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CATATAN GEOLOGI (GEOLOGICAL NOTES)

SEQUENTIAL AERIAL PHOTOGRAPHS IN MONITORING COASTAL CHANGES

J.K. Raj, Department of Geology, University of Malaya.

Abstract

The use of sequential aerial photographs for monitoring coastal changes is discussed and illustrated by a case study of the Tumpat area of North-eastern Peninsular Malaysia. Problems associated with the interpretation of aerial photographs and the transfer of information from them onto base maps are also discussed. Qualitative and quantitative data obtained from the case study lead to the conclusion that sequential aerial photographs are useful for not only monitoring coastal changes but also for interpretation of the processes responsible for the changes.

Introduction

Coastal areas are one of the more important geological environments whose landforms and other features are subject to a rapidity in change of form with time. These changes result from the operation of various natural processes and need to be recognized and monitored to allow for the effective design, construction and maintenance of coastal engineering structures as harbours and groynes. Sequential aerial photographs offer a most useful means of fulfilling these objectives as they depict actual ground situations at different moments in time. Comparison of the ground situations of coastal features at different moments in time can thus allow for their changes to be recognized and monitored. From these changes it is furthermore possible to obtain qualitative and quantitative data of the processes responsible; data that are most useful to the design, construction and maintenance of coastal engineering structures. A number of problems associated with the use of sequential aerial photographs in monitoring coastal changes, however, need discussion as they influence interpretation of the changes and processes responsible.

In this paper, a case study of the Tumpat area of Northeastern Peninsular Malaysia is presented to illustrate the usefulness of sequential aerial photographs in recognizing and monitoring coastal changes. The problems associated with this application of sequential aerial photographs are also discussed.

Problems associated with the use of sequential aerial photographs in monitoring coastal changes

Two groups of problems can be differentiated; one group being inherent characteristics of the aerial photographs themselves and the other group arising from the dependency of coastal changes with time. The first group of problems includes those arising from the relief and tilt displacements of aerial photographs, their scale and quality and the time of photography. Relief displacements can lead to errors in the transfer and accurate location

of coastal features on base maps, but are only important in aerial photographs of coastal areas with topographically high landforms as headlands. Tilt displacements can similarly lead to errors in the transfer and accurate location of coastal features on base maps but are only a problem when non-vertical aerial photographs are used. Both relief and tilt displacements can, however, be corrected for during the transfer of information from the aerial photographs onto base maps through the use of various instruments, such as optical projectors or stereo-sketchmasters. The quality and scale of aerial photographs both affect the amount of detail that can be interpreted for only with good quality and clear (i.e. no cloud cover) photographs can detailed interpretations of coastal features be carried out. Small scale aerial photographs furthermore, only allow recognition and interpretation of large coastal features, while large scale photographs allow recognition and interpretation of both small and large coastal features. The time of photograph finally needs to be known as fluctuations of sea-level can lead to variations in the positions of shorelines. Knowledge of the time of photography will thus allow for sea-level fluctuations to be taken into consideration during interpretation of the coastal features.

The second group of problems arises from the dependency of coastal changes with time, for these changes can be of a daily, weekly, monthly, seasonal or annual occurrence. Thus for effective recognition and monitoring of coastal changes, it would be necessary to have aerial photographs that have been flown at closely spaced time intervals. In view of the expense involved, however, most sequential aerial photographs are only taken at widely spaced time intervals and thus only allow recognition and monitoring of the long-term coastal changes. This aspect does not reduce the usefulness of sequential aerial photographs for it is usually the long-term changes that have an impact on the environment.

Study area - General

As an illustration of the usefulness of sequential aerial photographs in monitoring coastal changes, a case study of the Tumpat area of Northeast Peninsular Malaysia (Fig. 1) is presented. The study area has experienced a considerable amount of coastal changes over the last thirty years and provides a good illustration as the area is covered by black and white aerial photographs of approximately 1:25,000 scale flown in the years 1948/49, 1966 and 1974/75, and of approximately 1:60,000 scale flown in 1957.

The study area forms part of the Sungai Kelantan delta and is entirely fronted by sand beaches except at the river mouths where sand spits are usually present. Within the delta and river mouths are tidal flats and swamps (Fig. 1). Inland is a broad plain underlain largely by alluvial deposits and locally covered by a number of beach ridges. Rainfall and wind distribution patterns are of a seasonal character (Table 1), being primarily influenced by the Northeast Monsoon blowing from November to March (Ooi, 1963). During this period, strong on-shore blowing winds are present with heavy rainfalls, whereas during the rest of the year, weak and variable, frequently off-shore blowing winds and low rainfalls are experienced. High and low tides are usually of a diurnal occurrence throughout the year with tidal fluctuations between higher, high and lower, low water levels being less than 1.5 m (Tide Tables, 1977). Surface drift currents in South China Sea close to the study area vary with the time of year, with a southeast setting drift from November to March, but a generally northwest setting drift from June to October (Dale, 1956). Wavefronts of sea waves and swell approaching the

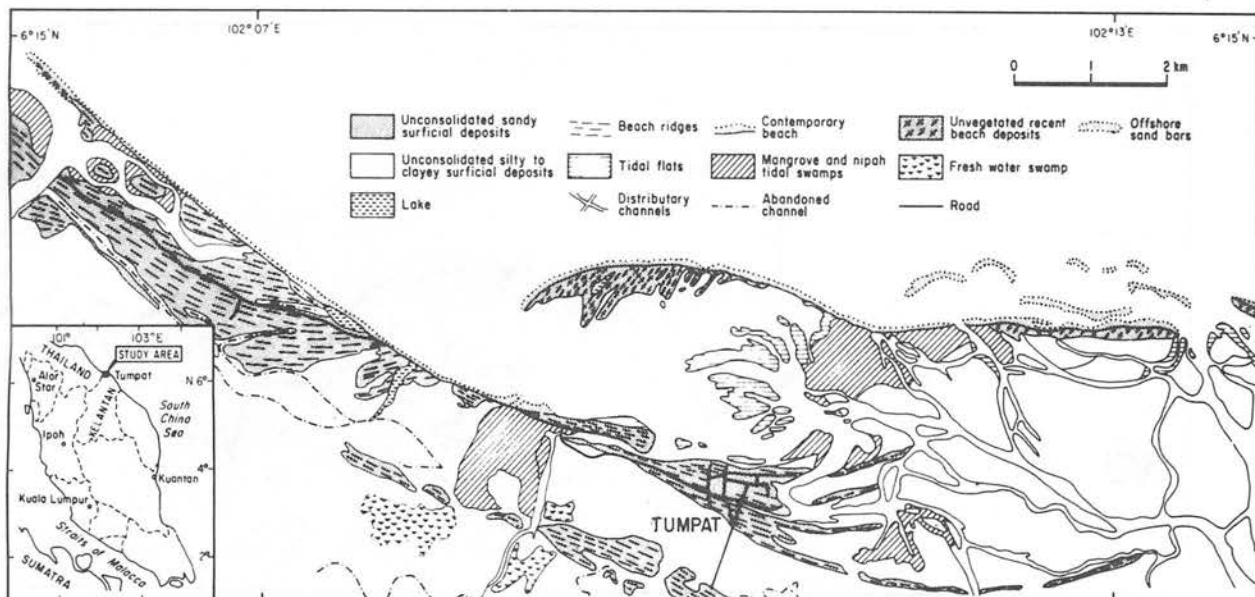


Fig. 1. Geomorphic features of the Tumpat area, Kelantan, Peninsular Malaysia.
 (In part after Swan, 1968 and Zakaria, 1975)
 (Note land area based on aerial photographs flown April 1966)

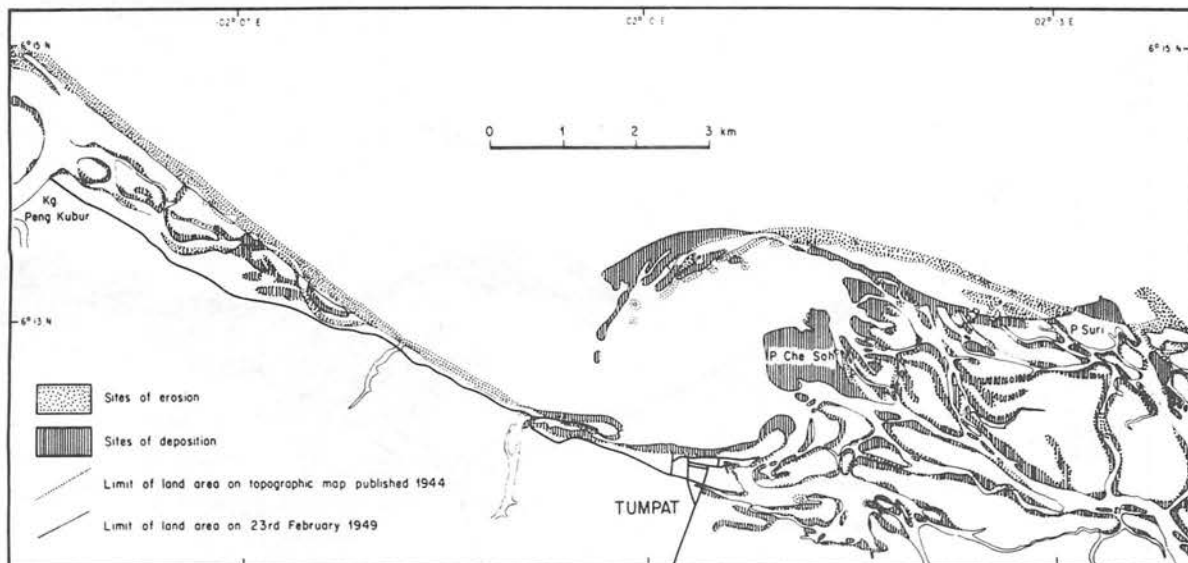


Fig. 2. Coastal changes between 1939 and 1949.

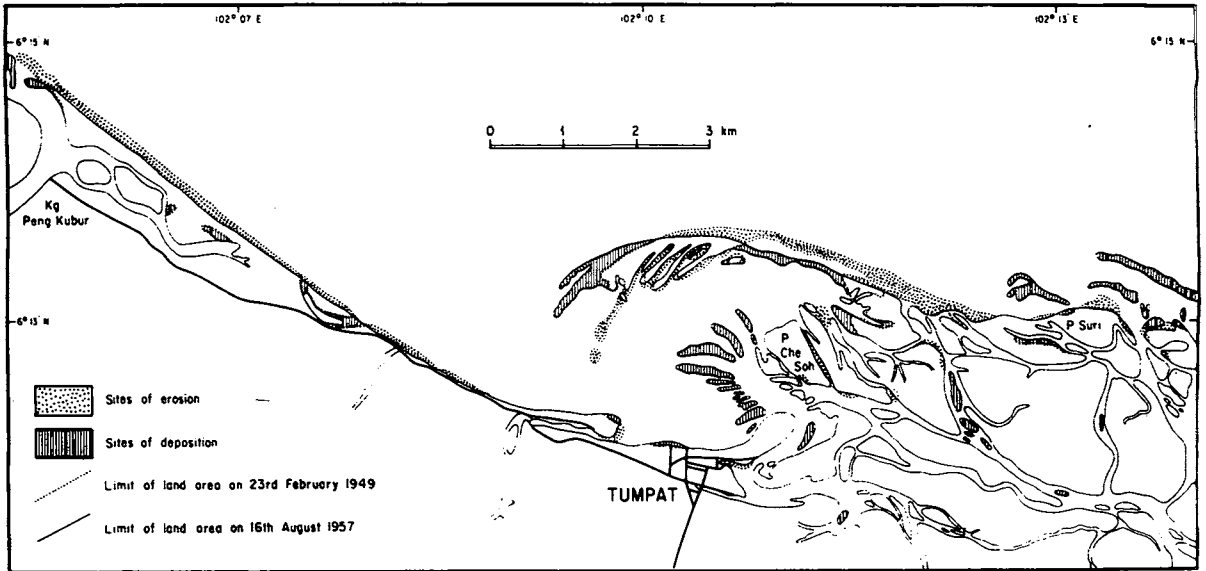


Fig. 3. Coastal changes between 1949 and 1957.

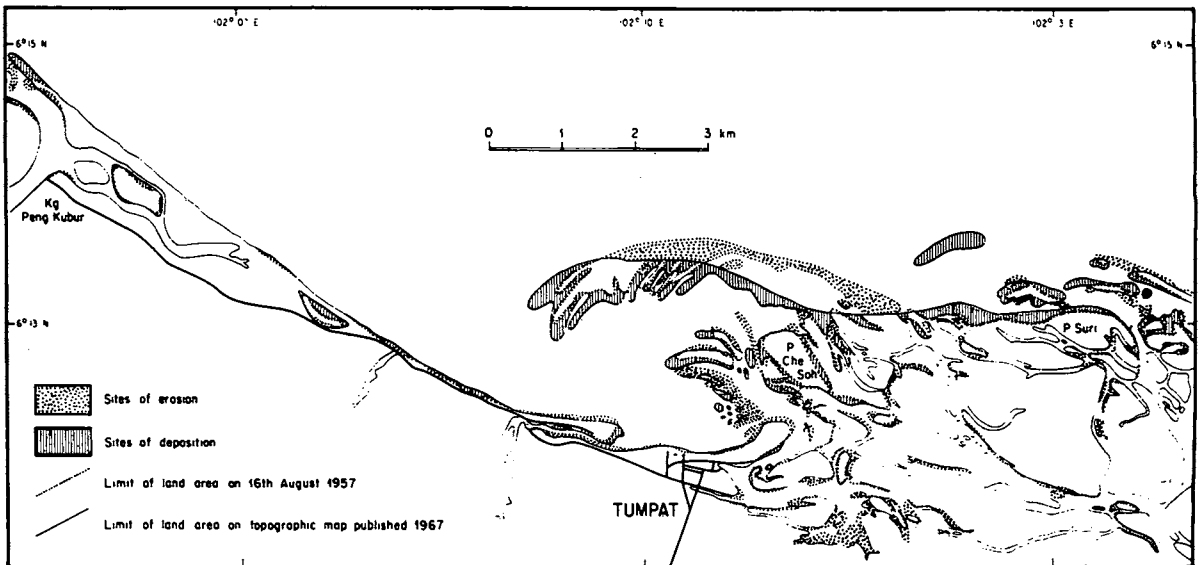


Fig. 4. Coastal changes between 1957 and 1963.

