALENDAR (CALENDAR)

1989

July 24 - August 4, 1989
INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (6th Scientific Assembly), Exeter, U.K. (Dr. Roy Jady, IAGA 1989 Organizing Secretary, Department of Mathematics, University of Exeter, Exeter EX4 4QE, U.K.).

July 31 - August 3, 1989
EROSION AND VOLCANIC DEBRIS FLOW TECHNOLOGY (International Symposium), Yogyakarta, Indonesia. (Mr. Hartono Pramudo, Tromol Pos 23/KBT Kebayoran Baru, Jakarta Selatan, Indonesia).

August 1-3, 1989
PLATINUM (5th International Symposium), Espoo, Finland. Co-sponsored by IAGOD. (Prof. H. Papunen, Department of Geology, University of Turku, SF-20500 Turku, Finland).

August 2-4, 1989
PREPAREDNESS, MITIGATION AND MANAGEMENT OF NATURAL DISASTERS (Symposium), New Delhi, India. Language: English. (Dr. R.C. Agrawal, Symposium PMMND, c/o Dept. of Earthquake Engineering, University of Roorkee, Roorkee-247667, India).

August 3-12, 1989
WATER-ROCK INTERACTION (6th IAGC International Symposium), Malvern, England. (Dr. W.M. Edmunds, British Geological Survey, Wallingford, Oxon OX10 8BB, U.K.).

August 7-10, 1989
PACIFIC NEOGENE STRATIGRAPHIC, PALEOCEANOGRAPHIC AND ANDEAN EVENTS (IGCP-246 Meeting), Vina del Mar, Chile. (IGCP-246, Pacific Science Association, VI Inter-Congress, Box 14187, Suc. 21, Santiago, Chile).

August 13-18, 1989
SOIL MECHANICS AND FOUNDATION ENGINEERING (12th International Conference), Rio de Janeiro, Brazil. (Organizing Committee, XII ICSMFE, Caixa Postal 1559, 2000 Rio de Janeiro PJ, Brazil).

August 14-17, 1989
PRECAMBRIAN GRANITOIDS: Petrogenesis, Geochemistry, and Metallogeny (IGCP 217 and 247 Symposium), Helsinki, Finland. (Precambrian Granitoids Symposium, Department of Geology, University of Helsinki, P.O. Box 115, SF-00171 Helsinki, Finland).

August 14-29, 1989
SPELEOLOGY (10th International Congress), Budapest, Hungary. (10th International Congress of Speleology, c/o Magyar Karszt -'es Barlangkutatas Tarsulat, Anker köz 1, H-1061 Budapest, Hungary).

August 21-25, 1989
INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH (23rd Congress), Ottawa, Canada. (IAHR Secretariat, National Research Council, Building M-58, Montreal Road, Ottawa, Ontario, Canada K1A OR6).

August 21 - September 1, 1989
IASPEI (25th General Assembly), Istanbul, Turkey. Co-sponsored by ICL. (Dr. Otkay Ergunay, Earthquake Research Division, Ministry of Public Works and Settlement, Yuksel Cad No. 7/F, Ankara, Turkey).

August 22-25, 1989
CLASTIC TIDAL DEPOSITS (2nd International Research Symposium), Calgary, Alberta, Canada. (Ray Rahmani, Canadian Hunter Exploration Ltd., 435 - 4th Avenue S.W., Calgary, Alberta, Canada T2P 3A8).

August 28 - September 2, 1989
AIPEA (9th International Clay Conference), Strasbourg, France. (Prof. Dr. Yves Tardy, Institut de Géologie, 1 rue Blessig, 67084 Strasbourg, France).

August 30 - September 2, 1989
ROCK AT GREAT DEPTH (Symposium), Pau, France. (Symposium, Elf Aquitaine, CSTCS, Bat. L5, 64018 Pau Cedex France).

August 31 - September 6, 1989
PALEOLIMNOLOGY (5th International Symposium), Ambleside, Cumbria, U.K. (Prof. Frank Oldfield, Department of Geography, University of Liverpool, P.O. Box 147, Liverpool L69 3BX, U.K.).

September 3-9, 1989
GEOMORPHOLOGY (2nd International Conference), Frankfurt/Main, F.R.G. (Prof. Dr. Arno Semmel, Institut für Physische Geographie, Universität Frankfurt, Senckenberganlage 36, Postfach 11 19 32, D-6000 Frankfurt/Main, F.R. Germany).

September 4-7, 1989
CHALK (International Symposium), Brighton, U.K. (Dr. R.N. Mortimore, Department of Civil Engineering, Brighton Polytechnic, Moulsecoomb, Brighton BN2 4GJ, U.K.).

September 4-8, 1989
NON-METALLIC MINERALS (2nd World Congress), Beijing, China. (Prof. Xu Changyou, Wuhan University of Technology, Wuhan, Hubei Province, P.R. China).

