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NEWSLETTER

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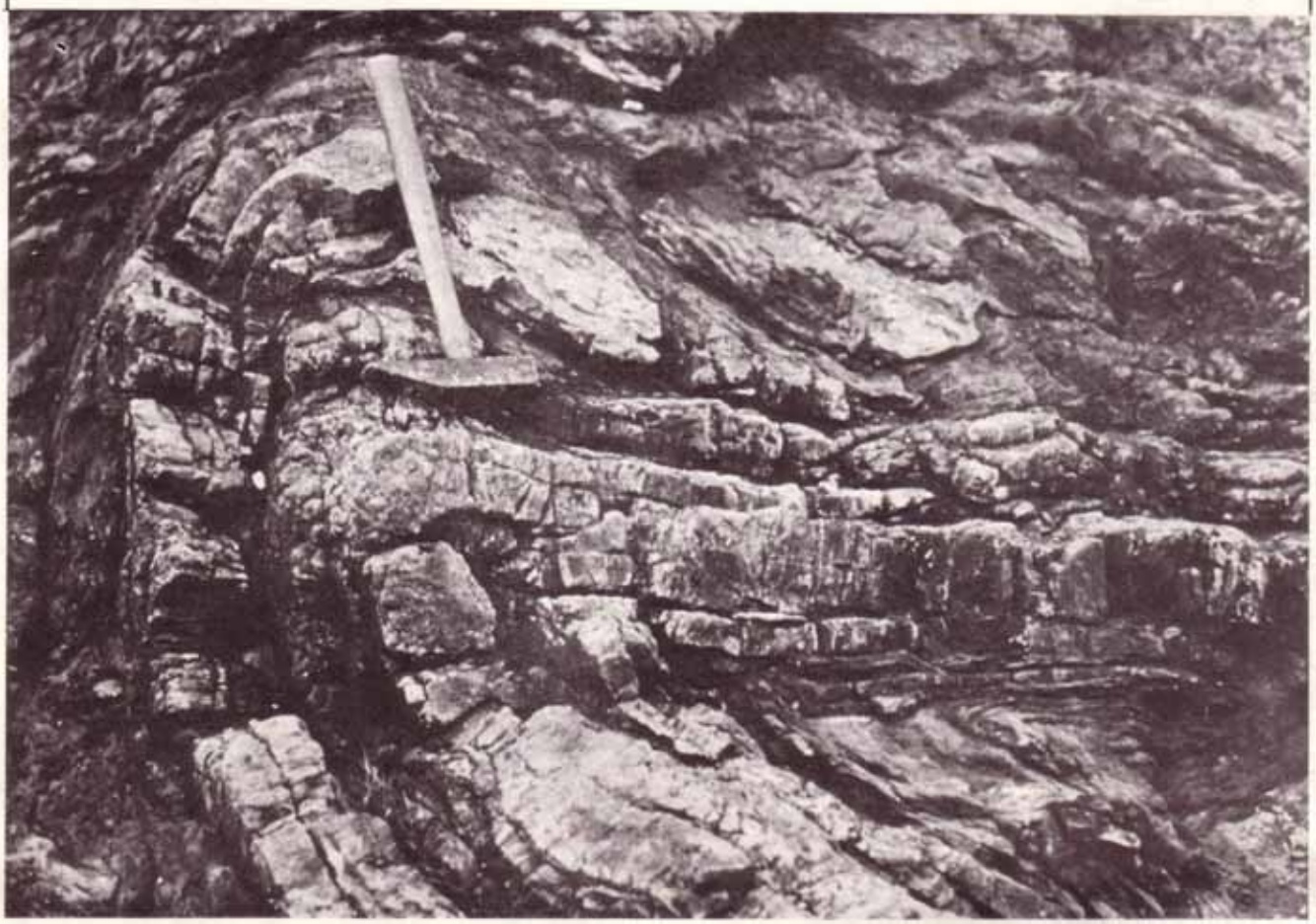

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Cover Photograph : Courtesy - Dr. D.R. Workman
Fold in Tolo Harbour Formation
Ma Shi Chau

MARBLE AND SUB-SURFACE KARST AT YUEN LONG, NEW TERRITORIES

K.L. Siu and K.M. Wong
Freeman Fox (Far East) Limited

Introduction

A concealed marble formation and sub-surface karst features were found in 1980 and 1981 during site investigations carried out for two building sites at Yuen Long, New Territories. The marble was found to be underlain by metamorphosed siltstone and/or mudstone and to have contact with quartz porphyry. It was water bearing and large quantities of water could be abstracted through deep wells.

Marble is not an unknown type of rock in Hong Kong and samples have been collected from time to time in the past. However, it was not until the late 1970's, as the result of extensive development, that large concealed marble formation were discovered in the areas of Yuen Long and Castle Peak. The discovery is of importance to geologists in the under-standing of the stratigraphy of Hong Kong and its relationship with that of China. However, as yet only few and brief details of marble in Hong Kong have been published (refs. 1 and 2).

This paper describes the structural condition, occurrence and distribution of the marble and karst features found in the two sites.

Sites and Site Investigation

The sites are located on the Yuen Long alluvial plain as shown in Fig. 1. For site investigation purposes, boreholes were drilled at the positions shown on Fig. 3. Undisturbed soil samples of 100 mm diameter were recovered at 1.5 m intervals and continuous rock cores of 54 mm diameter were obtained by diamond drilling. Standpipes and piezometers were installed in completed boreholes, at various depths, for ground water monitoring. A typical ground profile is shown on Fig. 3 and the composite borehole section of the site area is included in Table 1.

Geological Background

Based on the available information (refs. 4, 5), there are Upper Palaeozoic water-bearing carbonate rocks, with clastic rocks interbedded, in the area northeast of Shenzhen (Fig. 2). The Upper Palaeozoic rocks are enclosed by Jurassic formations and there are intrusive rocks of Mesozoic age. Based on comparison of the type of rock and the age of formation, it is possible that the Upper Palaeozoic rock formation to the northeast of Shenzhen is related to the rock formation on the Hong Kong side. If this is the case, the marble in Yuen Long may have been formed in a period older than the Lower Jurassic, making it one of the oldest rocks in Hong Kong.

Geotectonically, the area of Yuen Long is part of the South China Massif of the Yenshanian orgenic belt in the eastern part of the Neocathaysian Tectonic System. It is probable that tectonic movement associated with the Yenshanian orogeny was responsible for the underlying controlling structures of the Yuen Long alluvial plain and adjoining areas in Castle Peak and Shenzhen. It is also probable that the major NE-trending fault found in Shenzhen (Fig. 2) extends to the Hong Kong side. Whilst there is no direct evidence of faulting revealed in the site investigation, the presence of the quartz porphyry and the abrupt change of bedrock level suggests that a fault of NE trend may cut across the site.

The marble recovered from boreholes at Yuen Long displays colour banding, sometimes as regular alternations of grey and white but commonly irregular and streaky. It is well jointed. Two sets of joints are developed, one parallel to and another crossing the banding. The joint planes are generally iron stained and some are infilled with clayey materials. Irregular fissues infilled with calcareous materials were noted in the massive marble rock.