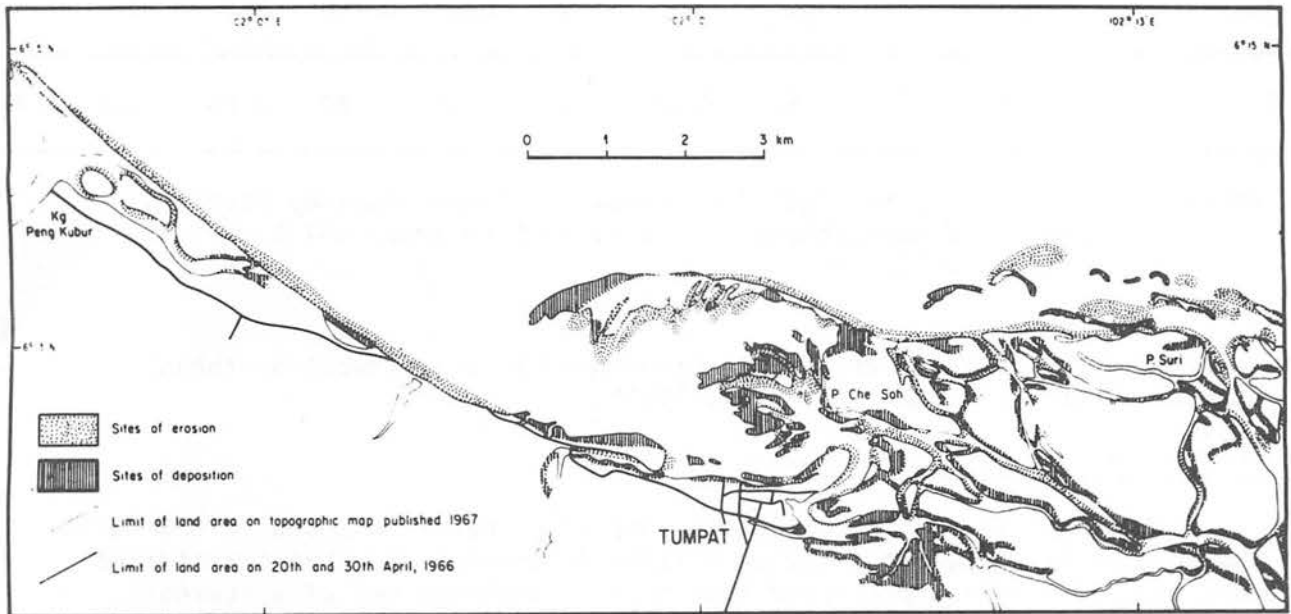


Fig. 5. Coastal changes between 1963 and 1966.

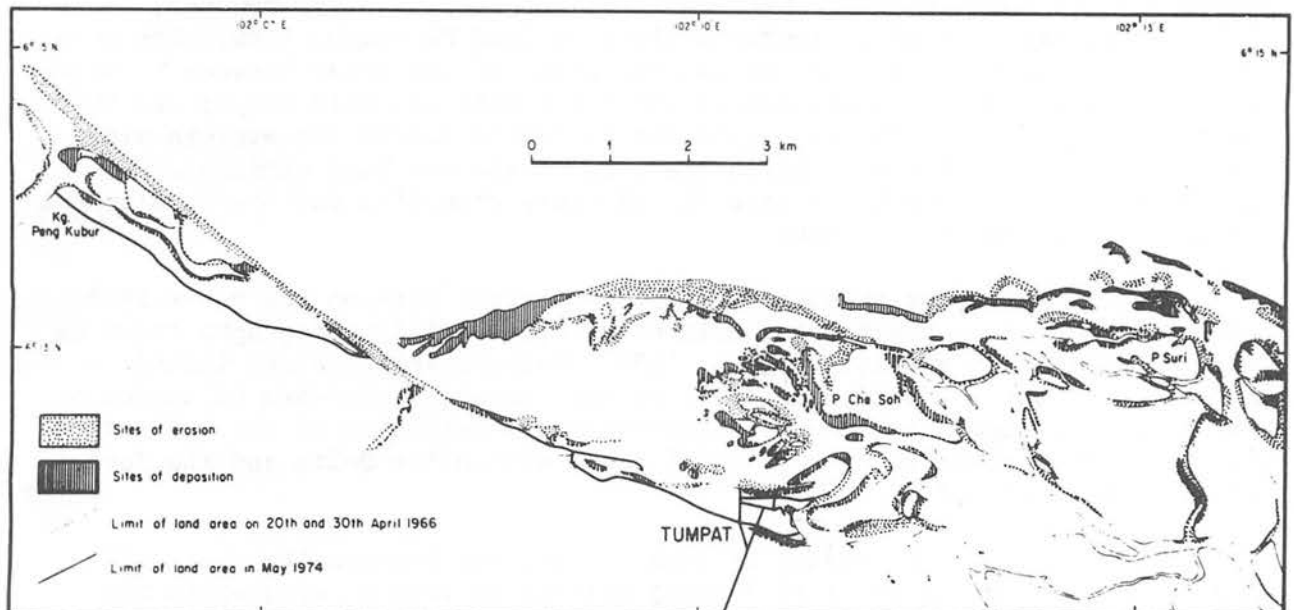


Fig. 6. Coastal changes between 1966 and 1974.

July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	Apr	May	Jun
5.49	5.77	9.56	10.73	22.63	27.3	5.14	2.06	2.90	2.60	5.25	6.22

Table 1. Mean monthly rainfall (in inches) at Tumpat Railway Station.
(Period of measurement - July, 1965 to June, 1975)
(D.I.D., 1973, 1977)

study area are furthermore usually orientated in a northwest-southeast direction throughout the year (Raj, 1982).

Study area - Coastal changes

The land areas (i.e. areas not covered by water) exposed on the aerial photographs of different dates were first delineated and then transferred onto 1:25,000 scale topographic base maps through the use of a stereo-sketchmaster. The super-positioning of the exposed land areas of two consecutive dates then allowed for recognition of the changes of coastal features that occurred between the two dates. Interpretation of the types of coastal landforms existing at the different dates of photography was also carried out in order to allow interpretation of the processes responsible for the coastal changes.

Fig. 2 shows the changes of coastal features between the years 1939 and 1949; the exposed land area of 1939, but whose compilation from field surveys dates back to 1939. The 1949 limit of land area is, however, interpreted from aerial photographs flown on 23rd February, 1949. The more important changes include an overall recession of the coast between K. Golok and Tumpat, a westward migration of the large spit opposite Tumpat and the westward migration of the sand spit and sand-bars across the western side of K. Besar. Within the delta furthermore, there has been erosion and accretion along the banks of some distributary channels, and the development of tidal flats (at P. Che Soh).

Fig. 3 shows the changes of coastal features between the years 1949 and 1957; the land areas being delineated from aerial photographs flown on 23rd February 1949 and 16th August, 1957. Recognizable changes include a recession of the coast between K. Golok and Tumpat, a westward migration of the large spit opposite Tumpat, a northwestward extension of the spit at K. Besar, the formation of some tidal flats within the delta and the formation of some sand-bars off P. Suri.

Fig. 4 shows the changes of coastal features between the years 1957 and 1963; the land area of 1963 being delineated from a topographic map published in 1967 but whose last revision of data was carried out in 1963. Only a few changes are seen and is due to the fact that the 1963 data has been based in part on the 1957 aerial photographs. Recognizable changes include a northwestward extension of the spit at K. Golok, a westward migration of the large spit opposite Tumpat and the westward migration of the sand-bars off P. Suri.

Fig. 5 shows the changes of coastal features between the years 1963

and 1966; the land area of 1966 being delineated from aerial photographs flown on 20th April, 1966. Recognizable changes include a recession of the coast between K. Golok and Tumpang, a westward migration of the large spit opposite Tumpang with the formation of some tidal flats, and erosion and accretion along the banks of some distributary channels, within the delta.

Fig. 6 shows the changes of coastal features between the years 1966 and 1974; the land area of 1974 being delineated from aerial photographs flown in May 1974. The changes that have occurred are particularly profound when compared with the changes of earlier years and result from the breaching of the large spit opposite Tumpang by a distributary of the Sungai Kelantan. Recognizable changes include a recession of the coast between K. Golok and Tumpang, the westward migration of the large spit opposite Tumpang with the formation of some tidal flats, and erosion and accretion along the banks of some distributary channels, within the delta.

Apart from mere recognition and monitoring of the coastal changes that have occurred, quantitative data can also be obtained from the interpretations of the land areas of the different dates of aerial photography. This quantitative data, particularly aerial data, is measurable if transfer of the information from the aerial photographs onto base maps has been correctly carried out to minimize radial and tilt displacements. The quantitative data that have been obtained are summarized in Table 2.

From the changes that have occurred, it is furthermore possible to interpret the processes responsible as different coastal landforms have been involved in the changes. Along the beaches and sand spits fronting the coast, wave generated processes of erosion and deposition and littoral drift are responsible for the changes as evidenced by the continuous westward migration of beach sediment between the different years. Within the delta, however, fluvial and tidal processes have been responsible for the changes as evidenced by the gradual development of tidal flats, and the periodic erosion and deposition of sediment along the banks of distributary channels. It is furthermore possible to predict future changes of coastal features within the Tumpang area based on the qualitative and quantitative data that has been obtained. This is, however, not discussed for it is outside the scope of this paper.

Conclusion

In conclusion, it can be stated that sequential aerial photographs offer an excellent means of recognizing and monitoring coastal changes. In addition, where sufficient care has been taken in the transfer of data from aerial photographs onto base maps, as illustrated by the case study, it is possible to obtain quantitative data on the changes of coastal features.

Acknowledgements

Cik Asmaliah Ahmad typed the manuscript while En. Roslin and En. Srinivas drafted the figures.

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LOCALITY	PROCESS INVOLVED	1939-1949 (km ²)	1949-1957 (km ²)	1957-1963 (km ²)	1963-1966 (km ²)	1966-1974 (km ²)
1. River mouth at K. Golok	Fluvial/Tidal Erosion	0.202	0.020	0.065	0.153	0.093
	Fluvial/Tidal Deposition	0.516	0.073	0.093	0.125	0.230
2. Coastal stretch between K. Golok and Tumpat	Beach Sediment Erosion	1.140	0.484	0.133	0.641	0.673
	Beach Sediment Accretion	0.075	0.069	0.113	0.161	0.081
3. Large spit opposite Tumpat	Beach Sediment Erosion	1.206	1.270	1.238	1.270	1.210
	Beach Sediment Accretion	1.258	1.218	1.246	1.250	1.089
4. Coastal stretch S. of the large spit (Including offshore bars)	Beach Sediment Erosion	0	0.093	0.163	0.606	0.302
	Beach Sediment Accretion	0	0.327	0.601	0.178	0.629
5. Sg. Kelantan delta (back of shoreline)	Fluvial/Tidal Erosion	0.169	0.121	0.569	0.644	0.818
	Fluvial/Tidal Deposition	3.457	0.516	0.469	2.359	0.806

Table 2. Changes of land areas in the Tumpat area between the years 1939, 1949, 1957, 1963, 1966 and 1974.

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PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

TECHNICAL TALKS

Shigeki Hada: *Mélange* and subduction in the Outer Zone of Southwest Japan

Extended Abstract

Geologically, Southwest Japan can be divided into 2 parts, namely the Inner Zone on the Sea of Japan side and the Outer Zone on the Pacific side by a major fault called the Median Tectonic Line. The Outer Zone of Southwest Japan is characterized by the distinct zonal distribution of pre-Neogene rocks and is traditionally subdivided into the Sambagawa, Chichibu and Shimanto Belts.