September 4-8, 1989
COASTAL EVOLUTION, MANAGEMENT AND EXPLORATION IN SOUTHEAST ASIA (IGCP-274 International Symposium), Ipoh, Malaysia. (Dr. H.D. Tjia, Jabatan Geologi, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia).

September 4-9, 1989
ANALYSIS OF SEISMICITY AND SEISMIC RISK (4th International Symposium), Bechyne, Czechoslovakia. (Dr. Z. Schenkova, Geophysical Institute, Bocni II, 14131 Prague 4, Czechoslovakia).

September 4-13, 1989
MICROPALEONTOLOGICAL COLLOQUIUM (26th), Budapest, Hungary. IPA. (Dr. A. Nagymarosy, Department of Geology, "Eötvös L." University, Budapest VIII, Muzeum krt. 4/A H-1088, Hungary).

September 10-14, 1989
QUATERNARY ENGINEERING GEOLOGY (Conference), Edinburgh, U.K. Cosponsored by IAEG. (Dr. J.A. Little, Dept. of Civil Engineering, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, Scotland, U.K.)

September 10-15, 1989
GEOLOGY AND RESERVOIR HETEROGENEITY (Symposium), Banff, Alberta, Canada. (Mrs.) Pat Larlham, Faculty of Extension, University of Alberta, Edmonton, Alberta, Canada T6G 2G4).

September 10-16, 1989
PALAEOCEANOGRAPHY (3rd International Conference), Cambridge, U.K. (N.J. Shackleton, Department of Earth Sciences, University of Cambridge, Dowing Street, Cambridge CB2 3EQ, U.K.).

September 11-22, 1989
ARCHEAN - PROTEROZOIC TRANSITION (Field Conference), Harare, Zimbabwe. Co-sponsored by IGCP and IUGS. (Apt 89, Geological Society of Zimbabwe, P.O. Box 8427, Causeway, Harare, Zimbabwe).

September 12-15, 1989
COAL: Formation, Occurrence and Related Properties (International Meeting), Orléans, France. (P. Bertrand, Unité de Recherche en Pétrologie, Organique, Université d'Orleans, 45067 Orléans, Cedex 2, France).

September 14-19, 1989
EDITING INTO THE 90's (Joint CBE, EASE, AESE Meeting), Ottawa, Canada. (Conference Office, National Research Council of Canada, Ottawa, Ontario, Canada K1A OR6).

September 17-24, 1989
AGGLUTINATED FORAMINIFERA (3rd International Workshop), Tübingen, F.R.G. (Dr. C.H. Leben, Geologisches Institut der Universität, Sigwartstrasse 10, D-7400 Tübingen, Federal Republic of Germany).

September 17-24, 1989
ENERGY (14th World Congress), Montreal, Quebec, Canada. (World Energy Conf., 34th St. James's Street, London SW1A 1HD, U.K.).

September 18-22, 1989
ORGANIC GEOCHEMISTRY (14th International Congress), Paris, France. (Ms. Yolande Rondot, Institut Francais du Petrole, B.P. 311, 92506 Rueil-Malmaison cedex, France).

September 24-30, 1989
CARBONIFEROUS STRATIGRAPHY (IUGS Subcommission Biennial Field and General Meeting), Utah/Nevada, U.S.A. (Walter L. Manger, Department of Geology, University of Arkansas, Fayetteville, AK 72701, U.S.A.).

September 25-28, 1989
MINING LATIN AMERICA (IMM Conference and Exhibition), Rio de Janerio, Brazil. (The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.).

October 1-4, 1989
SINKHOLES AND THE ENGINEERING AND ENVIRONMENTAL IMPACTS OF KARST (3rd Multidisciplinary Conference), St. Petersburg, Florida, U.S.A. (Conference, Florida Sinkhole Research Institute, University of Central Florida, Orlando, FL 332816, U.S.A.).

October 1-6, 1989
GEOCHEMICAL EXPLORATION (13th International Symposium) and BRAZILIAN GEOCHEMICAL CONGRESS (2nd), Rio de Janeiro, Brazil. Co-sponsored by AEG. Languages: Symposium - English; Congress - Protuguese. (D.C. Bruni, 13th IGES, P.O. Box 2432, 20010, Rio de Janeiro, R.J., Brazil).

October 2-4, 1989
FLUVIAL SEDIMENTOLOGY (4th International Conference), Barcelona, Spain. (C. Puigdefàbregas, Servei Geologic de Catalunya, carrer Diputacio 92, 08015 Barcelona, Spain).

October 2-5, 1989
GROUNDWATER MANAGEMENT: QUANTITY AND QUALITY (International Symposium), Benidorm, Alicante, Spain. Language: English. (Secretary General, IAHS, Institute of Hydrology, Wallingford, Oxon. OX10 8BB, U.K.).