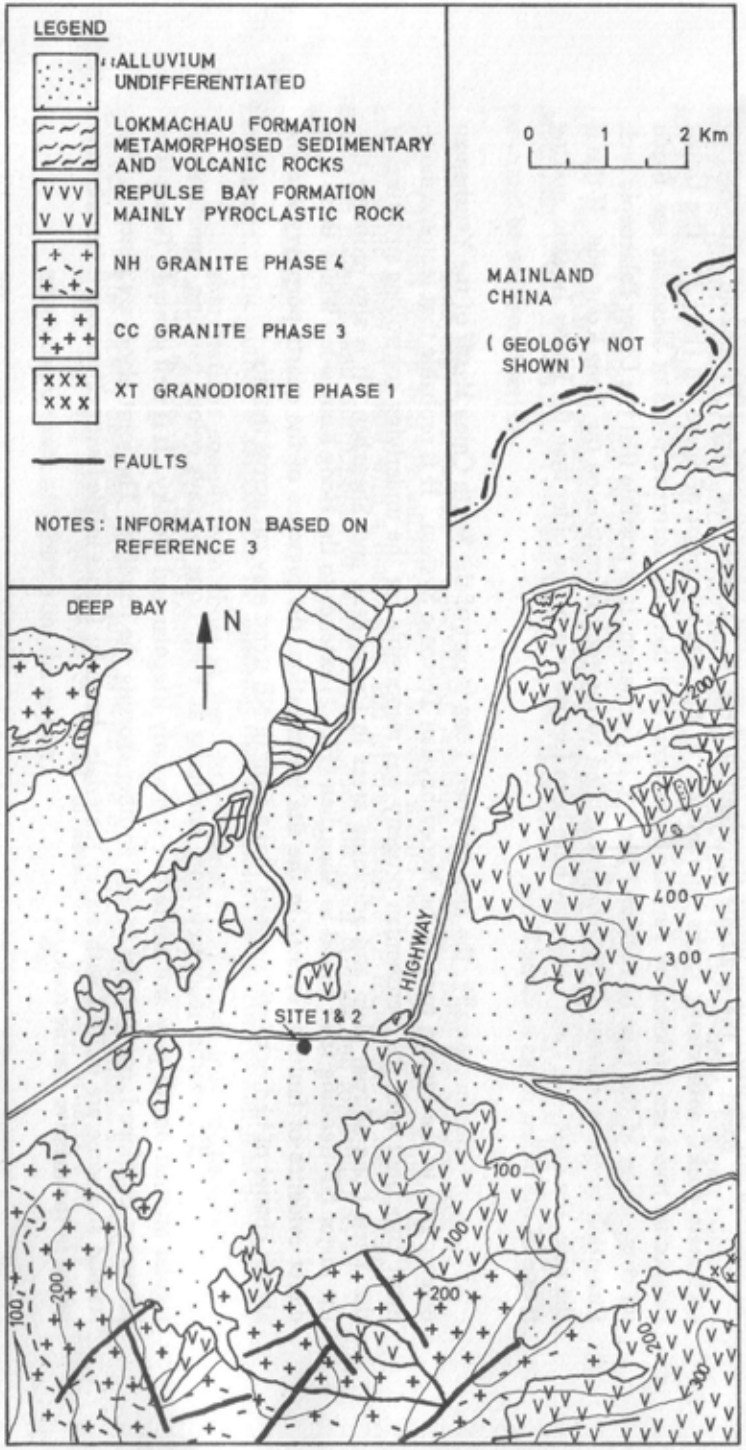

FIG. 1 GEOLOGY OF YUEN LONG ALLUVIAL PLAINS

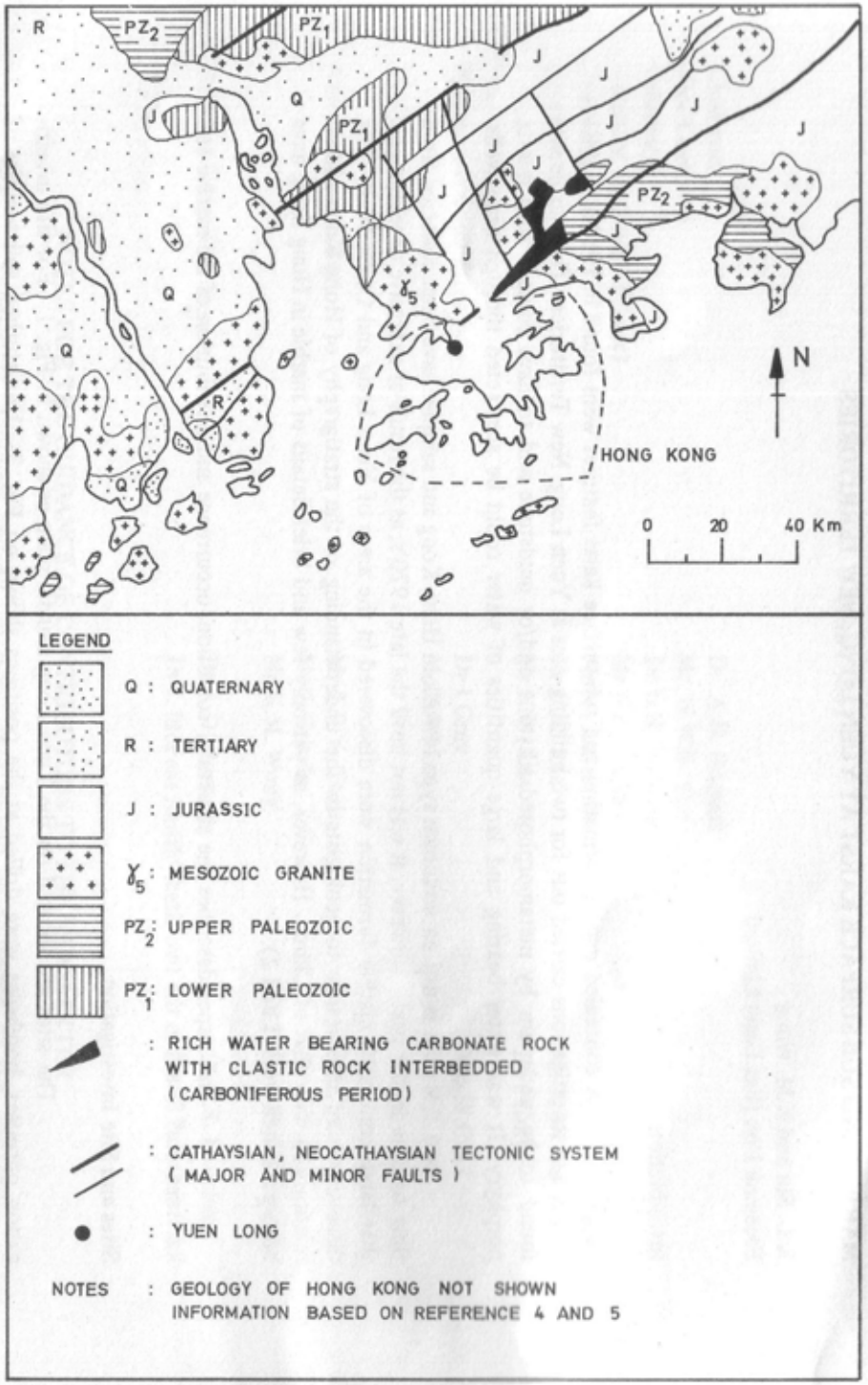

FIG. 2 SIMPLIFIED GEOLOGY OF SOUTHEASTERN GUANGDUNG

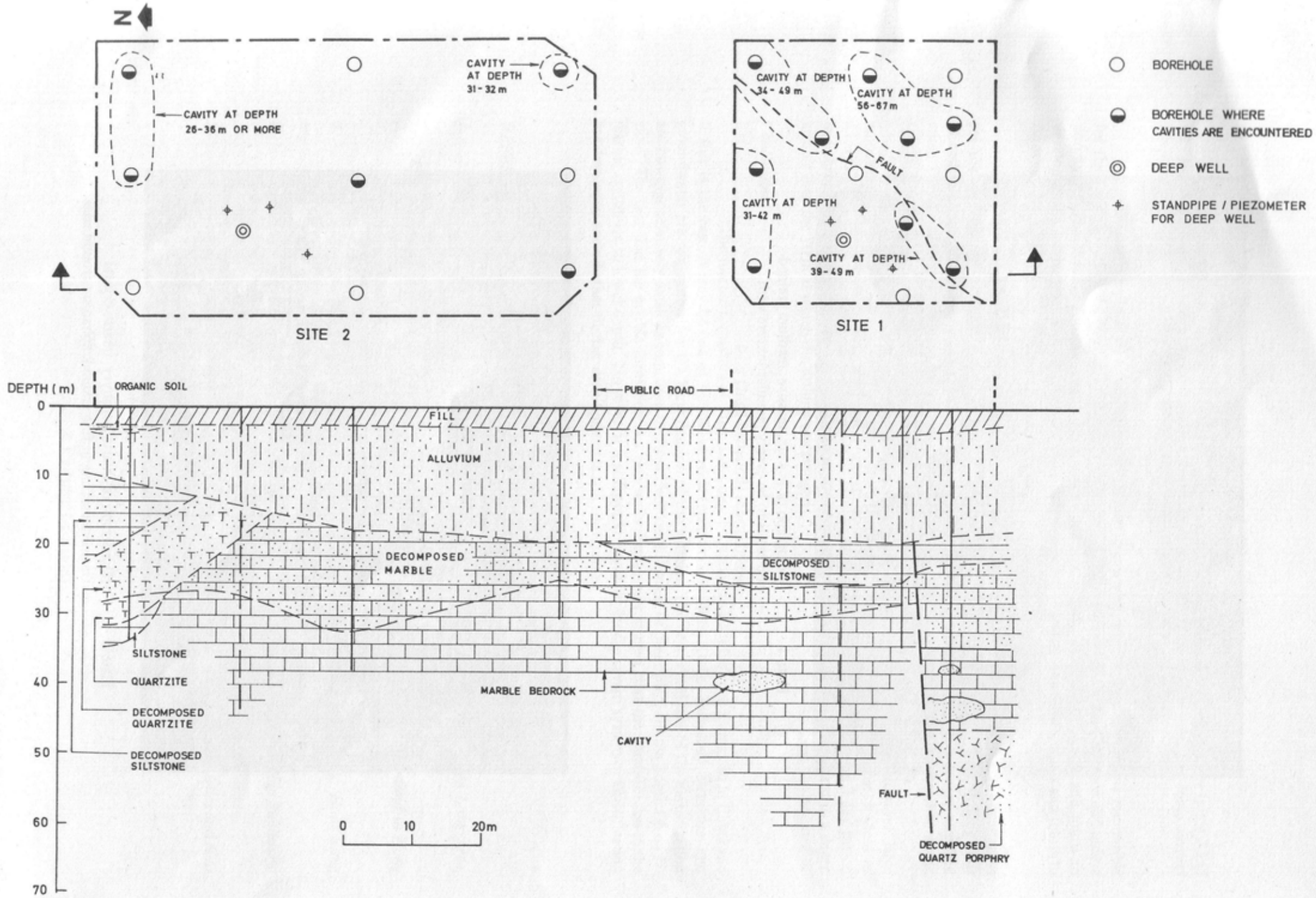

FIG. 3 GROUND PROFILE OF SITE 1 AND 2

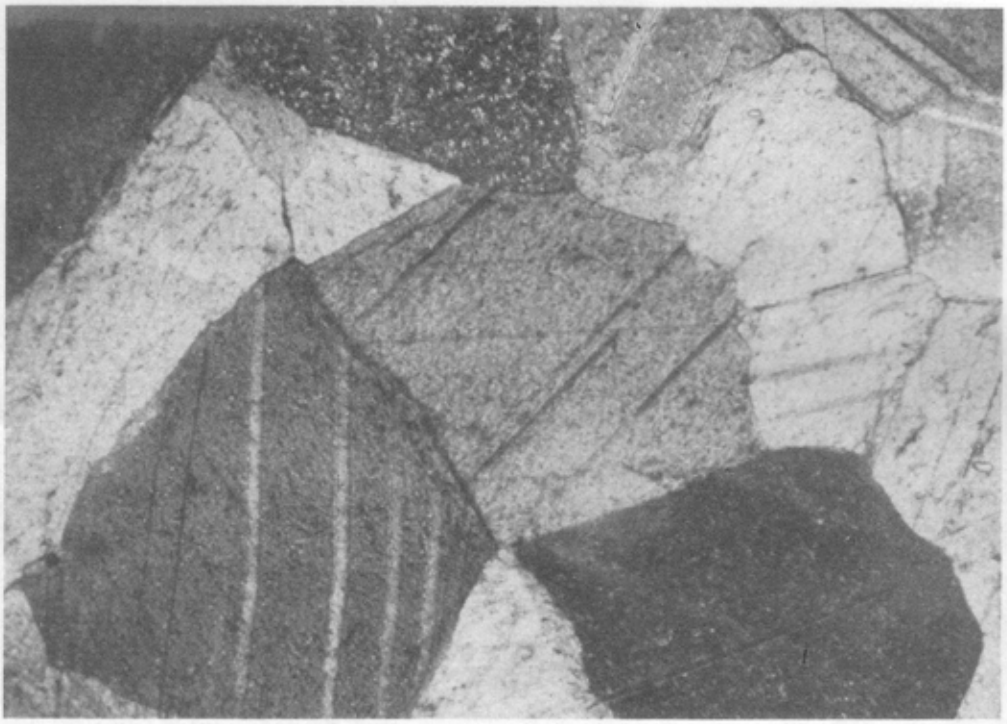

Plate 1 Micrograph of marble, massive, medium grained and tends to be evenly granular texture with veined shades (Polarised light) x 14

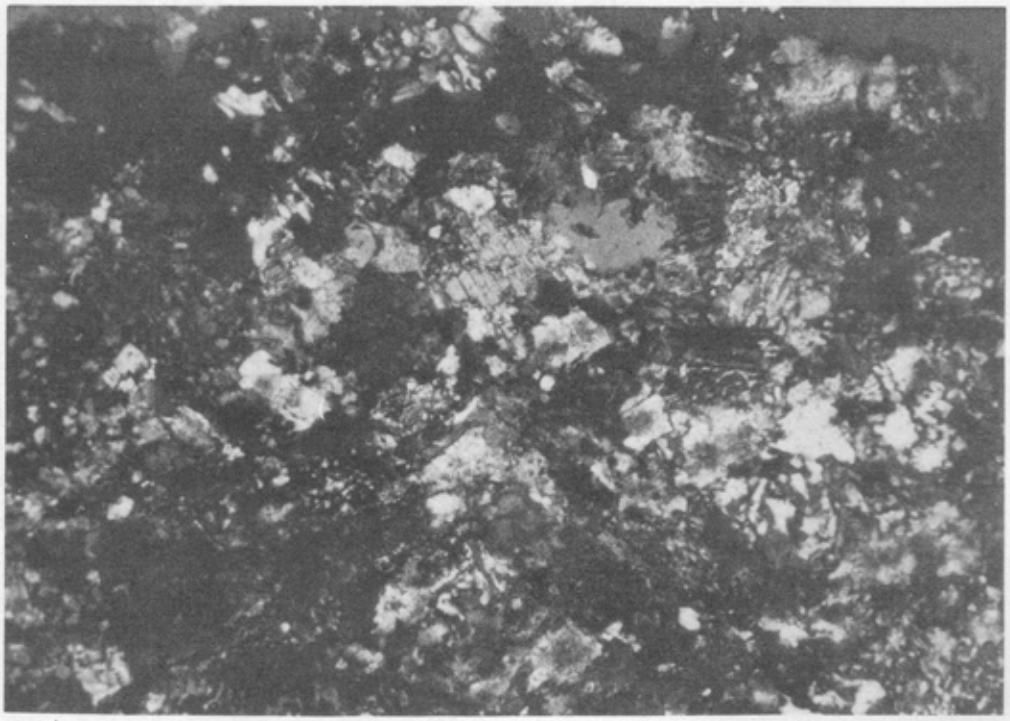

Plate 2 Micrograph of quartz porphyry, quartz crystal fragments setting in fine grained, aphanitic groundmass (polarized light) x 1.5

Subsurface Karst Features

Cavities were encountered during drilling and observed in the marble rock cores (plate 3 and 4). Maximum vertical size of the individual cavities varied from 0.2 to 3 m. Locations of some cavities are shown in Fig. 3. All cavities were found to be partly infilled with clayey material.

The lithology, structural and groundwater conditions may be the main factors responsible for the development of the cavities, which are located mostly in the vicinity of the faulting zone and quartz porphyry. The faulting and the quartz porphyry intrusion may have caused the fissures and joints to develop in the marble rock and seepage of ground water may then have enlarged the fissures and joints to form cavities.

While the cavities are small in size, they have already given rise to some strange experiences for the workers on site. The site investigation labourers have noted that sometimes their drilling rods or casings suddenly dropped more than 1 m during drilling or sampling. The piling foremen were surprised when they had to drive some piles several metres deeper than the adjacent piles located just 1 m away.

It is not yet known to what depth the cavities and karst features extend. However, large amounts of groundwater could be abstracted from the marble formation. As an example, a yield of 11,000 litres/hour was obtained from the bottom 17 m section of one well, 42 m deep, over a 3-day period in February 1982. The water-bearing capacity of the karstic conduit may be expected to persist to a depth greater than the 70 m at which the drilling was stopped.

Conclusion

The marble formation at Yuen Long may be related to a similar rock formation in China and if this is the case, it may be one of the oldest rock formations in Hong Kong. Lithology, structure, and groundwater are responsible for the karstification of the marble. The degree and rate of the karstification are however relatively small as compared to the surface karstification of other places in the South China region. The fact that the marble formation is a rich water bearer may suggest that the karstification in the marble continues to lower depth. However, it is still not known how far the cavern system or karstification has developed and whether further development is still continuing.