*On the other hand, a remarkable tectonic zone called the Kurosegawa Tectonic Zone extends over 650 km across islands from Kyushu to the Kii Peninsula. The present Kurosegawa Tectonic Zone is characterized by a serpentinite *mélange* zone.*

*Two types of characteristic accretionary complex were introduced by the author in the southern side of the Kurosegawa Tectonic Zone. One is the Jurassic to Lower Cretaceous accretionary complex in the Southern Chichibu Belt ("*Sambosan Belt*") and the other one is the Upper Cretaceous accretionary complex in the Shimanto Belt.*

The Southern Chichibu Belt is characterized by apparently alternate occurrence of steeply north dipping strata of chert and coarse clastics. This is due to the repetition of the stratigraphic unit which is composed of, in ascending order, chert layer, siliceous mudstone layer, mudstone layer and coarse clastics layer, and these are separated from each other by faults. These stratigraphic units are tectonically piled up to form an imbricate, north dipping structure. Detailed biostratigraphic study revealed that the age of each of the layers become systematically younger from the northern stratigraphic unit to the southern ones. Thus, the remarkable polarity in age can be recognized in this belt. From lithologic and biostratigraphic features, the layers of the stratigraphic units correspond to pelagic, hemipelagic and trench-fill sediments deposited on the oceanic layer 2 during the spreading of the oceanic plate from the oceanic ridge to the subduction zone. Those layers were then finally scraped off from the subducting oceanic plate and accreted on to the Asian continental plate unit by unit.

*In contrast, the accretionary complex in the Shimanto Belt is characterized by the existence of *mélange*. In the belt, the coherent unit consisting of weakly deformed flysch and *mélange* are tectonically piled up to form an imbricate, steeply north dipping structure. The *mélange* unit is composed of inclusions of diverse shapes, sizes and compositions in an argillite matrix. In the case of Cretaceous *mélange* in Kochi of Shikoku, Valanginian to Albian chert, pillowed basalts with interpillow nannolimestone (Valanginian), Turonian red pelagic shale and Coniacian to Santonian red and green hemipelagites are incorporated into Campanian black shale matrix together with terrigenous sandstone. The Cretaceous *mélange* of the Shimanto Belt is thus interpreted as accreted trench deposits in thick oceanic plate facies were incorporated during subduction.*

With regard to the origin of the *mélange*, physical and mechanical properties of sedimentary rocks in the Cretaceous Shimanto Belt have attracted much of the author's interest. More than 300 samples of sandstone and mudstone from both coherent and *mélange* units were examined. Mudstone samples from both units have densities from 2.63 g/cm³ up to 2.67 g/cm³. The mechanical properties of the *mélange* mudstones suggest that these mudstones were once significantly denser than the coherent mudstones. These mudstones also have illite crystallinities of between 4 and 7 nm. Comparison of the above values with data for the shale matrix of the *mélange* in the central belt of the Franciscan suggest that not only the rocks of the *mélange* unit but also those of the coherent unit represent accreted and tectonically-deformed trench-floor or abyssal-plain deposits. Thus, the coherent unit includes rocks of the accretionary complex as well as slope basin deposits, and the coherent and *mélange* units correspond respectively to shallower and deeper parts of the accretionary wedge. The *mélange* sandstones have higher densities, higher P-wave velocities and lower porosities than the coherent sandstones. Generally, the former is stronger and has higher values of Young's Modulus than the latter. Comparison of these measures of physical and mechanical properties and also the observations of microstructure of sandstones indicate that rocks of the *mélange* unit have been subjected to ductile deformation during the formation of *mélange* in the deeper levels of the accretionary wedge, while the rocks of the coherent unit have been subjected to only elastic deformation in the shallower levels of the wedge.

Comparison of the above-mentioned evidences and the situation in the present-day Nankai Trough off-Shikoku, the following process is proposed for the formation of the accretionary wedge. In the Southern Chichibu Belt, an example in which accretion was accomplished by simple offscraping process was shown. The author believes that in that case, the trench-fill sediments are not thick. It, however, as seems to be the case in the Shimanto Belt, trench-fill sediments were thick, the first-stage deformation was restricted in the turbidite sequence of trench-fill sediments and thickening of accretionary wedge was accomplished by offscraping. But when the oceanic layers were reached to the deeper part, something around 10 km in the subduction zone, thrusts and decollement planes reached to the oceanic layer 2 for the first time and a characteristic *mélange* which included inclusions of greenstones were formed. Continuing thrusting and multi-layered decollement brought the *mélange* to the shallower parts of the accretionary wedge. From the study of the accretionary wedge in the Cretaceous Shimanto Belt, the author believes that the *mélange* in the accretionary wedge is tectonic in origin.

Report

Dr. Shigeki Hada is Professor of Geology at the Kochi University, Japan, and his fields of interest include Structural Geology and Tectonics. He obtained his Ph.D. from Osaka City University, Japan in 1973 and has previously visited Malaysia in 1964 and 1968 as a member of the Scientific Expedition of that University.

Currently, Dr. Hada is on sabbatical and his visit to Malaysia and later Thailand is related to the new IGCP Project "Pre-Jurassic Evolution of the Continental Margin of Asia" organised by Prof. Ichikawa of the Osaka City University.

G.H. Teh

A.G. Smith: The motion of Africa and Europe and its relevance to Alpine-Mediterranean tectonics.

Abstract

The motion of Africa relative to Europe (or vice versa) can be obtained from the Atlantic ocean-floor spreading data. These data have been revised to take into account new magnetic anomaly time-scales and new biostratigraphic scales.

The new data show a smoother, simpler motion than some previous models, with limited movement during the Palaeocene. The movement pattern can be related in a general way to the development of the Alpine-Mediterranean region. For an E-W plate margin between Africa and Europe, the Jurassic motion is essentially oblique extension, the Cretaceous motion is oblique compression and the Cenozoic movement is compression.

In addition to these phases, the effects of continental collision bring other motions into being. In particular, the collision between continental prongs appears to cause strike-slip motion of continental fragments and the pinning of subduction zones by collision appears to bring about extension and rotation of small continental fragments, as in the west Mediterranean.

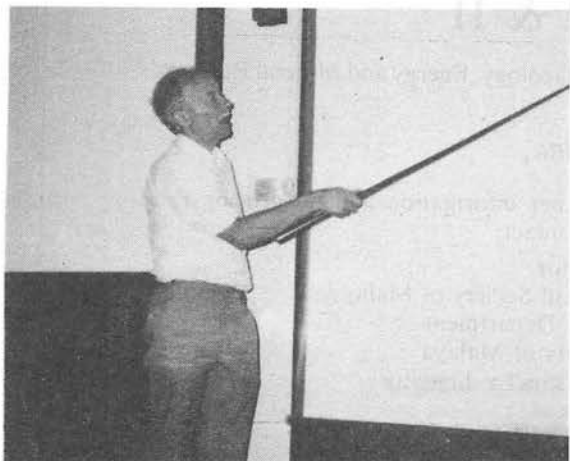
While the Africa-Europe motions appear to control the main phases of tectonic development of the region, there is still no adequate, self-consistent phase tectonic picture of its evolution.

Report

Dr. Alan G. Smith is a lecturer at the Department of Earth Sciences, University of Cambridge, England.

His interest include tectonics, particularly global reconstructions, the geological time-scale, and the application of palaeomagnetism to reconstructions. Dr. Smith is presently on his way to New Zealand to work with John Harper on a model of how plates move.

G.H. Teh



A.G. SMITH



SHIGEKI HADA

BERITA-BERITA PERSATUAN
(NEWS OF THE SOCIETY)

PENERBITAN PERSATUAN (PUBLICATIONS OF THE SOCIETY)

1. Bulletin 19 - GEOSEA V Proceedings Vol. I

The GEOSEA V Proceedings (Vol. I) is now in the page-proof stage. The papers appearing in this volume are listed below.

2. Bulletin 20 - GEOSEA V Proceedings Vol. II

Typesetting is still in progress.

3. Bulletin 21

Review of the 4 papers for this volume is still in progress.

4. Bulletin 22 - Special Issue on Petroleum Geology Volume 2

Two papers received so far, one from CPC and the other from GSI. ESSO has informed us their paper is with PETRONAS for clearance. Letters have gone out to authors of papers of Petroleum Geology Seminar '85 to submit their manuscripts early. We hope the response will be encouraging.

5. Warta Geologi - this issue

The Society's newsletter, the *Warta Geologi*, goes colour with this issue. Our appreciation of Schlumberger S.A.'s very generous contribution and constant support of the Society's publications and activities.

Editor

FORTHCOMING GSM BULLETINS

BULLETINS 19 & 20

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VOLS. I & II

A collection of 95 papers presented at the 5th Geology, Energy and Mineral Resources of Southeast Asia Congress.

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Papers appearing in Bulletin 19 - GEOSEA V Proceedings Vol. I

1. Massive sulphide deposits and their possible significance to other ores in Southeast Asia - R.W. Hutchinson (Keynote paper)
2. Nature of gold mineralization in certain areas in East Manipur, India, within the Indo-Burmese Ophiolite Belt - P.J. Deka
3. Chromite deposits of Papua New Guinea - a future potential source of chrome - P.M. Afenya
4. The succession of vertebrate faunas in the continental Mesozoic of Thailand - E. Buffetaut & R. Ingavat
5. Present understanding of the Pre-Cenozoic stratigraphy of Hong Kong - D.R. Workman, R. Addison, J.D. Bennett and A.D. Burnett
6. Clay mineralogy of selected alluvial soils from Peninsular Malaysia - J. Shamshuddin
7. Palaeogeographic development of west Sarawak - Denis N.K. Tan
8. Discovery of Lower Permian corals in Sumatra - H. Fontaine
9. Residual soil development on sedimentary rocks of the Jurong Formation in Singapore - J. Pitts & R. Kannan
10. Geologic significance of granitic fragments found from pumice flow of 1883 eruption at the Krakatau Group, Indonesia - N. Oba, K. Tomita, M. Yamamoto, M. Istidjab, A. Sudradjat & T. Sahanda
11. A preliminary sulfur and oxygen isotope study of the Maha Sarakham Evaporitic Anhydrite from Bamnet Narong Area of NE Thailand - Visut Pisutha-Arnond, Hitoshi Chiba & Sombat Yumuang.
12. The chemistry of Lateritic Soils: The search for new agricultural technology - B.I. Kronberg, W.S. Fyfe, J. Walden & D.B. Walden
13. Bauxite in the Kuantan area, Peninsular Malaysia - S. Senathi Rajah
14. Magnetic spectrum of the San Kampaeng geothermal area, Northern Thailand - Somsri Sertsrivanit, Charn Tantisukrit & Surachai Praserdvigai
15. On a Pleistocene gravel beach sequence exposed in coastal plain tin mines, Phuket Island, Thailand - G.A.M. Kruse
16. The role of the ESCAP Regional Mineral Resources Development Centre - J.F. McDivitt
17. Palynology as a tool in delineating tropical lowland depositional environments of Late Quaternary age - R. Hillen
18. Cretaceous mélangé in West Kalimantan and its tectonic implications - P.R. Williams, S. Supriatna & B. Harahap

19. Mud volcanoes and the origin of chaotic deposits in Sabah, East Malaysia
- J. McManus & R.B. Tate
20. Progress in Quaternary Geology investigations in S.E. Asian countries
since GEOSEA IV, Manila, 1981 - J.A.M. Ten Cate
21. Aspects of the Geochemistry of Malaysian cassiterites - W. Fuad Hassan
22. Recent advances in exploration modelling for tin deposits, and their
application to the S.E. Asian environment - R.G. Taylor & P.J. Pollard
23. On the Geology of the Petchabun Fold-Belt (Central Thailand) -
Implications on the Geodynamic Evolution of Mainland S.E. Asia
- Dietrich Helmcke
24. Some aspects of southern granitoid complex and tin mineralization in
the northern part of Bangka, Indonesia - R. Soeria-Hmadja, D. Darda &
Hasanuddin
25. On the Quaternary Deposits of Thailand - Phisit Dheeradilok &
Worakoon Kaewyana
26. Engineering geological aspects of clastic metasediments in the Kuala
Lumpur area, Peninsular Malaysia - I. Komoo
27. The rare-earth elements geochemistry of Lingshan tungsten-tin bearing
granites and their applications to petrogenesis of the granites
- Yuan Zhongxing, Boi Ge
28. Petrological & geochemical studies of granites of Kathu Plutons of Phuket
Island, Southern Thailand - P. Charusiri, W. Pongsapich & S. Vedchakanchana.
29. Complex tin-bearing sulphides of the South Chinese Ore Type - G.H. Moh
30. Quaternary volcanic ash deposits in the Padang Terap District, Kedah,
Peninsular Malaysia - J. Debaveye, M. De Dapper, P. De Pepe & R. Gijbels
31. The pattern of K/Ar ages of biotites from the granites of Penang:
Its interpretation in the light of available Rb/Sr and U/Pb data -
T.S. Kwan & F.L. Yap
32. Geological evolution of the Southern Philippines - C.K. Burton
33. Southeast Asia as a part of an Early Palaeozoic Australian Gondwanaland
- C. Burrett & B. Stait
34. Some thoughts on the development of the alluvial tinfields of the
Malay-Thai Peninsula - D. Taylor
35. The slope stability problem at Mae Moh Lignite Mine, Lampang Province,
Northern Thailand - W. Tandicul, N. Muangnoicharoen & N.
Gumperayarnont
36. The Holocene transgression in Peninsular Thailand - P. Pramojanee &
P. Hastings

37. Factors concerning with spontaneous fires in Northern Thailand coals
- B. Ratanasthien
38. Soil landscapes in Peninsular Malaysia - S. Paramanathan & S. Zauyah
39. Base metal exploration in Sabah - David T.C. Lee & H.S. Weber
40. Development of San Kamphaeng geothermal energy project, Thailand
- T. Ramingwong & S. Praserdvigai
41. Regional controls of hydrothermal ore localization in northern Thailand
- P. Asnachinda & S. Chantaramee
42. Recent advances in the knowledge of geology and mineral resources of
Vietnam since 1981 - Le Thai Xinh & Nguyen Xuan An (Review Paper)
43. Tertiary basins of S.E. Asia - their disparate tectonic origins and
eustatic stratigraphical similarities - Charles S. Hutchison
44. Neogene stratigraphy, sturcture and petroleum potential of the Oiapu-
Yule Island - Oroï Region, Papua New Guinea - G. Francis,
R. Rogerson, D.W. Haig & J. Sari
45. Results of a gravity survey in the Kuala Lumpur area - C.A. Foss
46. The nature and potential of gold mineralization in Kelantan, Peninsular
Malaysia - L.H. Chu & D. Santokh Singh
47. Late Palaeozoic palaeogeography of Southeast Asia: Some stratigraphical,
palaeontological and palaeomagnetic constraints - I. Metcalfe

ANNUAL CONFERENCE '86, ANNUAL GENERAL MEETING AND DINNER - UPDATE

28-29 April, 1986

Rumah Universiti, Universiti Malaya

ANNUAL CONFERENCE '86

.The response has been good and so far 30 papers have been selected for presentation. Details of the papers are listed below. The highlight of the Annual Conference will be the 2 keynote papers by Prof. C.S. Hutchison and Prof. H.D. Tjia, both recently made Honorary Members of the Society.