October 16-20, 1989
EARTHQUAKE PROGNOSTICS (4th International Seminar). Beijing, P.R. China. Language: English. (Prof. Wu Yilin, Crustal Deformation Department, Institute of Seismology, State Seismological Bureau of China, Xiao Hong Shan, Wuhan, P.R. China).

October 16-20, 1989
MATHEMATICAL METHODS IN GEOLOGY (IAMG Symposium), Pribram, Czechoslovakia. Sekretariat symposia, Hornicka Pribram ve Vede a Technice, post. schr. 41,261 02 Pribram, Czechoslovakia).

October 18-20, 1989
STRUCTURAL AND TECTONIC MODELLING AND ITS APPLICATION TO PETROLEUM GEOLOGY (Meeting), Stavanger, Norway. (Norwegian Petroleum Society, P.O. Box 1897 - Vika, 0124 Oslo, Norway).

October 22-25, 1989
WORLD GOLD '89 (Meeting), Reno, Nevada, U.S.A. (Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162, U.S.A.).

October 23-27, 1989
COAL SCIENCE (International Conference), Tokyo, Japan. Language: English. (Secretariat for ICCS, Coal Conversion Department, New Energy Development Organization (NEDO), Sunshine 60 Building, 1-1, Higashi-Ikeburkuro 3-chome, Toshima-ku, Tokyo 170, Japan).

October 29 - November 2, 1989
SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Dallas, Texas, U.S.A. (Convention Assistant, SEG, P.O. Box 3098, Tulsa, OK 74101, U.S.A.).

November 6-9, 1989
GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), St. Louis, Missouri, U.S.A. (Meetings Department, GSA, P.O. Box 9140, Boulder, CO 80301, U.S.A.).

November 13-15, 1989
MINERAL EXPLORATION PROGRAMME '89 (Symposium), Madrid, Spain. (MEP '89, 4 Brandon Road, London N7 9TR, England, U.K.).

November 14-16, 1989
WORLD WATER (Conference), Wembley, London, U.K. (World Water '89, Conference, Office, Institution of Civil Engineers, 1 - 7 Great George Street, Westminster, London SW1P 3AA, U.K.).

November - December 1989
PETROLEUM GEOLOGY SEMINAR '89, Kuala Lumpur, Malaysia. (c/o Organizing Chairman, Geological Society of Malaysia, Geology Department, University of Malaya, 59100 Kuala Lumpur, Malaysia).

December 4-8, 1989
AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, Calif., U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.).

1990

January, 1990
ANNUAL CONFERENCE '90, GEOLOGICAL SOCIETY MALAYSIA (Organising Chairman, Geological Society of Malaysia, c/o Geology Dept., University of Malaya, 59100 Kuala Lumpur, Malaysia).

January 15-27, 1990
OMAN OPHIOLITE, STRUCTURE, PETROLOGY, STRATIGRAPHY (International Symposium), Muscat, Sultanate of Oman. (Secretary, Hilal Azry, Ministry of Petroleum and Minerals, P.O. Box 551, Muscat, Oman).

February 5-9, 1990
BRACHIOPODS (2nd International Congress), Dunedin, New Zealand. (J.D. Campbell, Geology Department, University of Otago, P.O. Box 56, Dunedin, New Zealand).

April 18-20, 1990
OROGENESIS IN ACTION: Tectonics and Processes in the West Equatorial Pacific Margin (Meeting), London, U.K. (R. Hall, Department of Geological Sciences, University College London, Gower Street, London WC1E 6BT, U.K.).

May 6-12, 1990
PACIFIC RIM 90 (International Congress), Gold Coast, Queensland, Australia. (The AusIMM-Pacrim 90, P.O. Box 731, Toowong Qld 4066, Australia).

May 14-18, 1990
WORLD MINING (14th Congress), Beijing, P.R. China. (China Organizing Committee, 14th World Mining Congress, 54 Sanlihe Road, Beijing, People's Republic of China).

May 29 - June, 1990
EUROPEAN ASSOCIATION OF EXPLORATION GEOPHYSICISTS (52nd Annual Meeting), Copenhagen, Denmark. (J. Tychsen, Miljoministeriet, Amaliegade 13, DK-1265, Copenhagen K, Denmark).

June 1990
GEOCHEMISTRY OF WEATHERING (2nd International Symposium), Aix-en-Provence, France. Sponsored by IAGC. (B. Hitchon, Alberta Research Council, Box 8330, Station F. Edmonton, Alberta, Canada T6H 5X2).

June 3-6, 1990
AAPG/SEPM (Annual Meeting), San Francisco, California, U.S.A. (Convention Department, AAPG, Box 979, Tulsa, OK 74101, U.S.A.).

June 25-30, 1990
GEOSCIENCE INFORMATION (4th International Conference), Ottawa, Canada. (A. Bourgeouis, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, Canada K1A 0E8).