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Table 1 **Composite Borehole Section of the Site**

Geological Age	Formation	Description	Thickness (m)
Quaternary		Brown yellowish pink silty sand with gravels and occasional boulders FILL	3-4
		4 to 5 alternating layers of sand, silt and clay, layers of sandy material are 0.5 to 4.5 m thick and comprise yellowish brown clayey silty sand with gravel. Layers of clayey material are 0.54 to 8.0 m thick and comprise reddish yellow and greyish yellow silty clay and clayey silt ALLUVIUM	14-17
		UNCONFORMITY	
Lower Lias or Older (Jurassic or Older)	Lok Ma Chau	Yellowish brown clayey silt COMPLETELY WEATHERED METAMORPHOSED SILTSTONE AND MUDSTONE	1-7
		Brownish grey fine grained with schistose structure, some graphitic material contained FRESH METAMORPHOSED SILTSTONE and MUDSTONE	1-3
		Dark brown clayey silt with some marble gravel COMPLETELY/HIGHLY WEATHERED MARBLE	3-15
		Light grey and white marble, fine grained in the vicinity of the quartz porphyry becoming medium grained (calcite crystal) at distance from the quartz porphy FRESH MARBLE (plate 1)	10
		INTRUSIVE/FAULT CONTACT	
Lower/Middle Jurassic ?	?	Light yellowish white and white fine sandy silt COMPLETELY/HIGHLY WEATHERED QUARTZ PORPHYRY	5-8
		Light grey, porphyritic, fine grained quartz crystal fragments, aphanitic groundmass FRESH QUARTZ PORPHYRY (plate 2)	10

Plate 3 Karst features in marble

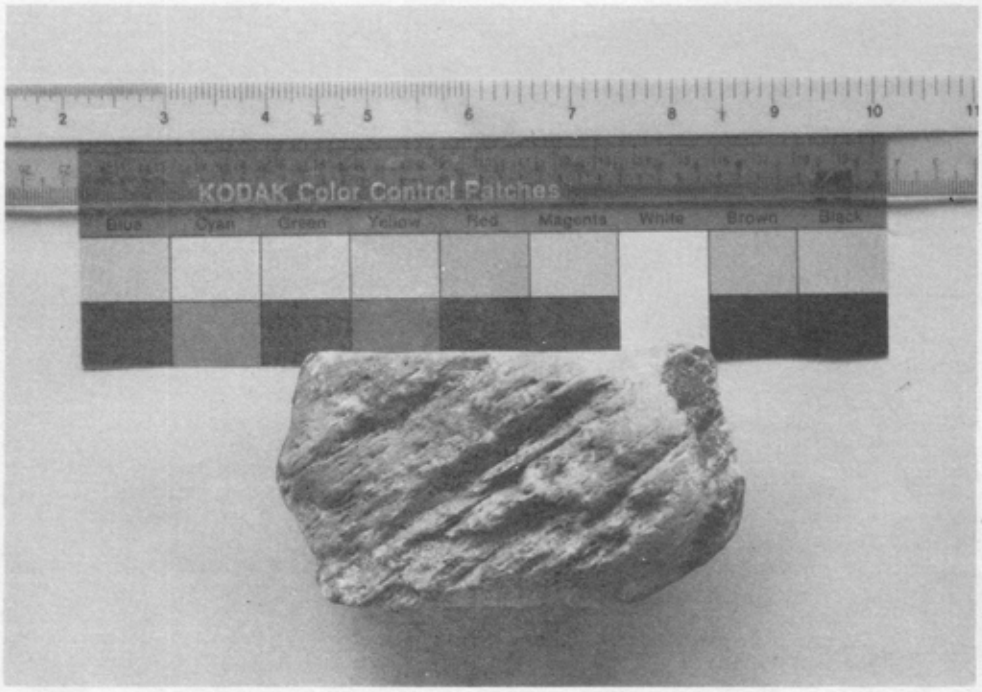


Plate 4 Close up view of karst features

NOTE ON BURIED KARST AT SHIGANGXU, SHENZHEN

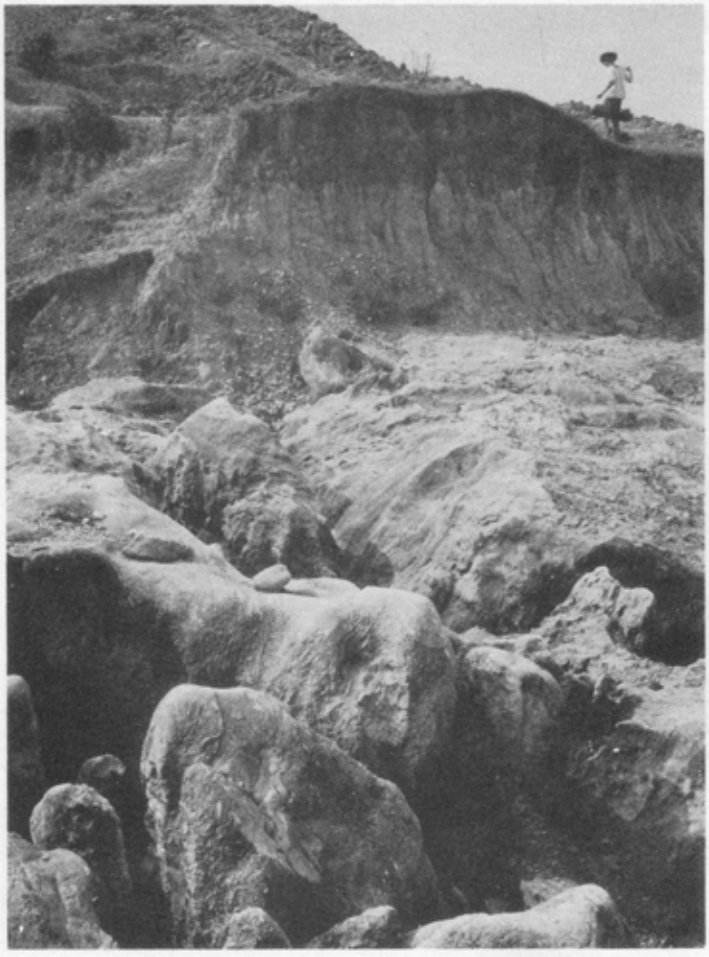
D.R. Workman
University of Hong Kong

The interesting paper by K.L. Siu and K.M. Wong on marble and sub-surface karst at Yuen Long (this issue) makes reference to the occurrence of carbonate rocks to the northeast of Shenzhen.

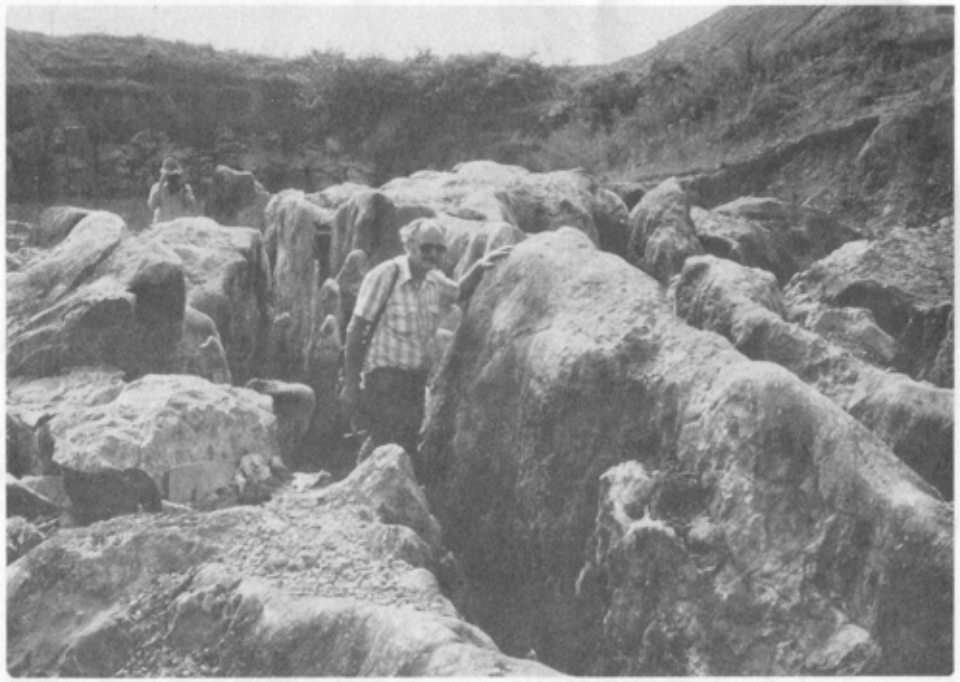
Two localities northeast of Shenzhen where carbonate rocks are found were visited by members of the society in 1983 (see Newsletter, v. 1, no. 5, July 1983). In neither case, apparently, are there any outcrops of the carbonate rocks, which were seen in drillcore and in open excavation beneath the alluvial cover of the wide, flat valleys.

The accompanying photographs show the karstic limestone exposed in a quarry at Shigangxu, which is about 20 km NNE of Shenzhen along the road to Longgang. As noted in the Newsletter report referred to above, the limestone at Shigangxu is not metamorphosed. It is fossiliferous, with fusulinids indicating Middle-Upper Carboniferous age, and is partly dolomitic. It has a highly irregular karstic surface beneath an estimated 2 to 3 metres of alluvium. The accompanying plates show the general features of this surface, exposed where the alluvium has been removed by hand digging prior to extension of the quarry. One of the plates shows the quarry itself; there is a large cave in the lower part of the quarry wall on the right of the picture.