The registration fees for the Conference are as follows:

	<u>Early</u> (by 10 April, 1986)	<u>Late</u> (after 10 April, 1986)
Members	M\$30	M\$40
Student Members (no lunch)	M\$10	M\$20
Non-members	M\$50	M\$60

PAPERSKeynote Papers

Prof. C.S. Hutchison (UM) - The Indosinian Orogeny and the problem of the Triassic basins.

Prof. H.D. Tjia (UKM) - Structural geology of the Macincang Formation, Langkawi Island.

Universiti Kebangsaan Malaysia

Tjia Hong Djin - Disparate Late Quaternary shorelines in Peninsular Malaysia - Shift of the geoid or crustal movement?

Abdul Rahim Samsudin - The role of geophysical techniques in Quaternary Geology.

Ibrahim Komoo - Engineering properties of some igneous rocks in Peninsular Malaysia.

Abdul Ghani Rafek - Depth of penetration of geophysical exploration methods as applied in shallow engineering geological investigations.

Ismail Mohd. Noor - Groundwater facies in Peninsular Malaysia.

Ismail Mohd. Noor - Recharge of deep aquifer in Kelantan, Peninsular Malaysia.

Tan Teong Hing - Estuarine sediments in geochemical exploration.

Hamzah Mohamad - Geochemical comparison of the Cretaceous-Tertiary and Triassic granites of the Malay Peninsula.

Tan Boon Kong - On the dispersion stability of the Singapore slime, and its relation to the Malaysian tin mining slime.

Tan Boon Kong - Rock slope stabilization for hillside residential development - A case study in Kuala Lumpur.

Universiti Malaya, Kuala Lumpur

John Kuna Raj - The stability of slope cuts along the Kuala Lumpur - Karak Highway.

John Kuna Raj - A case study of the seismic reflection method applied to subsurface geological mapping in the Kuala Lumpur area.

Teh Guan Hoe - Trace element distribution patterns in cassiterites from different geological environments.

Clive A. Foss - Gravity mapping of the coastal plain of Selangor.

K.R. Chakraborty - Interfacial Energy and Spatial Distribution of crystals in rocks.

K.R. Chakraborty - Crystallization history of Singapore norite.

Lim Heng Gaul - Palaeoenvironment of Subis - Ulu Niah area, Sarawak.

Sriyanee De Silva - Some petrological aspects of some Late Cenozoic Sarawak coal.

Ho Chee Kwong - Stratigraphical analysis of the Sg. Arip Area, Sarawak and its regional implication.

Ann Yasmin bt. Nordin - Some sedimentological aspects of the Teres-Bakau area, Sarawak.

Schlumberger Overseas S.A., Kuala Lumpur

Gordy G. Shanor - Litho/Dipmeter Synergy: A geological interpretation technique.

Chooi Shee Hoong & Co., Kuala Lumpur

Frank Yong Siew Kee - Conservation of geological features in Peninsular Malaysia.

Universiti Pertanian Malaysia, Serdang

S. Paramanathan - A comparative study of the mineralogy of soils of the Kedah and Kelantan Coastal Plains.

Maktab Sains MARA, Kuantan

S. Chandra Kumar - Granitoids, enclaves and magma mixing.

Unit Tenaga Nuklear, Jabatan Perdana Menteri

Daud Mohamad - A study of groundwater hydrology in the lower Sg. Kelantan basin with environmental isotopes.

Universiti Sains Malaysia, Penang

Cheang Kok Keong - Sn-W-Sb-Mo mineralization in schist, Bukit Bersih area, Bidor, Perak.

Geological Survey of Malaysia

Saim Suratnam - Foundation grouting of the Batu Dam, Kuala Lumpur.

Chow Weng Sum - Investigation of the presence of excessive arsenic and fluoride in well-water at Kg. Sekolah, Ulu Kepong.

ANNUAL DINNER

The Annual Dinner will be held at 8-10 p.m. on 28 April 1986 at Rumah Universiti, University of Malaya and will be a bar-be-cue and satay.

Cost of dinner is M\$20 per head. Members are encouraged to bring their spouses along for the dinner. Reservations for dinner must be made before 10 April, 1986.

PROGRAMME28 April, 1986

8.00 a.m. - 8.30 a.m.	Late Registration
8.30 a.m. - 8.40 a.m.	Presidential Address
8.40 a.m. - 8.50 a.m.	Opening Ceremony
8.50 a.m. - 9.00 a.m.	Refreshments
9.00 a.m. - 9.40 a.m.	Keynote Address I by Honorary Member, Prof. C.S. Hutchison
9.40 a.m. - 10.00 a.m.	Morning Tea
10.00 a.m. - 11.20 a.m.	Session I (4 papers)
11.20 a.m. - 12.40 p.m.	Session II (4 papers)
12.40 p.m. - 2.00 p.m.	Lunch - Presentation of Scrolls to new Honorary Members
2.00 p.m. - 3.20 p.m.	Session III (4 papers)
3.20 p.m. - 3.40 p.m.	Afternoon Tea
4.00 p.m. - 6.00 p.m.	AGM - Rumah Universiti, University of Malaya
8.00 p.m. - 10.00 p.m.	Dinner - Rumah Universiti, University of Malaya

29 April, 1986

9.00 a.m. - 9.40 a.m.	Keynote Address II by Honorary Member, Prof. H.D. Tjia
9.40 a.m. - 10.00 a.m.	Morning Tea
10.00 a.m. - 11.20 a.m.	Session IV (4 papers)
11.20 a.m. - 12.40 p.m.	Session V (4 papers)
12.40 p.m. - 2.00 p.m.	Lunch
2.00 p.m. - 3.20 p.m.	Session VI (4 papers)
3.20 p.m. - 3.40 p.m.	Afternoon Tea
3.40 p.m. - 5.00 p.m.	Session VII (4 papers)
5.00 p.m. - 5.10 p.m.	Closing Remarks by President

OTHER INFORMATION

Please contact:

The Organising Chairman
 Annual Conference '86,
 Geological Society of Malaysia,
 Jabatan Geologi,
 Universiti Malaya,
 59100 Kuala Lumpur.

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

- Phillip M. Cooney, Esso Production Malaysia, P.O. Box 10857, 50728 Kuala Lumpur.
- Ooi Chit Meng, Sarawak Shell Bhd., ITC, Lutong, Sarawak.
- Zakaria bin Hussain, Pejabat Kajibumi, Wisma Persekutuan Johor, Blok A, Tingkat 5, Johor Bahru, Johor.
- Paulus G. Gibin, OMRD Sabah Bhd., Peti Surat 5, 89307 Ranau, Sabah.
- Tong Khai Wah, Exploration Logging Int'l Inc., Blk. 3, Unit 4, Loyang Offshore Supply Base, Loyang Crescent, Singapore 1750.
- Abdullah Haron, Esso Production Malaysia, P.O. Box 10857, 50728 Kuala Lumpur.
- Lakatwu R. Lakile, OMRD, P.O. Box 5, 89307 Ranau, Sabah.
- Leow Hock Bee, Rahman Hydraulic Tin, P.O. Box WD1, 33200 Klian Intan, Perak.
- Shigki Hada, Department of Geology, Kochi University, Akebonocho 2-5-1, Kochi 780, Japan.
- Nik Raof Daud, Sime Darby Bhd., 21st Floor, Wisma Sime Darby, Jalan Raja Laut, Kuala Lumpur.
- Che Wan Roslan Che Wan Ahmad, Delcom Services, 14th Floor, Plaza MBF, Jalan Ampang, 50450 Kuala Lumpur.

Student Members

- Lim Thiam Chang, Department of Geology, University of Malaya, Kuala Lumpur.
- Chai Ted Sing, Department of Geology, University of Malaya, Kuala Lumpur.
- Yeap Kok Loo, Department of Geology, University of Malaya, Kuala Lumpur.
- Liew Kit Kong, Jabatan Geologi, Universiti Kebangsaan Malaysia, 43600 UKM, Bangi.

Institutional Members

- Tenneco Oil, 1100 Louisiana, P.O. Box 61548, Houston, Texas, 77208, U.S.A.
- Geodetic Malaysia Sdn. Bhd., c/o Geodetic and Construction Survey, 24 Cheong Chin Nam Road, S'pore 2159.

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:

1. Geobyte, 1985.
2. Stratigraphy of Xizang (Tibetan) Plateau, 1984.
3. A research on Cenozoic palynology of the Longjing Structural area in the Shelf Basin of the East China Sea (Donghai) Region, 1985.
4. Bulletin Science & Technology Malaysia, vol. 4, nos. 3 & 4, 1985.
5. Geophysical Research Bulletin, vol. 23, no. 4, 1985.
6. Chronique de la recherche miniere, no. 481, 1985.
7. Geological Survey of India News, vol. 16, nos. 4 & 5, 1985.
8. Bulletin of the Institution of Mining & Metallurgy, nos. 949 (1985) & 950 (1986).

9. AAPG Explorer, December 1985 & January 1986.
10. Report & statistics relating to the mining industry in Malaysia, 1981.
11. AGID News, no. 45, 1985.
12. Jurutera Galian, no. 20, 1985.
13. National Library Singapore: Adult reference collections accession list. October 1985.
14. Nada Petronas, January 1986.
15. Bulletin of the National Science Museum, Series C, vol. 11, no. 3, 1985.
16. Episodes vol. 8, no. 4, 1985.
17. Acta Palaeontologica Sinica, vol. 24, nos. 4 & 5.
18. Acta Stratigraphica Sinica, vol. 9, nos. 2-3, 1985.
19. Palaeontologica Sinica, New Series, vol. 2, nos. 3-4, 1985.

THE GEOLOGICAL SOCIETY OF MALAYSIA
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SPECIAL ISSUE ON PETROLEUM GEOLOGY

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Editors

G.H. TEH
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 MALAYSIA

BERITA-BERITA LAIN (OTHER NEWS)

MALAYSIA'S NEW AREAS AND TERMS FOR OIL EXPLORATION

The government of Malaysia announced relaxed terms for oil exploration at the closing ceremonies for the ASCOPE '85 Conference and Exhibition. Under the new terms, contractors will be able to claim up to 50% of gross production of crude oil for cost recovery. This addresses a major complaint of contractors, who have said that the old rate of 30% was too low to allow full cost recovery.

The Malaysian Cabinet approved the country's new production-sharing contract on December 4, 1985, and Finance Minister Daim Zainuddin announced the terms to a packed gathering of industry leaders in a speech at the closing ceremonies for ASCOPE '85 on December 5. Several weeks prior to the ASCOPE Conference and Exhibition, personnel from PETRONAS had visited the US to promote investment in Malaysia's petroleum sector. As a result, a number of US independent oil companies were on hand to hear the announcement.

Initial reaction to the announcement was muted, with the general belief that the real impact of the new regulations will not be clear until companies have a chance to negotiate contract specifics with PETRONAS. There was relief that the terms were finally out, however. Malaysia first indicated that terms were to be revised almost two years ago, but a final decision had been delayed a number of times.

Exploration drilling in Malaysia over the past 20 years has led to the conclusion that future oil discoveries are likely to be in smaller deposits. It is also generally believed that offshore Malaysia is gas prone.

The new terms are specifically aimed at improving the contractor's take on marginal discoveries.

The relaxed profit oil formula will be on a sliding scale based on average daily production. The profit oil split for the first 10,000 bpd of production will be in the ratio of 50:50 between PETRONAS and the contractor. The split for the next 10,000 bpd will be in the ratio of 60:40 in favour of PETRONAS, and all production in excess of 20,000 bpd will be split along the current ratio of 70:30 in favour of PETRONAS. The relaxed profit split, however, will only be applied to the first 50 million bbl of cumulative production for the contract area and all production in excess of 50 million bbl will be split 70:30 in favour of PETRONAS.