June 28 - July 3, 1990
INTERNATIONAL MINERALOGICAL ASSOCIATION (15th General Assembly), Beijing, P.R. China. (Prof. Huang Yunhui, c/o Institute of Mineral Deposits, Chinese Academy of Geological Sciences, Baiwan-zhuang Road 26, Fuchengmenwai, Beijing, P.R. China).

July, 1990
CAMBRIAN SYSTEM (3rd International Symposium), Novosibirsk, U.S.S.R. (Dr. J.W. Cowie, Department of Geology, University of Bristol, Queen's Building, University Walk, Bristol BS8 1RJ, England).

July 19-28, 1990
INTERNATIONAL UNION OF CRYSTALLOGRAPHY (15th Congress), Bordeaux, France. (Stefan S. Hafner, University of Marburg, 3550 Marburg, F.R. Germany).

July 29 - August 3, 1990
CIRCUM-PACIFIC ENERGY AND MINERALS RESOURCES (Conference), Honolulu, Hawaii. (Mary Stewart, Circum-Pacific Council on Energy and Mineral Resources, 5100 Westheimer Road, Houston, TX 77056, U.S.A.).

August, 1990
IGES (13th International Geochemical Exploration Symposium), Rio de Janeiro, Brazil. Sponsored by AEG. (Sherman Marsh, USGS, Federal Center MS 973, Denver, CO 80309-0250, U.S.A.).

August 6-10, 1990
IAEG (6th International Congress), Amsterdam, The Netherlands. Language: English and French. (Dr. L. Primel, L.C.P.C., 58 Boulevard Lefebvre, 75732 Paris Cedex 15, France).

August 12-18, 1990
INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (8th Symposium), Ottawa, Canada. (Dr. R.W. Boyle, 601 Booth Street, Ottawa, Canada K1A 0E8).

August 15-17, 1990
ARCTIC GEOLOGY AND PETROLEUM POTENTIAL (Meeting), Troms, Norway. (Norwegian Petroleum Society, Box 1897-Vika, 0124 Oslo 1, Norway).

August 26 - September 1, 1990
SEDIMENTOLOGY (13th International IAS Congress), Nottingham, U.K. (I.N. McCave, Department of Earth Sciences, University of Cambridge, Dowing Street, Cambridge CB2 3EQ, U.K.).

August 26 - September 8, 1990
LATIN AMERICAN CONODONT SYMPOSIUM, La Paz, Bolivia and San Juan, Argentina. (Mario Hunicken, Academia Nacional de Ciencias, Casilla Correo 36, 5000 Cordoba, Argentina).

August 27 - September 1, 1990
WATER RESOURCES IN MOUNTAINOUS REGIONS (International Symposium and IAH 22nd Congress), Lausanne, Switzerland. (Dr. A. Parriaux, Laboratory of Geology EPFL (GEOLEP), CH-1015 Lausanne, Switzerland).

September 1990
GEOCHEMICAL EXPLORATION (13th International Symposium), Prague, Czechoslovakia. Joint IAGC and AEG meeting. (B. Hitchon, Alberta Research Council, P.O. 8330, Station F. Edmonton, Alberta, Canada T6H 5X2).

September - October 1990
IPA GRAPTOLITE WORKING GROUP (4th International Conference), Nanjing, P.R. China. (Chen Xu, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Chi-Ming-Sau, Nanjing, P.R. China).

September 3-8, 1990
VOLCANOLOGY (International Congress), Mainz, F.R.G. (G. Brey, Max Planck Institut für Chemie, Abtl. Kosmochemie, Saarstrasse 23, 6500 Mainz, Federal Republic of Germany).

September 4-7, 1990
DEEP SEISMIC REFLECTION PROFILING OF THE CONTINENTAL LITHOSPHERE (4th International Symposium), Bayreuth, F.R.G. (C. Reichert, DEKORP, NLfB, Postfach 510153, D-3000 Hannover 51, F.R. Germany).

September 17-21, 1990
ARCHAEN (Symposium), Perth, Australia. (D.I. Groves, Department of Geology, University of Western Australia, Nedlands, Western Australia 6009).

September 23-27, 1990
SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), San Francisco, U.S.A. (Convention Assistant, SEG, P.O. Box 3098, Tulsa, OK 74101, U.S.A).

September 24-29, 1990
GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPE GEOLOGY (7th International Conference), Canberra, Australia. (Organizing Committee, ICOG 7, Research School of Earth Sciences, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia).

September 28 - October 2, 1990
BENTHIC FORAMINIFERA (4th International Symposium), Sendai, Japan. (Dr. Yokichi Takayanagi, Institute of Geology and Paleontology, Tohoku University, Sendai, 980 Japan).

October 29 - November 1, 1990
GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Dallas, Texas, U.S.A. (GSA, P.O. 9140 Boulder, CO 80301, U.S.A.).