It may be noted that the Yuen Long marble, as described by Siu and Wong, is more like the rock examined in drillcores at the second of the two localities near Shenzhen where carbonate rocks were seen. This was near Henggang, some 4 km south of Shigangxu. These cores, inspection of which by our group did not reveal any evidence of solution cavities, consisted of metamorphosed rocks, dominantly coarse grained white marble and dolomite with some tremolite, mapped as Lower Carboniferous.



The karstic surface and the overlying alluvium.



ABOVE: The Quarry

TOP RIGHT: Solution fissures in the paleokarst

RIGHT: Removal of the alluvium overlying the paleokarst

RADIOCARBON DATES OF THE ZHUJIANG DELTA AND THEIR IMPLICATIONS FOR HONG KONG

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Introduction

This is the second article based on extracts from the book entitled 'Zhujiang (Pearl River) Delta' by Huang et al. (1982). A summary table (Table 1) of 67 radiocarbon dates from the Zhujiang Delta is presented here together with a brief discussion on their implications for Hong Kong. A map of the radiocarbon dating localities referred to in Table 1 is shown in Fig. 1. We are responsible for any inaccuracies in the translation.

General discussion

In our previous article (Yim & Nau 1984), we presented a summary table of tectonic events and landscape evolutionary stages of the Zhujiang Delta. Huang et al. (1982) attributed the development stage of the Zhujiang Delta to three sedimentary cycles beginning at 40,000 years BP. If this is the case, the Delta must be a relatively young geological feature formed during the late Pleistocene and Holocene periods.

In Hong Kong, Kendall (1975) obtained two dates from the West Dam site excavation of High Island exceeding the radiocarbon dating limit of 40,000 years BP. Therefore, it appears that at least part of the lower sea-floor sedimentary sequences at some localities in Hong Kong is older than those dated in the Zhujiang Delta. According to the radiocarbon dates obtained by Huang et al. (1982), the Delta was formed in the Late Pleistocene, from 37,000 years BP onwards. The marine transgression of Huang et at. (1982) dating from 23,170 to 30,440 years BP (see Yim & Nau 1984) would correlate with a last interglacial age and be equivalent to the lower marine unit of Yim (1984). The marine transgression identified between 4,445 and 8,050 years BP in the Zhujiang Delta concurs with the Holocene transgression dates obtained in Hong Kong of 6,520 to 7,920 years BP (Yim 1983). However, no evidence has so far been found in Hong Kong to support the identification of the marine transgression of Huang et al. (1982) during 1,260 to 2,350 years BP.

In conclusion, it is clear from the radiocarbon dates and the elevation of the samples that the Zhujiang Delta region was subjected to episodic uplift and subsidence during the Late Pleistocene and Holocene periods. It is possible to account for the marine transgression of Huang et at. (1982) during 1,260 to 2,350 years BP by subsidence caused by a regional downrifting event.

CORRECTION

In the report of the lecture by Prof. Liu Zhaoshu (last issue) the date of Prof. Liu's lecture was given as 26 June 1983. This should have been 26 June 1984.

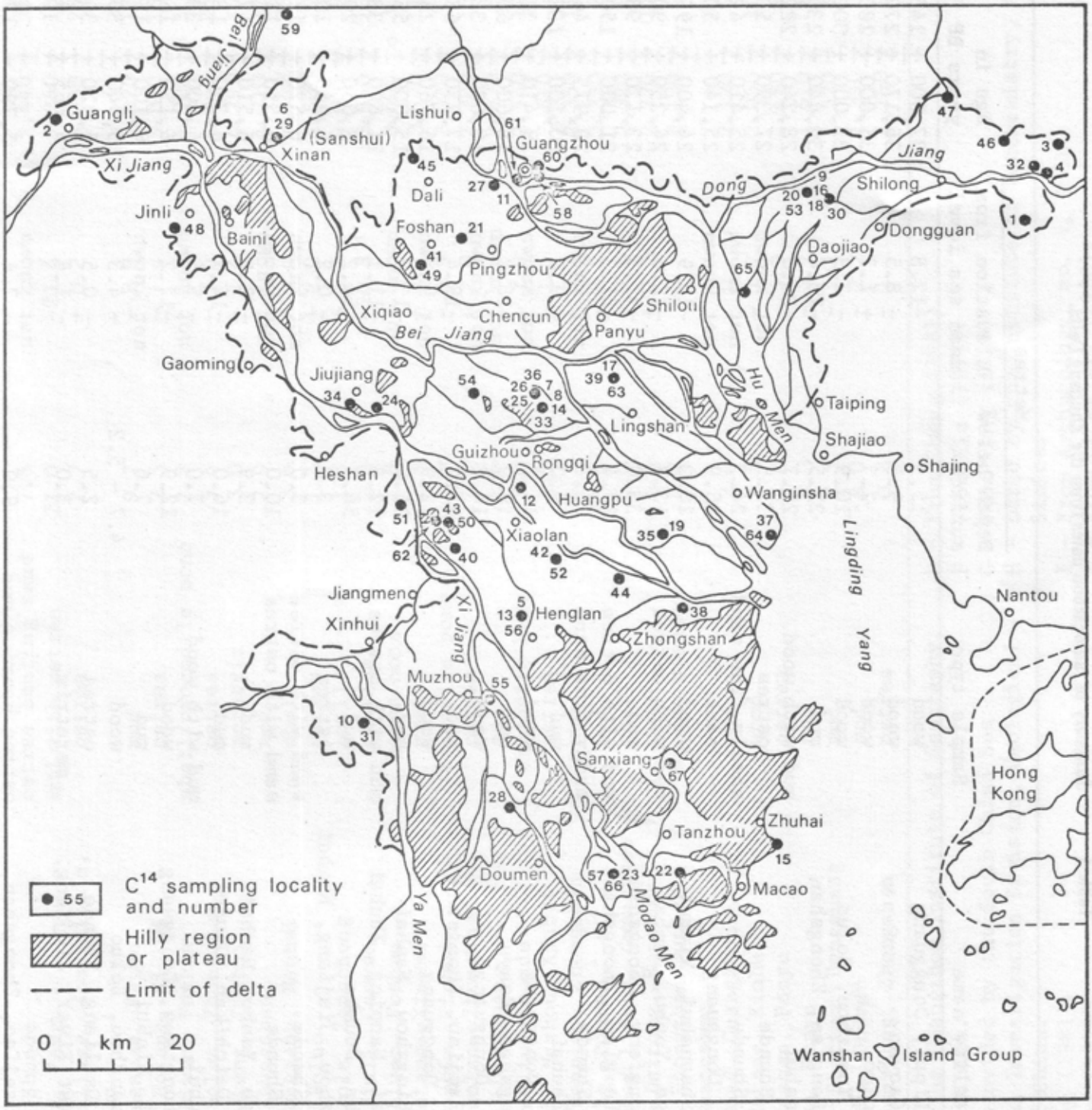

Fig. 1 **Map of the radiocarbon dating localities in the Zhujiang Delta.**

Table 1 Summary of radiocarbon dates from the Zhujiang Delta.