As a further incentive for oil companies to invest in Malaysia, the government has decided to waive all bonus payments. It is hoped that the elimination of signature, discovery and production bonuses will result in increased exploration work commitments from the contractors, PETRONAS said in a press release. In the past, contractors have been required to pay a signature bonus, plus a discovery bonus of M\$2.5 million and production bonuses of M\$5 million for each 50,000 bpd.

Terms for development of gas discoveries are substantially easier than in the past. The percentage of gas production allowed for cost recovery will

Schlumberger: services throughout Malaysia.

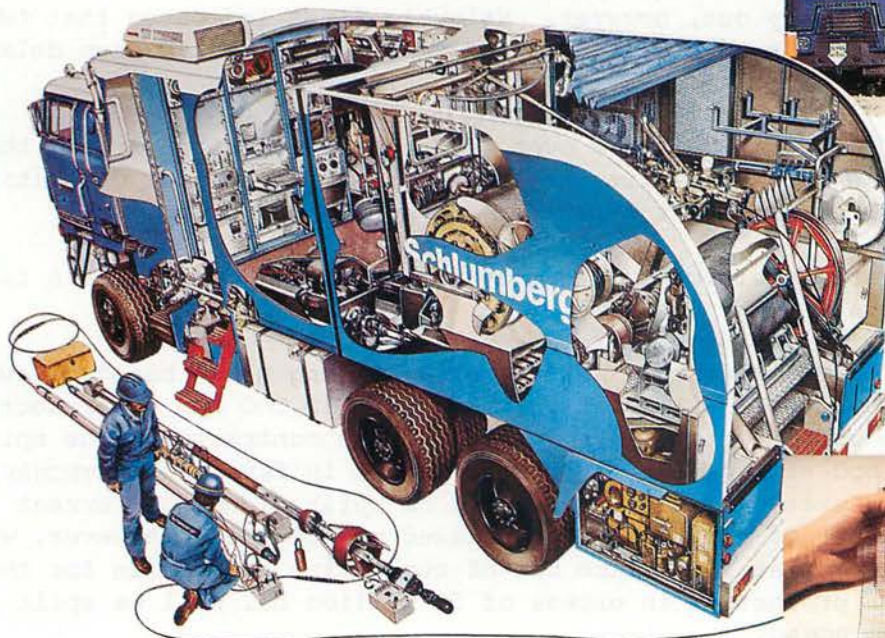
Schlumberger, the eyes of the oil industry, has provided services since the discovery of oil in Miri, Sarawak, several decades ago. Its commitment to high technology continues to provide the most cost effective results.



Schlumberger engineer at work with the Cyber Service Unit system inside a wireline logging Unit

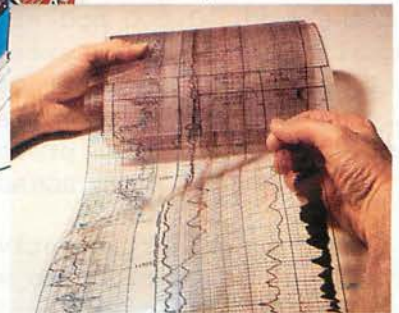


Cyber Service Unit on location.



Schlumberger crew checking a logging tool.

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



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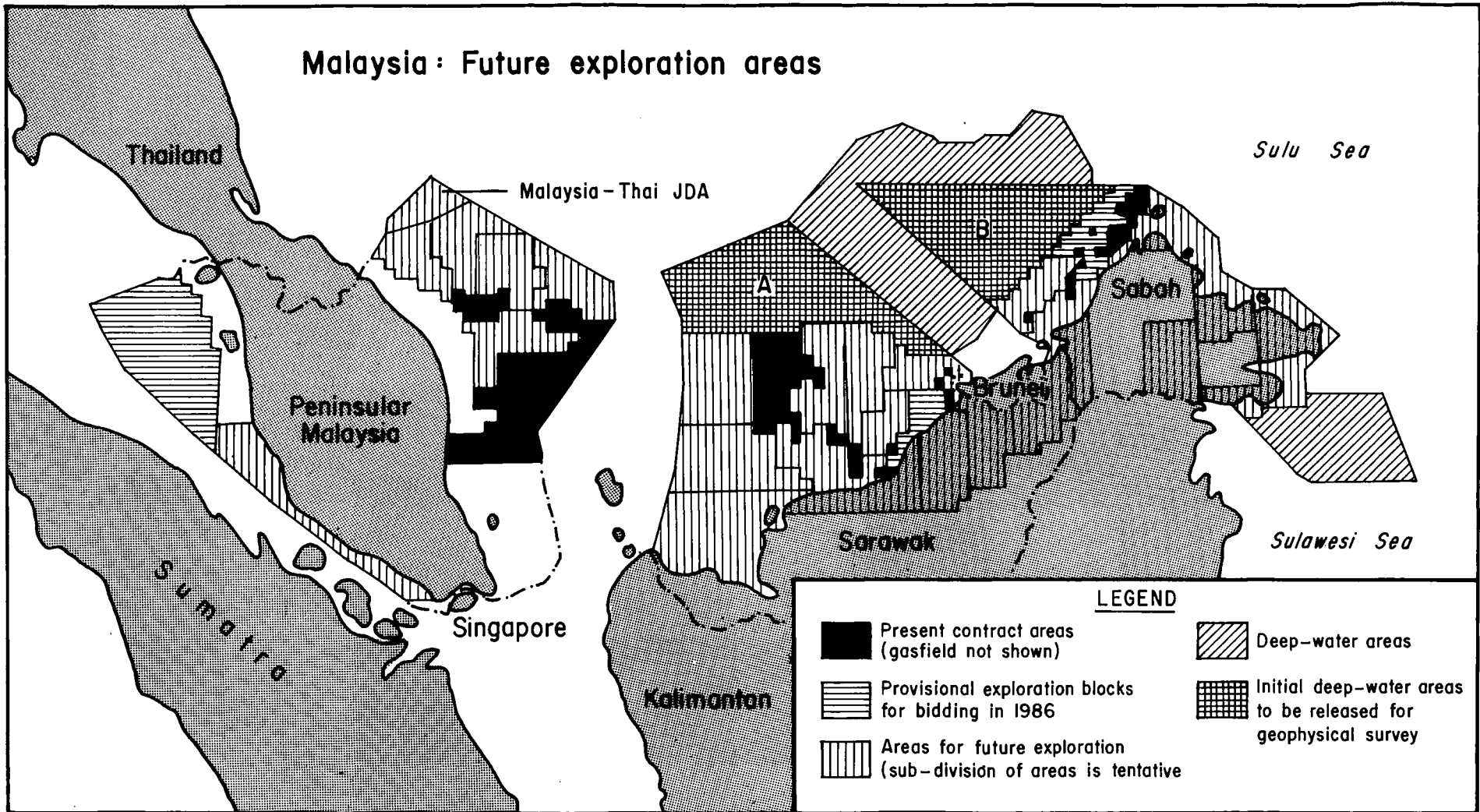
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Malaysia: Future exploration areas



Redrawn from *Asian Oil & Gas*, Jan. 1986.

be 60%, while all profit gas will be split in the ratio 50:50 for the first two trillion ft³ produced from a contract area. Once this level is reached, the split will revert to the current 65:35 ratio in favour of PETRONAS.

Spread over a 20-year period, production of two trillion ft³ of gas is equivalent to roughly 51,000 bpd of crude oil, and thus the new terms for gas appear very favourable. However, the price at which gas will be sold into domestic markets is yet to be negotiated, and could be substantially lower than the equivalent for crude oil.

PETRONAS Managing Director Rastam Hadi is on record as preferring a close relationship between domestic prices for oil and gas. However, the government has in the past pushed for low gas prices for important industrial projects - the Perwaja Steel Mill in Trengganu State, for instance, buys gas from PETRONAS at a substantial discount.

One aspect of the new terms that will not be regarded as favourably by contractors is the requirement that Petronas Carigali - the exploration and production arm of PETRONAS - be carried for a minimum 15% equity in any contract area awarded. It has been PETRONAS' stated policy that Carigali participate in new contracts. However, in the last PSC signed, with Elf Aquitaine in 1982, Carigali earned its 15% interest by committing to drill an agreed number of wells.

Carigali's participation is not limited to 15% - PETRONAS is hoping that competitive bids will push the carried equity higher.

PETRONAS President Tan Sri Abdullah Mohd Salleh told Asian Oil & Gas that, with the new terms approved by the government, the way is clear for a competitive bidding round to be announced in the new year.

PETRONAS displayed a map of the new contract areas expected to be put out to bid in 1986 at its stand at ASCOPE '85. According to the map, three areas, one offshore Sabah, one offshore Sarawak, and one in the Straits of Malacca off the west coast of Peninsular Malaysia, will be made available. The Straits of Malacca block covers the most prospective part of the area where PETRONAS conducted seismic surveys in 1984.

In addition, two deepwater areas, with water depth over 600 ft, will be available for seismic survey. If the surveys locate prospective structures, contractors can negotiate with PETRONAS for a contract area.

Extracted from *Asian Oil & Gas*, Jan. 1986.

NORTHWEST, SOUTHWEST, AND PACIFIC BASIN MAPS OF THE CIRCUM-PACIFIC REGION

These maps are available from the American Association of Petroleum Geologists Bookstore, Box 979, Tulsa, Oklahoma, U.S.A. 74101 at a cost of \$16.50 each postpaid. Entire series of Plate-Tectonic and Geodynamic Maps, 6-sheets each, are \$49 postpaid. An Explanatory Notes booklet for the Geodynamic and Plate-Tectonic series is free with any Geodynamic or Plate-

Tectonic Map order, or \$1 if ordered separately.

PLATE-TECTONIC MAP OF THE CIRCUM-PACIFIC REGION, NORTHWEST QUADRANT.
American Association of Petroleum Geologists, 1982, 1:10,000,000.

PLATE-TECTONIC MAP OF THE CIRCUM-PACIFIC REGION, SOUTHWEST QUADRANT.
American Association of Petroleum Geologists, 1982, 1:10,000,000.

PLATE-TECTONIC MAP OF THE CIRCUM-PACIFIC REGION, PACIFIC BASIN SHEET.
American Association of Petroleum Geologists, 1985, 1:17,000,000.

GEODYNAMIC MAP OF THE CIRCUM-PACIFIC REGION, NORTHWEST QUADRANT.
Circum-Pacific Council for Energy and Mineral Resources, 1985, 1:10,000,000.
Available from the AAPG Bookstore.

GEODYNAMIC MAP OF THE CIRCUM-PACIFIC REGION, SOUTHWEST QUADRANT.
American Association of Petroleum Geologists, 1985, 1:10,000,000.

GEODYNAMIC MAP OF THE CIRCUM-PACIFIC REGION, PACIFIC BASIN SHEET.
Circum-Pacific Council for Energy and Mineral Resources, 1985, 1:17,000,000.
Available from the AAPG Bookstore.

DEVELOPMENTS IN QUATERNARY GEOLOGICAL RESEARCH IN EAST AND SOUTHEAST ASIA DURING THE LAST DECADE

Bangkok, Thailand.

Second half of October, 1986.

Organised by Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP) in co-operation with The Department of Mineral Resources (DMR), Thailand, The Geological Survey of the Netherlands and IGCP Project 218 "Quaternary Processes and Events in Southeast Asia".

Objectives are to inventory and to discuss:

1. Quaternary geological mapping projects carried out by government agencies.
2. Problems encountered during Quaternary geological surveys and in compiling maps for publication (such as problems with legend systems, stratigraphical framework, log descriptions ready for storage in data banks, subsidiary maps and cross-sections).
3. Laboratory analyses used for compilation of maps, setting up of legend systems and stratigraphical framework, and information in explanatory notes to maps (such as datings, grainsize analyses, light and heavy detrital mineral interpretation, palaeontological data, chemical data, geotechnical data and types of clay minerals).
4. Shallow exploration techniques in use for Quaternary geological mapping projects.
5. Practical applications of Quaternary geological maps (Translation of traditional Quaternary geological maps into thematic maps to demonstrate the exploitability of the shallow subsurface in terms of mineral

resources, construction and energy materials, groundwater, agriculture, to draw attention to restrictions in exploitation in terms of foundation and natural hazards, and to provide specific information for use by non-geologists e.g. planners).

6. Correlations of offshore and on-land Quaternary deposits.
7. Developments of curriculum for a B.Sc., M.Sc. and Ph.D. degree in Quaternary Geology at universities.

The dateline for receipt of the title and abstract of papers is 1st September, 1986. Further information contact: The Organiser, Developments in Quaternary Geological Research, The United Nations Building, Rajadamnern Avenue, Bangkok, 10200, Thailand.

EXTRACTIVE INDUSTRY GEOLOGY '87

Extractive industry geology '87, the fifth in this series of conferences, will be held at Keele University, Staffordshire, on 23 and 24 March, 1987. Organized by the Institution of Mining and Metallurgy in cooperation with the Institution of Geologists and the Geological Society, the conference will give special attention to clays/ceramics and drilling methods. Papers are invited on any topic of relevance to the conference, but of particular interest are those which deal with refractory materials, fluorspar, limestone, computer techniques, quarry and open-pit design, rock mechanics, evaluation and environmental matters. Case histories will be welcomed. Abstracts (150 - 200 words) of proposed papers should be sent to the IMM Conference Office, 44 Portland Place, London W1N 4BR before 1 June, 1986. Pre- and post-conference technical visits are planned.