November 1990
MEDITERRANEAN NEOGENE (9th International Congress), Barcelona, Spain. Cosponsored by IUGS. (Prof. Jordi Martinell, Fac. de Geologia, Univ. de Barcelona, Zona Universitaria de Pedralbes, 08028 Barcelona, Spain).

1991

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

April 7-10, 1991
AAPG/SEPM (Annual Meeting), Dallas, Texas, U.S.A. (Convention Department, AAPG, Box 979, Tulsa, OK 74101, U.S.A.).

April 26 - May 1, 1991
ASSOCIATION OF EXPLORATION GEOCHEMISTS (15th International Geochemical Exploration Symposium), Reno, U.S.A. (Richard B. Jones, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada 89557-0088, U.S.A.

May 27-29, 1991
GAC/MAC (Joint Annual Meeting), Toronto, Canada. (J. Fawcett, Department of Geology, University of Toronto, Toronto, Ontario, Canada M5S 1A1).

August 2-9, 1991
QUATERNARY RESEARCH (13th International Congress), Beijing, P.R. China. (Secretariat, 13th INQUA Congress, Chinese Academy of Sciences, 52 Sanlihe, Beijing 100864, P.R. China).

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS
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Bulletin 1 (1968). 79 p. Studies in Malaysian Geology. Edited by P.H. Stauffer. A collection of papers presented at a meeting of the Geological Society on 31st January 1967. Price: M$3.00 (US$1.50).

Bulletin 2 (1968). 152 p. Bibliography and Index of the Geology of West Malaysia and Singapore by D.J. Gobbett. Price: M$10.00 (US$5.00)—Softcover; M$15.00 (US$7.50).

Bulletin 3 (1970). 146 p. Papers in Geomorphology and Stratigraphy (with Bibliography supplement). Edited by P.H. Stauffer. Price: M$10.00 (US$5.00).

Bulletin 4 (1971). 100 p. Papers in Petrology, Structure and Economic Geology. Edited by P.H. Stauffer. Price: M$10.00 (US$5.00).

Bulletin 5 (1973). 70 p. The Search for Tungsten Deposits by K.F.G. Hosking. Price: M$10.00 (US$5.00).

Bulletin 6 (1973). 334 p. Proceedings, Regional Conference on the Geology of Southeast Asia. A collection of papers, Kuala Lumpur, March, 1972. Edited by B.K. Tan. Price: M$22.00 (US$11.00)—hardcover only.

Bulletin 7 (1974). 138 p. A collection of papers on geology. Edited by B.K. Tan. Price: M$12.00 (US$6.00).

Bulletin 8 (1977). 158 p. A collection of papers on geology. Edited by T.T. Khoo. Price: M$12.00 (US$6.00).

Bulletin 9 (1977). 277 p. The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting, 12–13 November 1975, Kuala Lumpur. Edited by J.A. Roddick & T.T. Khoo. Price: M$25.00 (US$12.00).

Bulletin 10 (1978). 95 p. A collection of papers on the geology of South-east Asia. Edited by C.H. Yeap. Price: M$10.00 (US$5.00).

Bulletin 11 (1979). 393 p. Geology of Tin Deposits. A collection of papers presented at the International Symposium on 'Geology of Tin Deposits', 23–25 March 1978, Kuala Lumpur. Edited by C.H. Yeap. Price: M$50.00 (US$22.00).

Bulletin 12 (1980). 86 p. A collection of papers on geology. Edited by G.H. Teh. Price: M$20.00 (US$9.50).

Bulletin 13 (1980). 111 p. A collection of papers on the geology of Malaysia and Thailand. Edited by G.H. Teh. Price: M$20.00 (US$9.50).

Bulletin 14 (1981). 151 p. A collection of papers on the geology of Southeast Asia. Edited by G.H. Teh. Price: M$30.00 (US$14.00).

Bulletin 15 (1982). 151 p. A collection of papers on geology. Edited by G.H. Teh. Price: M$30.00 (US$14.00).

Bulletin 16 (1983). 239 p. A collection of papers on geology. Edited by G.H. Teh. Price: M$30.00 (US$14.00).

Bulletin 17 (1984). 371 p. A collection of papers on geology. Edited by G.H. Teh. Price: M$35.00 (US$17.00).

Bulletin 18 (1985). 209 p. Special Issue on Petroleum Geology. Edited by G.H. Teh & S. Paramananthan. Price: M$30.00 (US$17.00).

Bulletin 19 (1986). 652 p. GEOSEA V Proceedings Vol. I. Fifth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia, Kuala Lumpur, 9–13 April 1984. Edited by G.H. Teh & S. Paramananthan. Price for Bulletins 19 & 20: Members—M$50.00 (US$21.90), Non-members—M$125.00 (US$53.20).