Location no.	Locality name	Sample type	Metres		Age in years BP	Reference
			Depth below surface	Elevation from mean sea level*		
1	Xiasha, Shipai, Dongguang	wood	15.9	-12.8	37,000 ± 1480	A
2	Guangli, Gaoyao	wood	9.3	- 8.5	36,170 ± 2700	A
3	Jiutan, Boluo	wood	2.7	+ 1.7	35,000 ± 2800	A
4	Shangnan, Yuanzhou, Boluo	wood	10.9	- 7.3	33,000 ± 3000	A
5	Suifeng, Henglan, Zhongshan	mud	22.5	-23.4	30,440 ± 2300	A
6	Xinan, Sanshui	mud with wood	25.7	-24.0	28,240 ± 2220	A
7	Dailiang, Shunde	ostrea	31.5	not known	27,390 ± 500	B
8	Dailiang, Shunde	shelly fine sand	24.3	not known	25,410 ± 420	B
9	Zhongtang, Dongguang	peat	15.9	not known	25,140 ± 500	B
10	Qiaomei, Shuanshui, Xinhui	wood	20.3	-18.9	24,400 ± 1950	A
11	Luo village, Yanbu, Nanhai	mud with ostrea	13.8	-12.6	24,250 ± 900	A
12	Tongan, Dongfeng, Zhongshan	mud	33.0	-31.3	23,170 ± 980	A
13	Suifeng, Henglan, Zhongshan	mud with ostrea	20.4	-21.3	21,000 ± 1500	A
14	Dailiang, Shunde	muddy fine sand	20.8	not known	20,975 ± 460	B
15	Xingang, Zhuhai	mud	9.0	- 9.0	20,100 ± 1320	A
16	Zhongtang, Dongguang	wood	14.8	not known	19,410 ± 320	B
17	Jiubi, Lingshan, Panyu	mud	19.0	-18.2	18,600 ± 600	A
18	Zhongtang, Dongguang	wood	14.2	not known	18,620 ± 320	B
19	Guangyi, Sanjiao, Zhongshan	mud	21.0	-19.4	17,270 ± 680	A
20	Zhongtang, Dongguang	wood	12.9	not known	16,760 ± 250	B
21	Xiajiao, Pingzhou, Nanhai	mud	15.0	-13.9	15,000 ± 550	A
22	Guangxinwai, Nanping, Zhuhai	mud with ostrea	12.8	-11.1	11,620 ± 380	A
23	Denglongsha, Doumen	mud	54.7	-54.2	8,050 ± 200	A
24	Longchuanzhou, Jiujiang, Nanhai	ostrea	3.0	- 0.2	6,985 ± 105	E
25	Dailiang, Shunde	sand with ostrea	3.0	not known	6,620 ± 170	B
26	Dailiang, Shunde	sand with ostrea	10.0	not known	6,550 ± 150	B
27	Luo village, Yanbu, Nanhai	mud	3.9	- 3.8	6,510 ± 170	A
28	Chongkou, Daichikan, Doumen	mud	16.0	-14.9	6,350 ± 180	A
29	Xinan, Sanhui	mud with wood	7.0	- 5.4	6,300 ± 330	A
30	Jiaoli, Zhongtang, Dongguang	wood	12.9	-12.2	6,150 ± 160	H
31	Shuangshui, Xinhui	mud	7.6	not known	6,100 ± 150	B
32	Xianan, Yuanzhou, Boluo	wood	4.7 - 5.2	- 4.3	5,940 ± 300	A
33	Jinjuzui, Dailiang, Shunde	ostrea	2.5	- 0.5	5,920 ± 300	C
34	Edge of West River, Jiujiang, Nanhai	meretrix	3.0	- 1.4	5,865 ± 95	E
35	Guangyi, Sanjiao, Zhongshan	ostrea bearing mud	9.0	- 7.4	5,790 ± 170	A

36	Dailiang, Shunde	ostrea bearing sand	7.6	not known	5,440 ± 550	B
37	Wanqingsha, Panyu	mud with ostrea	21.0	-21.4	5,360 ± 160	A
38	Baimiao village, Zhangjiabin, Zhongshan	ostrea	2.7	+ 0.2	5,030 ± 250	C
39	Jiubi, Lingshan, Panyu	mud	9.7	- 8.9	5,020 ± 175	A
40	Huilihui, Hetang, Xinhui	ostrea	2.5	- 1.4	5,020 ± 150	A
41	Hedang, Shiwan, Foshan	shell/crocodile bone	2.5	not known	4,900 to 5,000	G
42	Yumin, Xiaolan, Zhongshan	ostrea	5.6	- 5.6	4,940 ± 250	C
43	Weimin, Hetang, Xinhui	meretrix	3.0	- 1.4	4,790 ± 140	A
44	Gangkou, Zhongshan	mud	7.9	not known	4,710 ± 120	B
45	Shijie, Songgang, Nanhai	shell	3.6	+ 3.6	4,640 ± 280	A
46	Tiechang, Boluo	ostrea	1.4	+ 2.0	4,500 ± 120	A
47	Jinlan Temple, Zengcheng	shell	1.5	+ 1.1	4,035 ± 95	F
48	Maogang, Jinli, Gaoyao	charcoal	2.0	- 0.8	3,950 ± 100	I
49	Hedang, Shiwan, Foshan	human bone	1.6	not known	3,600 to 3,800	G
50	Weimin, Hetang, Xinhui	peat	1.5	+ 0.1	3,670 ± 110	A
51	Dalin, Tangxia, Xinhui	crocodile bone	3.0	- 0.9	3,020 ± 80	E
52	Yumin, Xiaolan, Zhongshan	ostrea	3.2	- 2.0	2,700 ± 150	C
53	Zhongtang, Dongguang	mud	1.6	not known	2,670 ± 85	B
54	Longyan, Leliu, Shunde	crocodile bone	3.0	- 1.9	2,540 ± 120	E
55	River lock, Muzhou, Xinhui	ostrea	2.5	- 1.5	2,510 ± 90	A
56	Suifeng, Henglan, Zhongshan	mud	4.5	- 3.4	2,350 ± 110	A
57	Denglongsha, Doumen	mud	18.6	-18.2	2,350 ± 90	A
58	Yanan Number 1 Road, Guangzhou	shell	5.0	+ 0.6	2,320 ± 85	A
59	Lianjiao, Daitang, Sanshui	wood	1.5	+ 0.3	2,270 ± 110	A
60	Old dock, Zhongshan Number 4 Road, Guangzhou	wooden plank	4.7	0	2,190 ± 90	D
61	Baoyuan Road, Guangzhou	mud	2.6	0	2,120 ± 90	A
62	Tagang, Hetang, Xinhui	wood	2.8	- 1.2	2,050 ± 100	H
63	Jiuli, Linshan, Panyu	ostrea	4.0	- 5.9	1,680 ± 90	A
64	Wanqingsha, Panyu	mud	4.3	- 4.7	1,610 ± 80	A
65	Xinchong, Shatian, Dongguang	mud	3.5	- 2.1	1,520 ± 90	A
66	Denglongsha, Doumen	mud	3.0	- 2.2	1,390 ± 70	A
67	Yongmo, Sanxiang, Zhongshan	ostrea	0.8	- 1.2	1,260 ± 90	C

Notes: A - Dated by the Guangzhou Institute of Geography, Academic Sinica.
B - Samples provided by the South China Sea Geological Investigation Division, Geological Bureau of China.
C - From Huang (1981).
D - From Zheng (1979).
E - From Zheng (1981).
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G - From Yang (1978).
H - Dated by the Institute of Geochemistry, Academia Sinica.
I - From Archaeology, no. 4, 1981.
* - From Li et al. (1982).

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W.W. S. Yim & P.S. Nau (1984). Zhujiang Delta - extracts from a research report published by the Guangzhou Institute of Geography. Geological Society of Hong Kong Newsletter, 2, no. 4, 1-4.

Z. Zheng (1979). Changes in the waterways of the Guangzhou district - discovery of a Qin-Han dynasty dock site. J. South China Teachers' College, no. 3 (in Chinese).

Z. Zheng (1981). Application of geomorphology in the management and control of the Zhujiang Delta. J. South China Teachers' College, no. 1 (in Chinese).

PROPOSALS TO INCREASE SUBSCRIPTIONS AND TO REVISE PROVISIONS FOR SUSPENSION ON NON-PAYMENT OF ANNUAL DUES

1. To balance income and expenditure and maintain the Newsletter in its present form, it will be necessary to raise subscriptions in 1985. To do this requires an amendment to the By-Laws by simple majority of votes received in a postal ballot before 20th November 1984. In this Newsletter there is a ballot paper with details of the proposed increases. It will be noted that the proposal is for a new annual subscription of $80 for resident and non-resident members alike. Please return the ballot paper to the Secretary of the Society immediately. Ballot papers received after 20th November 1984 will not be counted.

2. A second amendment to the By-Laws is proposed on the same ballot paper, to ensure early payment of annual dues.

GCO GEOLOGICAL SURVEY PROJECT - TECHNICAL NOTES

The following is an updated list of the series of technical notes prepared by the Gological Survey Section of the Planning Division of the Geotechnical Control Office.

Technical Note	Title
1.	Geological Laboratory Requirements
2.	Geological Laboratory : Equipment Requirements
3.	Field Data Recording (Draft)
4.	Geological Laboratory Requirements (II)
5.	Sample Submission and preparation procedures
6.	Field and Office Equipement Requirements
7.	Classification and Nomenclature of Rocks and Superficial Deposits
8.	Geological Research, Specialist Investigations and the Acquisition of Post-Graduate Research Students
9.	Provisional Work Programme, Field Area Allocations and Reporting Requirements
10.	Rock and Drillcore Storage Requirements
11.	Geological Map Format and Colour Scheme
12.	Map Preparation Requirements and Procedures
13.	Support Staff Duties
14.	Geological Map Symbols
15.	Mapping Programme - Bulletin Format
16.	Technical File Series
17.	Geological Sheet Atlas System
18.	Assessment of Mapping Rates and Procedures Based on a Pilot Study of Part of Sheet 7
19.	Alternative Strategies for the Engineering Geological (EG) Contribution to the Memoirs for the Geological Survey
20.	Alternative Contents of the Superficial Geological Map

2ND CIRCULAR AND REGISTRATION FORM

CONFERENCE ON

GEOLOGICAL ASPECTS OF SITE INVESTIGATION

organised jointly by

THE GEOLOGICAL SOCIETY OF HONG KONG

and

DEPARTMENT OF GEOGRAPHY AND GEOLOGY,

UNIVERSITY OF HONG KONG

Date : 17-19 December, 1984

Venue: **University of Hong Kong,**
2nd floor,
Knowles Building

Selection of Provisional Papers

A review of photogeological lineaments in Hong Kong. A.D. Burnett & K.W. Lai.