Further details of the conference and its associated events will be given in the First Circular, available in February/March, 1986, from IMM Conference Office.

SECOND INTERNATIONAL SYMPOSIUM ON THE DEVONIAN SYSTEM - FIRST CIRCULAR AND CALL FOR PAPERS

August 17-20, 1987.
Calgary, Alberta, Canada.

The Symposium will bring together geologists from every part of the world interested in Devonian rocks from both theoretical and practical points of view.

The technical program will focus on Devonian palaeogeographic reconstruction throughout the world, and will also include sessions on selected topics, as outlined in this brochure. In addition to oral presentations, poster, core and palaeontological displays are planned. The proceedings of the Symposium will be published as part of the Canadian Society of Petroleum Geologists (C.S.P.G.) Memoir series. A large selection of field excursions

to exposures of Devonian rocks throughout Canada will complement the technical programme.

Technical Programme

A comprehensive worldwide coverage of Devonian geology is planned for the Symposium and the technical programme will consist of two parts. The first part will be devoted to Palaeogeographic Reconstruction and contributions are sought that will blend lithologic, palaeontologic and tectonic data into interpretive syntheses of portions of the Devonian World. The second part will consist of sessions on a variety of selected topics.

Content

PART I: Presentations for the Palaeogeographic Reconstruction portion of the Symposium will be interpretive syntheses which summarize the geological evolution of an area during all or a portion of Devonian time. Regional compilations are desirable although contributions on a more local scale may also be acceptable. An outline for a contribution to this part of the programme is suggested:

Introduction: distribution map

Tectonic setting: map, cross-section

Stratigraphy (bio and litho) and sedimentology: time stratigraphic chart(s); stratigraphic cross-sections (controlled or schematic); maps (isopach, facies)

Depositional history: maps (palaeogeography); block diagrams

Economic geology: map, schematic sections

PART II: The Selected Topics portion of the Symposium will consist of sessions on the following themes:

1. Global reconstructions
 - palaeomagnetic
 - palaeoclimatic
 - palaeobiogeographic
2. Tectonics and basin evolution
 - large-scale plate interactions
 - thermo-mechanical models
 - unconformities and sedimentation
 - economic implications
3. Transgressive-regressive cycles and event stratigraphy
 - documentation on local, regional and global scales
 - causes
 - economic implications
4. Major clastic provinces
 - source areas
 - depositional systems
 - tectonic control
 - future potential

5. Biostratigraphy
 - recent advances
 - worldwide correlation
 - intercalibration of multiple zonal schemes
6. Correlation of non-marine and marine successions
7. Animal and plant communities
8. Reefs
 - distribution and growth patterns
 - composition and environment
 - diagenesis and reservoir characteristics
 - reef - off reef relationships
9. Black carbonates and black shales
 - occurrence, composition and origin
 - source potential
10. Hydrocarbon occurrences
 - source to reservoir
 - relation to regional setting
11. Economic geology
 - setting and origin of major base metal provinces
 - major evaporite basins

Oral Presentations

English is the official language of the Symposium. Each speaker will be given one half hour for presentation and discussion.

Abstracts are due February 1st, 1987 and abstract forms will be included in the second circular which will be available in the fall of 1986.

Publication

All contributors to the Symposium are invited to submit manuscripts in English which will be considered for inclusion in the Proceedings, to be published as part of the C.S.P.G. Memoir series. Papers not read at the meeting but which fit with the themes of the Symposium will also be considered for publication.

Field Excursions

In conjunction with the Symposium, a number of field trips will be scheduled to view Devonian outcrops throughout Canada.

Pre-Conference Trips

- A1 - S.W. Ellesmere Island, Arctic Islands.
- A2 - Hay River-Pine Point, N.W.T.
- A3 - Norman Wells, N.W.T.
- A4 - Northeast British Columbia
- A5 - Ancient Wall Reef Complex, Alberta
- A6 - Cline Channel, Alberta
- A7 - Cripple Creek - Ram River, Alberta

Post-Conference Trips

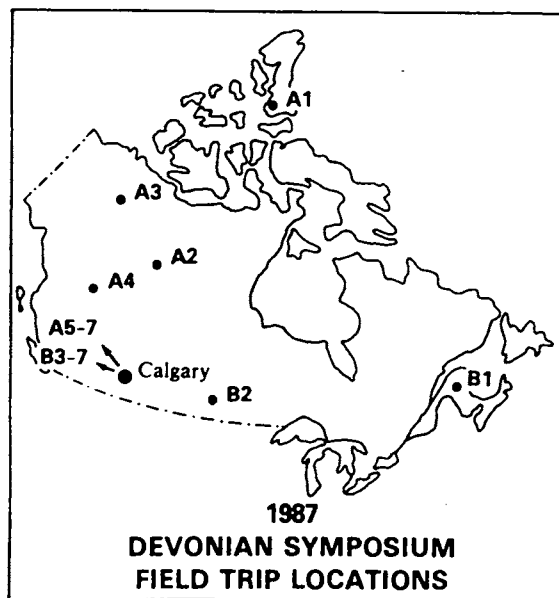
- B1 - Gaspé Peninsula, Quebec
- B2 - Southern Manitoba and Saskatchewan
- B3 - Burnt Timber Embayment, Alberta
- B4 - Frasnian and Famennian, Basinal Sedimentation, Jasper Basin
- B5 - Fairholme Reef Complex, S. Alberta
- B6 - White Man Gap, Canmore
- B7 - Jura Creek, Alberta

Correspondence

Please send all correspondence concerning the Symposium to the following address:

Second International Symposium Devonian System
 c/o Canadian Society Petroleum Geologists,
 505, 206 - 7 Avenue S.W.,
 Calgary, Alberta, Canada,
 T2P 0W7.

Telephone: (403) 264-5610



XVI PACIFIC SCIENCE CONGRESS

August 20-30, 1987.

Seoul, Korea.

Theme: "New Dimensions of Science, Manpower and Resources in the Pacific"

Sponsored by: National Academy of Sciences, Republic of Korea.

The Pacific Science Association is an international, non-governmental, regional scientific organization. The founding meeting, the First Pan-Pacific

Scientific Conference, was held in Honolulu, Hawaii, in 1920. Ninety-three scientists from Australia, Canada, China, Hawaii, Japan, New Zealand, the Philippines, the United Kingdom, and the United States met to "outline scientific problems of the Pacific region and to suggest methods for their solution, to make a critical inventory of existing knowledge, and to devise plans for future studies." Dr. Herbert E. Gregory, then Director of Bishop Museum, was Chairman of the meeting, and is recognized as the Founder of the Association.

Objectives

The objectives of the Association are:

- a) to initiate and promote cooperation in the study of scientific problems relating to the Pacific region, more particularly those affecting the prosperity and well-being of Pacific peoples; and
- b) to strengthen the bonds of peace among Pacific peoples by promoting a feeling of brotherhood among the scientists of all the Pacific countries.

Congresses

Fifteen Pacific Science Congresses have been held since 1920. They are the principal meetings of the Association and are held every four years. Though each Congress is centered on one main theme, programmes include those branches of the physical, biological, and social sciences which are appropriate to the main objectives of the Association.

For further information

Organizing Committee
XVI Pacific Science Congress,
K.P.O. Box 1008,
Seoul 110,
Korea

Tel: (02) 733-4478

SECOND INTERNATIONAL CONFERENCE ON COASTAL & PORT ENGINEERING IN DEVELOPING COUNTRIES

7-11 September, 1987.

Beijing, China.

Organized by the Chinese Ocean Engineering Society.

The Second International Conference on Coastal and Port Engineering in Developing Countries (COPEDEC) will be held in Beijing, China, during the period 7th to 11th September, 1987. A third announcement, including detailed practical information as well as registration and hotel booking forms, will be issued late 1986.

Objectives

The main objective of the Conference is to provide an international forum, where coastal and port engineers from developing countries may exchange know-how and experience amongst themselves and with colleagues from developed countries.

The Conference covers scientific developments and their application within the fields of coastal and port engineering. Emphasis is laid on practical applications and case studies with special reference to developing countries.

Venue

The Conference will be held at the Beijing Science Hall, which is located in the Friendship Hotel, Beijing.

Language

The language of the Conference will be English and no simultaneous interpretation will be provided.

Final Call for Papers

Papers will be presented on the following subjects with special reference to developing countries:

- Coastal stability, beach erosion and control.
- Ports in developing countries, site selection and lay-out.
- Choice of structures and materials, construction, performance and maintenance.
- Small craft harbours, anchorages and landing places.
- Low cost harbour facilities in undeveloped areas.
- Sedimentation and dredging problems.
- Coastal field surveys and measuring techniques.
- Environmental impacts of coastal and port engineering works.
- Economic aspects of coastal and port engineering projects.
- Hydrodynamic forces on coastal structures.

Selection of papers for presentation at the Conference will be based on type written two page abstracts, to be forwarded in five copies before May 1st, 1986, to:

Paper Selection Secretary,
COPEDEC Permanent Secretariat,
c/o Coast Conservation Department,
4th Floor, Maligawatta Secretariat,
Colombo 10,
SRI LANKA.

(Telex: 21419 MINFISH CE)

Fellowships

A limited number of fellowships will be made available by sponsors to accommodate the participation of professionals from developing countries.

Those interested are requested to write for further details to:

Fellowship Committee,
COPEDEC Permanent Secretariat,
c/o Coast Conservation Department,
4th Floor, Maligawatta Secretariat,
COLOMBO 10,
SRI LANKA

Inquiries

Inquiries may be made to:

Conference Secretary,
Second International Conference on Coastal and Port Engineering in
Developing Countries,
c/o Nanjing Hydraulic Research Institute,
223, Guanzhou Road,
Nanjing,
China.

Telex: 34153 NHRIC CN
Cable: 5710 Nanjing
Telephone: (025) 336622, 34713/34715

ASIAN MINING '88' - FIRST CIRCULAR

Asian Mining 88

**Geology · Mining ·
Mineral Processing · Metallurgy**

International conference and exhibition

**8-11 March 1988
Kuala Lumpur
Malaysia**

**Organized by the Institution of Mining and Metallurgy
in association with
The States of Malaya Chamber of Mines
The Malaysian Section of the Institution of Mining and Metallurgy
The Institute of Mineral Engineering, Malaysia
The Geological Society of Malaysia**

THEME

'Asian Mining '88' is the third conference in the series devoted to the development of the Asian minerals industry — geology, mining, mineral processing and metallurgy — to be organized by the Institution of Mining and Metallurgy. The conference will deal with the economics, exploration, evaluation, mining, mineral processing and metallurgy of Asian minerals. The main aim of the conference will be to provide a forum for the discussion of minerals industry research and practice as well as mining projects and the opportunities for investment in mining within the region.

DATE AND VENUE

The conference will be held in the Putra World Trade Centre, Kuala Lumpur, Malaysia, from 8 to 11 March, 1988. Malaysia is the world's largest producer of tin minerals and contributed 27.7% of world production in 1984. Although cassiterite is the single dominant mineral produced, other than petroleum, efforts are being made to diversify into other fields. Kuala Lumpur is located in the centre of Southeast Asia and has excellent air connections with most major cities. It has a tropical climate with temperatures ranging from 21° to 32°C.

CALL FOR PAPERS

The Organizing Committee will be pleased to consider papers that deal with technical and operational aspects of geology, mineral exploration, mining, mineral processing, smelting and refining, as well as those concerned with financing, investment and safety. Papers on projects from any area of the world will be considered, but priority will be given to those which are of direct relevance to the Asian minerals industry.

Abstracts (200–300 words) of proposed papers should be submitted for consideration by the Organizing Committee to the Conference Office, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England, before 15 September, 1986. Completed manuscripts of approved papers will be required in June, 1987, and a preprinted volume of papers (*Asian mining '88*) will be sent to registrants in advance of the conference.

TOURS

Technical visits will be arranged within Malaysia and to nearby countries, such as Thailand and Indonesia. To assist in the planning of these visits, potential registrants are requested to indicate their interest in tours on the *Reply form*.

EXHIBITION

The exhibition, 'Asian Mining '88', will be held alongside the conference in the Putra World Trade Centre. Enquiries relating to the exhibition should be addressed to the organizers, Infinity Plus, 3rd Floor, Makati Stock Exchange Building, Ayala Avenue, Makati, Metro Manila, Philippines (telephone: 851921; telex: 26436 SEARBY PH) or 268 Banyule Road, Rosanna, Victoria, Australia 3084 (telephone: 458 3990).

FURTHER INFORMATION

Further details of the conference and its associated events will be given in the *Second circular*, which will be available in October–November, 1986. Potential registrants are requested to complete and return the attached *Reply form*.

Enquiries about the conference should be addressed to the Conference Officer, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England. (telephone: 01-580 3802; telex 261410).

OFFICIAL CARRIER

Malaysian Airlines has been appointed the official carrier for the conference. MAS offices worldwide will be pleased to discuss registrants' flight requirements.

REPLY FORM

'Asian Mining '88'
8-11 March 1988
Kuala Lumpur
Malaysia

To: **The Conference Office**
The Institution of Mining and Metallurgy
44 Portland Place
London W1N 4BR
England

NAME

ORGANIZATION

ADDRESS

.....

.....