Field Guide 1. A 7-day one thousand mile, geological excursion in Central and South Malaya (West Malaysia and Singapore) (1973). 40 p. by C.S. Hutchison. Price: M$5.00 (US$2.50).

Abstracts of papers. Regional Conference on the Geology of Southeast Asia. Kuala Lumpur (1972). 64 p. 8 figs. 3 tables, many extended abstracts. Edited by N.S. Haile. Price: M$6.00 (US$3.00).

Proceedings of the Workshop on Stratigraphic Correlation of Thailand and Malaysia Vol. 1: Technical Papers (1983). 383 p. Price: M$25.00 (US$12.40). (Members: M$12.00/US$6.50).

WARTA GEOLOGI (Newsletter of the Geological Society of Malaysia). Price: M$5.00 (US$3.20) per bimonthly issue from July 1966.

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Dengan ini saya mengaku iaitu semua maklumat-maklumat yang saya catitkan diatas adalah betul dan benar, dan jika saya dilantik, akan mematuhi Perlembagaan dan Undang-undang Persatuan.
I declare that the information given above is true and accurate and also, if elected, will observe the Constitution and By-Laws of the Society.

Tarikh ..... Tandatangan .....
Date *Signature*

Particulars

1. Completed application form should be sent to the Hon. Secretary, Geological Society of Malaysia, c/o Dept. of Geology, University of Malaya, 59100 Kuala Lumpur, Malaysia.

2. **Article III, Constitution of Society**

   Candidates for Full Member shall be persons who have a Bachelors degree in geology or equivalent qualifications in a related science or an equivalent training through practical experience.

   Section 6

   Any person who is enrolled as a student in geology or related science in an institution of higher learning is eligible for Student Membership.

   Student Members shall enjoy all the privileges of Corporate Membership save that they shall not hold office or vote. The Council may advance to Corporate Membership upon application those Student Members in good standing who have subsequent to election fulfilled the requirements therefore. Student membership shall be limited to a maximum of five years. Any Student Member who has (1) not applied for transfer to another class of membership or (2) whose application for such transfer has not been approved prior to the termination of five years of membership shall be considered as having resigned. At the discretion of the Council the five years period may be extended upon application to the Council.

   Section 7

   Any person who is interested in geology, but who does not meet the requirements of other classes of membership, shall be eligible for Associate membership. Associate Members shall enjoy all the privileges of Corporate membership in the Society except that they shall not be eligible to vote or hold office. The Council upon application may transfer to Corporate membership, those Associate Members in good standing who have subsequent to election, fulfilled the requirements therefore.

3. **By-Laws 1, Section 2, Constitution of Society**

   The annual dues of Full, Associate and Professional Members shall be 40.00 ringgit. An entrance fee of 20.00 ringgit shall be payable on election.

   The annual dues of student members shall be 10.00 ringgit. No entrance fee shall be payable by persons elected as Student Members, nor by Student Members promoted to Corporated Membership provided they have been student members for at least two years.

   Section 3

   Upon the payment of 400.00 ringgit, any Full or Associate Member in good standing may be elected to Life membership.

Butir-butir

1. Borang permohonan yang telah dipenuhi hendaklah dikirimkan kepada Setiausaha Kehormat, Persatuan Geologi Malaysia, d/a Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur, Malaysia.

2. **Artikel III, Perlembagaan Persatuan**

   Calun-calun untuk menjadi Ahli Penuh adalah seseorang yang mempunyai Ijazah didalam bidang geologi atau kelulusan yang sama di dalam bidang sains berhubungan atau mempunyai latihan yang sama menerusi pengalaman amali.

   Seksyen 6

   Seseorang yang berdaftar sebagai seorang penuntut di dalam geologi atau sains yang berhubungan didalam mana-mana satu institusi pengajian tinggi adalah layak menjadi seorang Ahli Penuntut.

   Ahli-ahli penuntut adalah layak menikmati keistimewaan-keistimewaan yang sama seperti Ahli Sekutu tertakluk kepada bahawa mereka tidak memegang apa-apa jawatan atau hak mengundi. Pihak Majlis boleh memajukan permohonan Ahli Penuntut menjadi Ahli Sekutu dengan syarat permohon mempunyai kedudukan baik dan setelah dilantik memenuhi keperluan-keperluan yang ada. Tempoh maksima keahlian bagi Ahli Penuntut ialah lima tahun. Seseorang Ahli Penuntut yang (1) belum membuat permohonan pemindahan kepada kelas ahli yang lain, atau (2) permohonannya untuk pemindahan belum lagi diluluskan sebelum keahlian selama lima tahun tamat; adalah dianggap telah berhenti. Tertakluk kepada budibicara dan pertimbangan Majlis, jangka masa lima tahun boleh dilanjutkan semasa membuat permohonan kepada Majlis.

   Seksyen 7

   Seseorang yang berminat dalam bidang geologi akan tetapi tidak memenuhi keperluan seperti diperlukan didalam kelas-kelas keahlian yang lain adalah layak untuk memohon menjadi Ahli Gabungan.