The drilling of long horizontal boreholes for site investigation purposes. I. McFeat-Smith.

Site investigation for the Junk Bay Road tunnel. C.R. Matson.

Quantitative assessment of the accuracy of an engineering geological mapping system. A.D. Burnett & A. Hansen.

Marble and subsurface karst features at Yuen Long, New Territories. K.L. Siu & K.M. Wong.

Geological investigation for a large site formation and reclamation project in Hong Kong. T.I. Gamon.

Staged engineering geological evaluation for the residential development at Tai Wo Tsuen. J. Costello & K.M. Wong.

Joint systems of the Hong Kong Granite. P.S. Nau.

Preliminary studies on early Liassic - Lower Jurassic fossil assemblages from Sham Chung, New Territories. C.M. Lee.

Forecasting earthquakes : the Chinese example and its implications for Hong Kong landslipping and offshore oil exploration. B. Denness.

Regional geological evaluation using landsat multi-spectral scanner imagery. A.J. Brimicombe.

Geological considerations in planning site investigations. C. Beggs.

Gully erosion in Hong Kong - factors influencing its development and remedial measures to curb its influence. A. Hansen & J.M. Nash.

Engineering properties of some Hong Kong rocks in relation to tunnelling practice. P. Whiteside & D. Bracegirdle.

Foraminiferal assemblages in bottom sediments of Hong Kong. Q.Y. Li & W.W.S. Yim.

Towards a simpler classification of Hong Kong granites. P. Strange.

Geologically complex site near Tsuen Wan. B.I. Dubin.

Knowing the rocks and rock structures related to petroleum, mining and construction problems. L.W. LeRoy.

Geological investigations for new town planning. C. Dutton.

Holocene foraminiferal distribution in marine drillholes of Hong Kong. W.W.S. Yim & H.Y. Ho.

Some seismological factors of Hong Kong. C.M. Lee.

A ring and radial structure in rhyolite from Victoria Peak, Hong Kong. -B.P. Ruxton.

The structure of some debris flow in Hong Kong. B.P. Ruxton.

Seismological measurements in Hong Kong. H.T. Poon.

Seismicity in Hong Kong : a structural geological appraisal. C.H. Tan.

Site investigation for roads and tunnels in weathered rock. J. Endicott.

A review of current near-shore and offshore site investigation practice. P. Blacker.

Preliminary assessment of Tai Tam Bay sediments. M.D. Howat & W.W.S. Yim.

Proposed Programme of Events

Monday 17th December

Morning Session	-	Registration. Paper contributions with discussion.
Afternoon Session	-	Paper contributions with discussion.

Tuesday 18th December

Morning Session	-	Paper contributions with discussion.
Afternoon Session	-	Field excursion to various sites of interest currently involved in site investigation geotechnical works.

Wednesday 19th December

Morning Session	-	Paper contributions with discussion. Short film, "Jade Shields" on underground construction works in Hong Kong.
Afternoon Session	-	Paper contributions with discussion.
Evening	-	Drinks followed by a Conference Dinner for delegates and their guests at the University of Hong Kong.

Tear off here

Registration Form

Meeting on "Geological Aspects of Site Investigation"

Please complete following:

Name Title Telephone

Address

HK$

Registration $200 (inclusive of coffee, Conference Buffet Dinner and a set of proceedings) .....

Buffet Dinner $70 per guest (inclusive of beer and soft drinks) persons .....

Signature Date Total

Return completed form with crossed cheque payable to "Geological Society of Hong Kong" to Conference Secretary, Department of Geography and Geology, University of Hong Kong, Pokfulam Road, Hong Kong.

NEW HONORARY MEMBERS

The Society accords a warm welcome to recently elected Honorary Members, Professor Ban Xiaozeng of Fuzhou and Professor Liu Tungsheng of Beijing.

Prof. Ban Xiaozeng

Professor Ban graduated from Zhongyang (Central) University, Chongqing, in 1946. Until 1952 he was with the Geological Survey in Nanjing. In 1952 he joined the 429 Division of the Ministry of Geology and from 1958 to 1980 was attached to the North Headquarters, North China Geology Bureau. In 1980 Prof. Ban was appointed to his present position of Chief Engineer and Deputy Chief of Bureau, Geological Bureau of Fujian. He is Standing Director of the Geological Society of Fujian and a member of the Committee of the Geological Society of China. His geological interests are mainly in ore deposits and petrology.

Prof. Liu Tungsheng

Professor Liu is a well-known scholar and member of the Institutes of Geology and Geochemistry, Academia Sinica, Beijing. Professor Liu graduated in 1942. He worked for a number of years in the Geological Survey of China and, from 1949, the Ministry of Geology, before joining the Institute of Geology in 1953. His principal fields of interest include Quaternary geology, loess, vertebrate palaeontology and palaeoclimatology. He is the author of numerous books and papers on these subjects. He was Editor-in-Chief of "Quaternary Geology and Environment of China", published in 1982 by the Quaternary Research Association of China.

RECENT DEPARTURES

The autumn of 1984 sees the departure from Hong Kong of four prominent members of the society, Richard Harris, Steve Hencher, Peter Randall and John Sekula, all of whom have been very active in planning, organizing and supporting the activities of the society since its inception. The society will be much the poorer for their departure; we wish them all the best for the future.

GENERAL COMMITTEE

Ian Gray (Programme Committee) has been co-opted onto the General Committee to fill the place vacated by Peter Randall.

TEACHER'S GROUP

A teacher's group has now been set up. It is open to all members who teach a relevant subject, whether full-time, part-time or occasionally. Members of the group will in future receive information about group activities and services direct (not in the Newsletter). Enquiries should be addressed to the group's secretary, Mr Keung Hon Ming, 6D Babington Path, 5/F., Hong Kong, or to the secretary of the society.

News of the first field meeting of the group is given below and will not be circulated separately. All eligible members of the society are welcome whether already members of the group or not. Join the trip and join the group on the spot. **Note** there is no advance booking. Simply meet at the appointed time and place.

Field Trip to Sham Wat - Tai O, Lantau, Saturday 24 November 1984 (Teachers Group)

Meet on 8.15 ferry from Hong Kong to Mui Wo (Silvermine Bay) or at Ngong Ping bus stand at Mui Wo on arrival. We shall take the Ngong Ping (Po Lin Monastery) bus, alighting at top of Shum Wat road. Route of walk will be via Sham Wat road, Sham Wat bay and shoreline to Tai O (about 4 hours). There are many interesting geological features along the way: well-bedded, folded and faulted sedimentary rocks, volcanic rocks, weathering features, colluvial and alluvial deposits, etc. For further information please call Mr P.S. Nau, 5-8592832.

Briefing for Nov. 24 field trip: November 3

Anyone interested is welcome to come along to the Geology Lab. at H.K.U. (Hui Oi Chow Building) at 10 a.m. on Saturday November 3, for a briefing on the Nov. 24 field trip, by Mr Nau and Dr Workman. Rocks from the fieldtrip area and elsewhere will be on display and there will be a slide show covering points of interest along the route, also advance handouts will be available.

FORTHCOMING PROGRAMME

Field Excursion to Ho Chung **Saturday 27th October 1984**

The purpose of this trip is to visit exposures of pegmatite in the Hong Kong Granite and to inspect old tungsten mine workings at Ho Chung which include adits and pits. In the area of the mine good quality RBS exposures can be examined.

The minibus will leave the Y.M.C.A. Hankow Road, adjacent to the Peninsula Hotel at 9:30 a.m. The transport charge will be $20 per person. Please mail a cheque with the tear-off reply slip included in this Newsletter. (For safety reasons, children under the age of 16 are not invited).

Return the slip to Ian Gray.

Numbers are limited so book early to avoid disappointment.

Ma On Shan Field Visit **Sunday 2nd December 1984**

On December 2 the Society will visit the Ma On Shan Iron ore mines. Members wishing to join this field trip should meet at Chinese University Pier at 9.30 a.m. where the Commercial Ferry will be used to take them to Wu Kai Sha. From here the members will walk 3.5 km to the mines and following the visit will return by the same route.

The ore at the mines is magnetite with some hematite and an ore content of about 60%. The ore formed as a result of granite intrusion into calcareous sediments and sandstone. It is intermixed with gangue which contains a number of accessory minerals. These include quartz, garnet, pyroxene, amphibole, mica, chlorite, epidote, flourite and serpentine.

No booking is required as normal public transport is used.