Please send me copies of future circulars for the conference

I expect to attend the conference

I expect to be accompanied by my wife/husband

I should be interested in a technical visit to

Malaysia

Other (please specify)

I intend to submit an abstract on the topic

.....

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REMOTE SENSING APPLICATIONS, COMMERCIAL ISSUES AND OPPORTUNITIES FOR THE SPACE STATION ERA - USERS' CONFERENCE

June 3-5, 1986.

Stapleton Plaze, Denver, Colorado.

Sponsors Include:

National Aeronautics & Space Administration (NASA),
National Oceanic & Atmospheric Administration (NOAA),
The Geosat Committee, Inc. (GEOSAT),
Institute for Technological Development/Space Remote Sensing
Center (ITD/SRSC),
Earth Observation Satellite Company (EOSAT),
American Society for Photogrammetry & Remote Sensing (ASPRS).

The major objectives of this important conference are to provide an open forum for government and the private sectors to interactively review present and future plans and user needs for global remote sensing now and in the Space Station/Polar Orbiting Platform era; stimulate the potential and existing remote sensing industry and accelerate the formation of new commercial ventures; encourage end-user, private industry, and government-coordinated development of global remote sensing requirements and applications; identify industry and government requirements for the Space Station and beyond.

Learn more about:

- Space Station Programme
- Commercialization Programme
- NASA/EOS System
- NOAA Programme and Plans
- ITD Space Remote Sensing Programme
- EOSAT
- User Prospective: Private/Government Cooperation
- International Activities

Participate in working groups on many remote sensing disciplines, including:

- | | |
|---------------------------|------------------|
| - Renewable resources | - Atmospheres |
| - Non-renewable resources | - Sensor systems |
| - Oceans | - Ground systems |

Interact with colleagues who are users, manufacturers, value-added and financial service organizations, government and international agency representatives and more!

For more information, call D.G. Park at (415) 981-6265, or fill out the form below and send it to:

D.G. Park, Administrator,
The Geosat Committee,
153 Kearny St., Suite 209,
San Francisco, CA 94108.

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

March 1986 - April 1986

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

March 1986 - April 1986

STRUCTURAL GEOLOGY (Dehra Dun, India). Regional training course organized by Wadia Institute of Himalayan Geology and sponsored by Unesco. For Information: Dr. V.C. Thakur, Wadia Institute of Himalayan Geology, Dehra Dun - 248001, India.

March 1986 - November 1986

PHOTOINTERPRETATION APPLIED TO GEOLOGY AND GEOTECHNICS (Bogota, Colombia). Diploma course organized by the Centro Interamericano por Fotointerpretación (CIAF) in cooperation with ITC and Unesco. Language: Spanish. For Information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

April 1986 - July 1986

RURAL GROUNDWATER DEVELOPMENT (Loughborough, U.K.). A 10-week diploma course organized annually by WEDC. For Information: WEDC, University of Technology, Loughborough LE11 3TU, U.K.

May 1986 - June 1986

GEOPHYSICS APPLIED TO GEOTHERMAL PROSPECTION (Manizales, Colombia). Annual course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For Information: Organización Latinoamericana de Energía (OLADE), P.O. Box 119, Quito, Ecuador.

May 1986 - June 1986

BASE MAPPING TECHNIQUES (Washington, D.C., U.S.A.). A training course organized by the U.S. Geological Survey for foreign participants in the preparation, publication, and use of base maps. For Information: U.S. Geological Survey, Training Section, National Center (917), Reston, Virginia 22092, U.S.A.

June 1986 - August 1986

TECHNIQUES OF HYDROLOGIC INVESTIGATIONS (Washington, D.C. and Denver, Colorado, U.S.A.). Annual training course for international participants. For Information: Office of International Hydrology, Water Resources Division, U.S. Geological Survey, 470 National Center, Reston, Virginia 22092, U.S.A.

July 1986 - August 1986

SUMMER COURSE ON EARTH SCIENCES: CRYSTALLOGRAPHY, MINERALOGY, METALLOGENY (Madrid, Spain). Annual course organized by the Department of Geology and Geochemistry of the Universidad Autónoma de Madrid and sponsored by Unesco. Language: Spanish. For Information: Prof. T. Monseur, Departamento de Geología y Geoquímica, Facultad de Ciencias, Universidad Autónoma de Madrid, Canto Blanco, Madrid 34, Spain.

July 1986 - September 1986

VOLCANOLOGY (Quito, Ecuador). Annual 10-week course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For Information: Organización Latinoamericana de Energía (OLADE), P.O. Box 119, Quito, Ecuador.

August 1986 - June 1988

SOIL SCIENCE AND WATER MANAGEMENT (Wageningen, The Netherlands). Two-year M.Sc. course designed for B.Sc. graduates from developing countries. Language: English. For Information: Director of Studies of the M.Sc. course in Soil Science and Water Management, P.O. Box 37, 6700 AA Wageningen, The Netherlands.

September 1986 - October 1986

REMOTE SENSING FUNDAMENTALS OF APPLICATIONS AND ANALYSIS TECHNIQUES, 25th International Workshop. (Sioux Falls, South Dakota, U.S.A.). Program of training workshops organized by the U.S. Geological Survey for non-U.S. scientists, engineers, and resources managers. For Information: Training Section, Office of International Geology, U.S. Geological Survey, National Center (917), Reston, VA 22092, U.S.A.

September 1986 - October 1986

GEOLOGIC AND HYDROLOGIC HAZARDS (Denver, Colorado, U.S.A.). A training program organized by the U.S. Geological Survey for international participants from disaster-prone countries. For Information: U.S. Geological Survey, Training Section, 917 National Center, Reston, Virginia 22092, U.S.A.

September 1986 - November 1986

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: Organización Latinoamericana de Energía (OLADE), P.O. Box 199, Quito, Ecuador.

September 1986 - November 1986

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: Organización Latinoamericana de Energía (OLADE), P.O. Box 119, Quito, Ecuador.

September 1986 - November 1986

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 1986 - June 1987

REMOTE SENSING TRAINING (Toulouse, France). A diploma course with options for geoscientists sponsored by the French Aerospace Remote Sensing Development Organization (GDTA), BRGM, IFP and other French institutions. Language: French. For Information: GDTA-Formation, 18 avenue Edouard-Belin, 31055 Toulouse Cedex, France.

September 1986 - August 1987

MINING EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Language: English. For Information: ITC (ME), 3, Kanaalweg, 2628 Delft, The Netherlands.

October 1986 - November 1986

TECTONICS, SEISMOLOGY AND SEISMIC RISK ASSESSMENTS (Potsdam, East Germany). 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 1500 Postdam, German Democratic Republic.

October 1986 - July 1987

ENGINEERING HYDROLOGY (Galway, Ireland). Annual diploma and post-graduate courses organized by the Department 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 1986 - September 1987

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 Group Leader, University of Technology, Loughborough, Leics LE11 3TU, U.K.

October 1986 - September 1987

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. Languages: English and French. For Information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

October 1986 - September 1987

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.

November 1986 - December 1986

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

November 1986 - December 1986

SMALL MINE POTENTIAL AND TECHNOLOGY (Leoben, Austria). Annual training course sponsored by Austria and Unesco. Language: English. For Information: Prof. Wolfbauer, Forschungsgesellschaft Joanneum, Roseggerstrasse 15, A-8700 Leoben, Austria.

November 1986 for two 11-month sessions

ENGINEERING GEOLOGY (Delft, The Netherlands). New post-graduate diploma course leading to M.Sc. degree in Engineering Geology. For Information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

December 1986 - January 1987

METHODS AND TECHNIQUES IN EXPLORATION GEOPHYSICS (Hyderabad, India). Diploma course organized annually 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.

January 1987 - April 1987

DIGITAL IMAGE PROCESSING (Enschede, The Netherlands). Certificate courses on techniques for national resources surveys, organized annually by the International Institute of Aerial Surveys and Earth Sciences (ITC). Sponsored by Unesco. Language: English. For Information: ITC Student Affairs Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

May 1987 - November 1987

GENERAL HYDROLOGY with emphasis on groundwater (Argentina). Post-graduate course organized every other year and sponsored by Unesco. Language: Spanish. For Information: Comite Nacional para el Programa Hidrologico Internacional de la Republica Argentina, Av 9 de Julio 1925 - 15^o piso, 1332 Buenos Aires, Argentina.

August 1987 - October 1987

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, Malostranske nam. 19, 11821 Prague 1, Czechoslovakia.

September 1987 - October 1987

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, A-8010 Graz, Austria.

KALENDAR (CALENDAR)

- May 17 - 21, 1986
REEFAL DEVELOPMENT IN A TERRIGENOUS PROVINCE (GSA Penrose Conference), Veracruz, Mexico. (Paul R. Krutak, Arco Exploration Company, P.O. Box 51408, Lafayette, LA 70505, U.S.A.).
- May 19 - 21, 1986
GEOLOGICAL, MINERALOGICAL ASSOCIATIONS OF CANADA (Joint Annual Meeting with Canadian Geophysical Union), Ottawa, Ontario, Canada. (Dr. J.A. Donaldson, Department of Geology, Carleton University, Ottawa, Ontario, Canada K1S 5B6)
- May 19 - 23, 1986
AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Maryland, U.S.A. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, U.S.A.)
- May 20 - 21, 1986
DESERT SEDIMENTS: ANCIENT AND MODERN (Meeting), London, U.K. (Carolyn Symonds, The Geological Society, Burlington House, Piccadilly, London W1, U.K.)
- May 20 - 27, 1986
SEISMIC ANISOTROPY (2nd International Workshop), Puschyno, U.S.S.R. Co-sponsored by IASPEI. (A.G. Bugayevsky, Soviet Geophysical Committee, Molodeznaya 3, Moscow 117296, U.S.S.R.)
- May 21 - 24, 1986
STABLE ISOTOPES IN LACUSTRINE SEDIMENTS (IGCP-219 Workshop), Krakow, Poland. (Dr. St. Leszczynski, Institute of Geological Sciences, Jagellonian University, Oleandry 2a, 30-063 Krakow, Poland)
- May 22 - 26, 1986
SHEAR CRITERIA IN BRITTLE AND DUCTILE ROCK (International Workshop), Rennes, France. (D. Gapais, CAESS, Universite de Rennes, Campus de Beaulieu, 35042 Rennes Cedex, France)
- May 23 - 25, 1986
INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS (7th Regional Meeting), Krakow, Poland. (Dr. St. Leszczynski, Institute of Geological Sciences, Jagellonian University, Oleandry 2A, 30-063 Krakow, Poland)
- June 1986
METALLOGENY OF OPHIOLITES (IGCP-197 Meeting), Athens, Greece. Languages: Greek and English. (Institute of Geology & Mineral Exploration, 70 Messoghion Street, 115 27 Athens, Greece)
- June 1 - 6, 1986
GEOSCIENCE INFORMATION (3rd International Conference), Adelaide, South Australia. (Conference Secretariat 31CGI, c/o Australian Mineral Foundation, Private Bag 97, Glenside, South Australia, 5065, Australia)
- June 2 - 4, 1986
CANADIAN SOCIETY OF PETROLEUM GEOLOGISTS (Annual Convention), Calgary, Alberta, Canada. (H.J. Sullivan, Amoco Canada Petroleum, 444 - 7th Avenue SW, Calgary, Alberta, Canada T2P 0Y2)
- June 2 - 5, 1986
DINOSAUR SYSTEMATICS (Symposium), Drumheller, Alberta, Canada. (Kenneth Carpenter, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103, U.S.A.)
- June 3 - 6, 1986
EUROPEAN ASSOCIATION OF EXPLORATION GEOPHYSICISTS (Meeting), Ostend, Belgium. (E. van der Gaag, European Association of Exploration Geophysicists, P.O. Box 162, NL-2501 AN The Hague, The Netherlands)
- June 8 - 13, 1986
MIGMATITES AND CRUSTAL MELTING (GSA Penrose Conference), Amherst, Massachusetts, U.S.A. (R.J. Tracy, Department of Geology and Geophysics, Yale University, New Haven, CT 06511, U.S.A.)
- June 15 - 18, 1986
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (Annual Convention), Atlanta, Georgia, U.S.A. (Howard Cramer, Emory University, Department of Geology, Atlanta, GA 30322, U.S.A.)
- June 16 - 21, 1986
CLIMATIC FLUCTUATIONS DURING THE QUATERNARY IN THE WESTERN MEDITERRANEAN REGIONS (Symposium), Madrid, Spain. Languages: Spanish, French and English. (Prof. F. Lopez-Vera, Dpto. De Geologia y Geoquimica, Universidad Autonoma, 28049 Madrid, Spain)
- June 22 - 26, 1986
HYDROGEOLOGY (3rd Annual Canadian/American Conference), Banff, Alberta, Canada. (Canadian/American Conferences on Hydrogeology, Brian Hitchon, Alberta Research Council, 4445 Calgary Trail South, Edmonton, Alberta, Canada T6H 5R7)
- June 23 - 26, 1986
ARENACEOUS FORAMINIFERA (2nd Workshop), Vienna, Austria. (Dr. Fred Rogl, Naturhistorisches Museum, Burgring 7, A-1014 Vienna, Austria)
- June 30 - July 2, 1986
CORRELATION AND RESOURCE EVALUATION OF TIN/TUNGSTEN GRANITES SOUTH-EAST ASIA AND THE WESTERN PACIFIC REGION (Meeting), Canberra, ACT, Australia. Sponsored by IGCP Project 220. (Dr. N.C. Higgins, Organizing Secretary, Bureau of Mineral Resources, P.O. Box 378, Canberra, ACT 2601, Australia)
- June 30 - July 4, 1986
GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPE GEOLOGY (6th International Conference), Cambridge, U.K. Sponsored by IAVCEI. (Organizing Committee, 6th International Conference, Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, U.K.)