3. **Undang-undang 1, Fasal 2, Perlembagaan Persatuan**

   Yuran tahunan bagi Ahli-ahli Penuh, Sekutu dan Profesyenal adalah sebanyak 40.00 ringgit. Yuran masuk adalah 20.00 ringgit dan hendaklah dibayar apabila permohonan diluluskan.

   Yuran tahunan bagi Ahli-ahli Penuntut adalah sebanyak 10.00 ringgit. Yuran masuk tidak dikenakan kepada Ahli-ahli Penuntut apabila ianya diterima sebagai ahli. Seseorang Ahli Penuntut yang telah dilantik sebagai seorang Ahli Sekutu tidak dikenakan apa-apa bayaran masuk dengan syarat ianya telah menjadi Ahli Penuntut selama sekurang-kurangnya dua tahun.

   Seksyen 3

   Selepas membuat pembayaran 400.00 ringgit, seseorang Ahli Penuh atau Ahli Gabungan yang mempunyai kedudukan baik bolehlah dilantik menjadi keahlian seumur hidup.

Untuk Kegunaan Pejabat
For office use only

Tarikh permohonan diterima ..... Tarikh pembayaran yuran .....
Date of receipt of application *Date of payment of fee*

Tarikh lantikan/penolakan ..... No. resit .....
Date of election/rejection *Receipt No.*

PP 174/12/86 ISSN 0126-6187

BULETIN PERSATUAN GEOLOGI MALAYSIA

BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

SPECIAL ISSUE ON PETROLEUM GEOLOGY VOL. II

KANDUNGAN (CONTENTS)

Editor
G.H. Teh

DECEMBER 1987 No. 21

Price: M$40.00 (US$16.50)

Cheques, Money Orders or Bank Drafts must accompany all orders. Please add US$1.50 for bank charges.

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c/o Dept. of Geology
University of Malaya
59100 Kuala Lumpur
MALAYSIA

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

General Information

The Society publishes the *Buletin Persatuan Geologi Malaysia* (Bulletin Geological Society of Malaysia) and the *Warta Geologi* (Newsletter of the Geological Society of Malaysia) which is issued bimonthly.

Papers of general interest or on the geology of the Southeast Asian region (South China, Burma, Thailand, Indochina, Malaysia, Singapore, Indonesia, Brunei and the Philippines) and also marine areas within the region are welcome for publication in the *Bulletin*. Short notes, progress reports and general items of information are best submitted to the *Warta Geologi*.

Papers should be as concise as possible. However, there is no fixed limit as to the length and number of illustrations. Therefore, papers of monograph length are also welcome. Normally, the whole paper should not exceed 30 printed pages and it is advisable that authors of papers longer than 30 printed pages should obtain the consent of the Editor before submission of the papers.

The final decision of any paper submitted for publication rests with the Editor who is aided by an Editorial Advisory Board. The Editor may send any paper submitted for review by one or more reviewers. Scripts of papers found to be unsuitable for publication may not be returned to the authors but reasons for the rejection will be given. The authors of papers found to be unsuitable for publication may appeal only to the Editor for re-consideration if they do not agree with the reasons for rejection. The Editor will consider the appeal together with the Editorial Advisory Board.

Unless with the consent of the Editor, papers which have been published before should not be submitted for consideration.

Authors must agree not to publish elsewhere a paper submitted to and accepted by the Society.

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

Twenty-five reprints of each paper are free-of-charge. Contributors should notify the Editor of extra reprints (which are of non-profit costs) required.

All papers should be submitted to the Editor, Geological Society of Malaysia, c/o Department of Geology, University of Malaya, 59100 Kuala Lumpur, MALAYSIA

Script Requirements

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

Two copies of the text and illustrations must be submitted. The scripts must be typewritten double-spaced on papers not exceeding 21 x 33 cm. One side of the page must only be typed on.

Figure captions must be typed on a separate sheet of paper. The captions must not be drafted on the figures.

Original maps and illustrations or as glossy prints should ideally be submitted with sufficiently bold and large lettering to permit reduction to 15 x 22 cm: fold-outs and large maps will be considered only under special circumstances.

Photographs should be of good quality, sharp and with contrast. For each photograph, submit two glossy prints, at least 8 x 12 cm and preferably larger. Use of metric system of measurements (ISU) is strongly urged wherever possible.

Reference cited in the text should be listed at the end of the paper and arranged in alphabetical order and typed double-spaced. The references should be quoted in the following manner:

Suntharalingam, T., 1968. Upper Palaeozoic stratigraphy of the area west of Kampar, Perak. *Geol. Soc. Malaysia Bull.*, 1, 1–15.