- June 30 - July 12, 1986
COSPAR (26th Plenary Meeting), Toulouse, France. Includes a Symposium co-sponsored by IUGS. (Z. Niemirowicz, COSPAR Secretariat, 5, boulevard de Montmorency, 75016 Paris, France)
- July 2, 1986
TIME SCALE CALIBRATION (4th Annual Meeting of IGCP Project 196), Cambridge, U.K. Co-sponsored by IUGS. To be held during 6th International Conference on Geochronology. (Organizing Committee, 6th ICOG, Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, U.K.)
- July 2 - 10, 1986
INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES (2nd General Assembly), Budapest, Hungary. Languages: English and French. (Dr. A. Szollosi-Nagy, VITUKI, H-1453, Budapest, Pf27, Hungary)
- July 4 - 12, 1986
PERMIAN AND PERMO-TRIASSIC BOUNDARY IN THE WESTERN TETHYAN REALM (Meeting and Field Trip), northern Italy and northern Yugoslavia. Co-sponsored by IGCP Project 203. (G. Cassinis, Dipartimento di Scienze della Terra, Sezione geologico-paleontologica, Universita degli Studi, Strada Nuova 65, Pavia 27100, Italy)
- July 7 - 11, 1986
GEOCONGRESS '86 (GSSA 21st Biennial Congress), Johannesburg, South Africa. Co-sponsored by IUGS. (The Symposium Secretariat, S. 339, CSIR, P.O. Box 395, Pretoria, South Africa 0001)
- July 7 - 14, 1986
SEA-LEVEL CHANGES AND QUATERNARY SHORELINES (International Symposium and Field Conference), Sao Paulo, Brazil. Co-sponsored by INQUA Shorelines Commission, IGCP Projects 200 and 201, and AGEQUA. (Prof. K. Suguio, Inst. de Geociencias, Univ. de Sao Paulo, C.P. 20899, Sao Paulo, Brazil)
- July 13 - 18, 1986
INTERNATIONAL MINERALOGICAL ASSOCIATION (General Meeting), Stanford, Calif., U.S.A. (Prof. C.T. Prewitt, Department of Earth and Space Sciences, State University of New York, Stony Brook, NY 11794, U.S.A.)
- July 13 - 19, 1986
PROTEROZOIC GEOCHEMISTRY (International Field Conference), Central Colorado, U.S.A. (K.C. Condie, Department of Geoscience, New Mexico Institute of Mining and Technology, Socorro, NM 87801, U.S.A.)
- July 14 - 17, 1986
THE COMPUTER HANDLING AND DISSEMINATION OF DATA: Numerical Data Processing and Dissemination in the Geosciences (Part of 10th International CODATA Conference), Ottawa, Canada. (Mrs. Lois Baignee, Conference Services, National Research Council of Canada, Montreal Road, Ottawa, Ontario, Canada K1A 0R6)
- July 15 - 17, 1986
DEEP SEISMIC REFLECTION PROFILING OF THE CONTINENTAL LITHOSPHERE (Meeting), Cambridge, U.K. (BIRPS, Bullard Labs, Magingley Road, Cambridge, CB3 0EZ, U.K.)
- July 21 - 25, 1986
THE ORIGIN OF LIFE (5th ISSOL Meeting and 8th International Conference), Berkeley, California, U.S.A. (Dr. S. Chang, Ames Research Center, Moffett Field, CA 94035, U.S.A.)
- August/September 1986
LANDSCAPES OF THE SOUTHERN HEMISPHERE (International Conference), Adelaide, Australia. (Prof. Jon Firman, S.A. Department of Mines and Energy, P.O. Box 151, Eastwood, S.A. 5063, Australia)
- August 1 - 7, 1986
SPELEOLOGY (9th International Congress), Barcelona, Spain. Languages: English and French. (General Secretary of the Congress, P.O. Box 343, E-08080 Barcelona, Spain)
- August 3 - 9, 1986
NATURAL AND MAN-MADE HAZARDS (international Symposium), Quebec, Canada. Sponsored by the Tsunami Society. (Mohammed El-Sabh, Department of Oceanography, University of Quebec at Rimouski, 310 Avenue des Ursulines, Rimouski, Quebec, Canada G5L 3A1)
- August 4 - 6, 1986
SPOROGENESIS IN ARCHEGONIATES (Meeting), Stockholm, Sweden. (Dr. E. Scheffield, Department of Botany, University of Manchester, Manchester M13 9PL, U.K.)
- August 4 - 7, 1986
INTERMONTANE BASINS (IAS Symposium), Chiang Mai, Thailand. (T. Thanasuthipitak, Department of Geological Science, Chiang Mai University, Chiang Mai 50002, Thailand)
- August 4 - 8, 1986
DRAINAGE BASIN SEDIMENT DELIVERY (International Symposium), Albuquerque, New Mexico, U.S.A. (R.F. Hadley, Secretary ICCE, c/o Department of Geography, University of Denver, Denver, CO 80208-0183, U.S.A.)
- August 4 - 8, 1986
HUMIC SUBSTANCES SOCIETY (3rd Annual Meeting), Oslo, Norway. (E. Gjessing, Norwegian Institute for Water Research, P.O. Box 333, Blindern Oslo 3, Norway; or W.L. Campbell, IHSS Standards & Reference Committee, 5293 Ward Road, Arvada, CO 80002, U.S.A.)
- August 4 - 11, 1986
PROCESSES IN THE DEEP ARCHEAN CRUST (Field Workshop), Northern Manitoba, Canada. (Archean Crust Field Workshop, Lunar and Planetary Institute, 3303 NASA Road 1, Houston TX 77052, U.S.A.)
- August 8 - 17, 1986
WATER-ROCK INTERACTION (5th International Symposium), Reykjavik, Iceland. Sponsored by IAGC. (Dr. Baldor Arnannsson, Orkustofnun - The National Energy Authority, Grensasvegur 9, 108 Reykjavik, Iceland)

- August 10 - 14, 1986
HEAT FLOW STUDIES IN SOUTH AMERICA (Meeting), Sao Paulo, Brazil. Sponsored by International Heat Flow Commission. (Dr. V. Manza, Inst. Astronomico e Geofisico, Univ. de Sao Paulo, CP 30.627, Sao Paulo, Brazil)
- August 10 - 15, 1986
MAGMATISM OF EXTENSIONAL REGIONS (International Congress), Lubumbashi, Zaire. Co-sponsored by IGCP Project 227. (Prof. A.B. Kampunzu, Laboratoire de Petrologie, Universite de Lubumbashi--B.P. 1825, Lubumbashi, Zaire)
- August 11 - 14, 1986
ENERGY RESOURCES IN ASIA (International Conference), Hong Kong. Language: English. (The Co-ordinator, AEMP, Asian Research Service, G.P.O. Box 2232, Hong Kong)
- August 11 - 15, 1986
KIMBERLITE (4th International Conference), Perth, Western Australia. (Dr. A.F. Trendall, Geological Survey of Western Australia, 66 Adelaide Terrace, Perth, W.A., Australia)
- August 12 - 15, 1986
NAPC IV (North Americal Palaeontological Convention), Boulder, Colorado, U.S.A. (Erle G. Kauffman, The Organizing Committee, NAPC IV, Department of Geological Sciences, University of Colorado, CB 250, Boulder, CO 80309, U.S.A.)
- August 13 - 15, 1986
BASINS OF EASTERN CANADA AND WORLD-WIDE ANALOGUES (Symposium), Halifax, Canada. Co-sponsored by Atlantic Geoscience Society, CSPG, and ICL. (C. Beaumont, Oceanography Department, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4J1)
- August 13 - 20, 1986
SOIL SCIENCE (13th ISSS International Congress), Hamburg, F.R.G. (Prof. Dr. K.H. Hartge, Inst. fur Bodenkunde, Univ. Hannover, Herrenhaserstrasse 2, D-3000 Hannover 21, F.R.G.)
- August 15 - 16, 1986
QUATERNARY SEA LEVELS OF AUSTRALIA (Meeting), Warrnambool, Victoria, Australia. Sponsored by IGCP-200 and INQUA. (Associate Prof. D. Hopley, Department of Geography, James Cook University, Townsville, Queensland, Australia)
- August 17 - 22, 1986
CIRCUM-PACIFIC ENERGY AND MINERAL RESOURCES (4th Conference), Singapore. (Circum-Pacific Conference IV, c/o AAPG, P.O. Box 979, Tulsa, OK 74101, U.S.A.)
- August 18 - 22, 1986
INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (7th Symposium), Lulea, Sweden. (Centek Conference, S-951 87 Lulea, Sweden)
- August 21 - 30, 1986
EUROPEAN GEOPHYSICAL SOCIETY/EUROPEAN SEISMOLOGICAL COMMISSION (Joint Meeting), Kiel, F.R.G. (Prof. R. Meissner, Institut fur Geophysik, Christian-Albrechts-Universitat, Olshausenstrasse 40, D-2300 Kiel 1, F.R.G.)
- August 24 - 30, 1986
SHALLOW TETHYS (International Symposium), Wagga Wagga, Australia. Sponsored by IPA. (K.G. McKenzie, School of Applied Science, Riverina C.A.E., P.O. Box 588, Wagga Wagga, N.S.W. 2650, Australia)
- August 24 - 30, 1986
SEDIMENTS DOWN-UNDER (12th International Sedimentological Congress), Canberra, Australia. Sponsored by IAS. (12th International Sedimentological Congress, ACTS, GPO Box 1929, Canberra ACT 2601, Australia)
- August 25 - 28, 1986
LARGE ROCK CAVERNS (meeting), Helsinki, Finland. (Dr. K. Saari, Technical Research Centre of Finland, Lehtisaarentie 2, SF-00340 Helsinki, Finland)
- August 25 - 29, 1986
REMOTE SENSING FOR RESOURCES DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT (International Symposium), Enschede, The Netherlands. (Secretariat Symposium Commission VII, ISPRS, c/o ITC, P.O. Box 6, 7500 AA Enschede, The Netherlands)
- August 25 - 30, 1986
FIGURE AND DYNAMICS OF THE EARTH, MOON AND PLANETS (International Symposium), Prague, Czechoslovakia. (Dr. P. Holota, Research Institute of Geodesy, Topography and Cartography, T. Politických veznu 12, Praha 1, Czechoslovakia)
- September 1 - 3, 1986
ROCK STRESS AND ROCK STRESS MEASUREMENTS (International Conference), Stockholm, Sweden. Languages: English, German, and French. (Centek Conference, Lulea University, S-951 87 Lulea, Sweden)
- September 4 - 10, 1986
GEOMECHANICS (International Symposium), Beijing, P.R. China. (Secretariat of International Symposium on Geomechanics, c/o Institute of Geomechanics, Chinese Academy of Geological Sciences, Fahuasi, Xijiao, Beijing, P.R. China)
- September 6 - 13, 1986
MAN'S IMPACT ON COASTAL ENVIRONMENT (Field Meeting), Spanish coast between French border and Valencia. Sponsored by IGU Commission on the Coastal Environment. (Dr. Maria-Angels Marques, Facultad de Geologia, Universidad de Barcelona, Gran Via 585, Barcelona 08011, Spain)
- September 8 - 10, 1986
INNOVATIVE DIRECTIONS IN PETROLEUM EXPLORATION (Symposium), Dallas, Texas. (I. Williamson, Department of Geology, Imperial College, Prince Consort Road, London SW7 2BP, U.K.)
- September 8 - 11, 1986
GEOSCIENCE AND REMOTE SENSING (International Symposium), Zurich, Switzerland. Sponsored by IEEE Geoscience & Remote Sensing Society. (Prof. H. Haefner, Remote Sensing Laboratory, Department of Geography, Universitat Zurich-Irchel, Winterthurerstrasse 190, 8057 Zurich, Switzerland)

- September 8 - 12, 1986
 INTEGRATED LAND USE PLANNING AND GROUNDWATER PROTECTION MANAGEMENT IN RURAL AREAS (IAH 19th International Congress), Karlovy Vary, Czechoslovakia. (Dr. J. Vrba, Gorkeho namesti 7, 11309 Praha 1, Czechoslovakia)
- September 8 - 12, 1986
 PALAEOCEANOGRAPHY (2nd International Conference), Woods Hole, U.S.A. (W.A. Berggren, Woods Hole Oceanographic Institute, Woods Hole, MA 02543, U.S.A.)
- 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 Musseum 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), Nurenberg, F.R.G. (Prof. U. Smoitczyk, 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), Guilin, 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. Ruttlely, 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. IGCP 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 Brazil)

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, 00111 Rome, Italy)

April 13 - 16, 1987

EUROPEAN UNION OF GEOSCIENCES (IV Biennial Conference), Strasbourg, France. (Prof. Dr. W. Lowrie, Inst. fur Geophysik, HPP 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, BMR, 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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