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

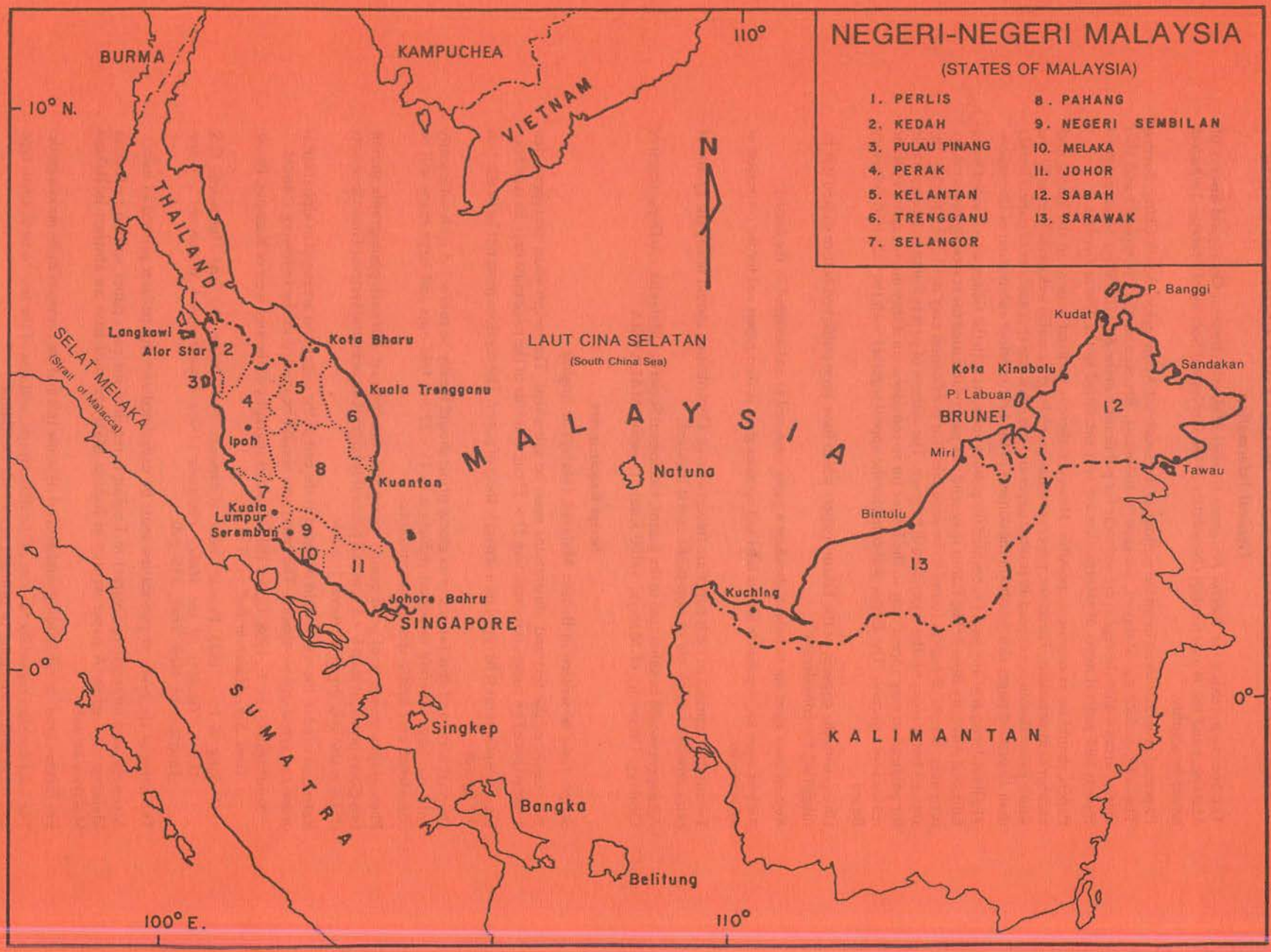
The name of the book or publication must be underlined and will be later printed in italics.

A concise and informative abstract in English is required for each paper written in Bahasa Malaysia or English. A paper written in Bahasa Malaysia must have an abstract in Bahasa Malaysia as well.

For format, kinds of subheadings and general style, use this and the previous *Bulletins* as a guide.

The final decision regarding the size of the illustrations, sections of the text to be in small type and other matters relating to printing rests with the Editor.

If authors have trouble over the script requirements, please write in to the Editor.


NEGERI-NEGERI MALAYSIA
(STATES OF MALAYSIA)
1. PERLIS
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
10° N.
110°
N
LAUT CINA SELATAN
(South China Sea)
MALAYSIA
SELAT MELAKA
(Strait of Malacca)
Langkawi
Alor Star
Kota Bharu
Kuala Trengganu
Ipoh
Kuala Lumpur
Seremban
Kuantan
Johore Bahru
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Natuna
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KALIMANTAN
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Singkep
Bangka
Belitung
0°
100° E.
110°