REPLY SLIP (Field Excursion to Ho Chung) **Saturday 27th October 1984**

I wish to attend and enclose a cheque for the sum of HK$ payable to the Geological Society of Hong Kong.

Name:

Address:

Telephone No.:

Return to: Mr Ian Gray
F2, Alexander Block
Victoria Barracks
Central

Contact telephone: Home 5-243869
Office 3-7211846

會訊

榮譽會員

最近應邀成爲本會榮譽會員的爲福州的邊效曾教授和北京的劉東生教授。

邊效曾教授 於1946年畢業於重慶中央大學。他在南京的地質測量署服務至1952年，然後加入了地質部的第429大隊。1958-80年間他隸屬於華北地質局的北區總部。邊教授於1980年被委任爲福建地質局之總工程師及副局長。他是現任的福建地質學會會長及中國地質學會委員。邊教授的研究興趣爲鑛床及岩石學。

劉東生教授 爲北京科技學院的地質及地球化學學院的著名學者。劉教授於1942年畢業後就在地質測量署服務；1949年起在地質部工作。劉教授於1953年加入了地質學院。他的研究興趣爲第四紀地質，黃土、古脊椎動物學，並著有很多有關的文獻。1982年由中國第四紀地質研究會出版的「中國第四紀地質及環境」就是由劉教授主編的。

告別香江

從本會萌芽開始便積極地參與籌辦及組織活動的四位會員，將於今年秋天離開香港。他們是Richard Harris, Steve Hencher, Peter Randall和John Sekula。

常務委員會

由於Peter Randall離港，本會現已增選Ian Gray （節目小組成員之一） 填補常委會中的空缺。

教師小組

本會現已設立了一個教師小組。會員中不論是否全職教授和地質有關的科目均可參加。小組的活動和服務都將不經本通訊而另行直接通知各小組成員。如有疑問，請向小組秘書姜漢明先生（香港巴炳頓道6D6樓）或本會秘書查詢。

小組將於十一月廿四日星期六往大嶼山之深屈及大澳作野外考察。詳情請參閱本期英文版或向鈕柏桑先生（5-8592832）查詢。

「探土中的地質問題」會議

有關這次在十二月間由香港大學和本會合辦的「探土中的地質問題」會議詳情現刊於本期的英文版。請各會友參閱。

增收會費及修改因欠交會費而暫停會籍措施之建議

1.1985年開始的會費必須提高以平衡本會的收支及維持定期出版通訊。這需要修改規章才能實行。本期通訊附有列出增費詳情之投票用紙。請於一九八四年十一月廿日前以郵寄方式投票。收到票數以總計多數裁定原則爲表決方法。請注意新會費是本地和海外會員一視同仁的港幣八十元。投票請從速寄回本會秘書。十一月廿日後寄出的當作無效。

2.爲保證會員能夠準時繳交會費，同一投票用紙上載有另一修改規章之建議。

新界元朗地下大理岩及其岩溶特徵

——蕭江林、黃廣美

七十年代末，正當大量土地工程開展時，在元朗及青山地區曾勘探出許多大理岩岩石。地下大理岩對本港地質學者是很熟悉的一種岩石，在過去一段時期內曾經收集了不少大理岩樣品及標本，大理岩組岩石的發現無疑將有助於進一步了解香港地質，尤其與鄰近中國地區的關係，這方面過去僅有過幾篇報導而已。

本文論述於1980和1981年期間，在元朗兩地爲高層房屋建築工程所進行的工程地質勘查中發現了大理岩組及其岩溶特徵。大理岩岩層埋藏於元朗冲積平原地下，下覆於變質粉質岩和泥岩層並與石英斑岩岩墻接觸。兩地深井地下水的開採量顯示出大理岩岩溶水資源豐富。

據研究資料認爲，地下大理岩岩溶的形成與大理岩岩性、構造及地下水有關。值得注意的是，兩地岩溶規模並不很大，其發育及溶度與中國南部地表岩溶相比相對也是小。但是其地下水量之豐富，兩地岩溶現象有可能發展到更深的部位。無論如何，目前尚未全部了解其洞穴體系、岩溶作用及其發展的深度。因此，希望通過本文論述將引起更多地質學者和工程師們的討論，並發表更多有關香港大理岩地質的文章。

珠江三角洲之放射性炭法年代確定及其對香港之意義

在本期的英文版裏香港大學的嚴維樞及鈕柏燊繼續介紹黃鎮國等的「珠江三角洲形成發育演變」內的放射性炭法所確定年代的資料。並根據原著的資料編纂了一撮要圖表，對研究本港地層年代確定之學者很有參考價值。

節目預告

馬鞍山野外考察　　十二月二日（星期日）

本會將於十二月二日參觀馬鞍山鐵鑛。有意參加者可於是日上午九時卅分集合於中文大學碼頭，乘搭小輪往烏溪沙。從烏溪沙起需步行約3.5公里始達鑛場。回程乃循原路。

馬鞍山鑛山主要爲磁鐵鑛雜以赤鐵鑛，含量約爲60%。鑛場鑛床成因爲花崗岩入侵石灰質的沉積物及砂岩。鑛床混雜着一些附屬鑛物如石英、石榴石、輝石、閃石、雲母、綠泥石、綠簾石、氟石及蛇紋岩等之尾鑛。

是次因使用公共交通，所以不須預訂。

西貢蠔涌半日遊　　十月廿七日（星期六）

觀察產於香港花崗岩中的偉晶岩，蠔涌一個已廢棄的鎢鑛場及其附近的淺水灣組中的沉積層。

集合地點：九龍尖沙咀漢口道半島酒店旁中華基督教青年會

出發時間：上午九時卅分

費　　用：旅遊車費二十元（每位計）

午　　餐：自備

浮標測量所取得的成果相吻合。

中央海盤的洋殼與周圍陸殼以岩石圈斷裂直接接觸，表現爲强烈的地貌反差，重、磁異常的高梯度帶，高或低的熱流帶和地殼厚度的突變帶。

(三)南海的演化

邊緣海盤地的演化可分爲六個發展階段。稱爲：萌動期、幼年期、成年期、轉老期、老年期和消亡期。目前南海相對處於轉老期，即正在進入第四階段的發展。

(1)萌動期(晚白堊紀至早第三紀古新世)。庫拉—太平洋斷塊自東南向東亞大陸俯冲，形成了北西—南華向的區域擠壓應力場。處於上冲盤上的陸緣區(仰冲體)，形成了北東—南西向的局部(次生)擠壓應力場。從而產生了北北東和北東東的X型剪切斷裂。隨着區域擠壓力的加强，牽就次生的X型剪切面形成的北東向鋸齒狀張性斷裂，並進一步發展成一系列的地塹式斷陷盤地。

(2)幼年期(始新世至早漸新世)。安底斯型活動的大陸邊緣之演化結束，區域擠壓應力場轉向鬆弛並轉爲拉張。地幔上隆、地殼變薄。斷裂向下發展深切，地幔物資沿岩石圈斷裂上升，地塹盤地加深加寬。大陸邊緣向洋擴張，俯冲帶後退(註：向洋心)。卡拉棉小陸塊脫離華南大陸，構成了菲律賓喜山期優地槽帶中的殘餘地塊。一個新洋盤出現並與其西南方向的巴拉望殘留海盤溝通，連接成北東向展布。類似於今日冲繩海槽的狹長海盤。至此，原始南海形成。

(3)成年期(中漸新世至早中新世)。區域應力場仍然爲拉張應力場，大陸邊緣繼續向洋擴張。在大陸前緣產生近東西向的擠壓應力場，導致菲律賓島弧的形成。在相對凹陷的南海地塹區，形成了次生的北北西和北東東向的X型剪切斷裂系統，牽就這組X型剪切斷裂，一條東西向的海底擴張軸最終出現，並發生南北向的剪切—拉張作用。

(4)轉老期(中中新世至第四紀)。自早中新世以後，隨着地幔物質冷却，密度增大。垂直運動代替水平運動，南海發生了區域性下沉。同時，菲律賓海斷塊(板塊)繼續向北西西方向擠壓。結果，菲律賓弧向西仰冲到南海洋殼之上，並形成向邊緣海一側凸出的反向島弧。海溝出現在邊緣海，形成了向大洋方向傾斜的反向俯冲帶。海底的垂向下沉運動和反向俯冲帶的側向拖曳作用，使北東向斷裂再次活動，從而形成了不同類型的島塊。南沙羣島向東南順時針旋轉而漂離中沙羣島。在中央海盤的西南部，出現了一塊楔形海盤。中沙與西沙島塊之間的西沙東海槽，自上新世以來出現了新洋殼。珠江口外盤地，則從斷陷盤地轉化爲拗陷盤地，沉積了巨厚的陸源碎屑海相地層。至此，現代南海的構造格局基本形成。

如果在南海地區的東西向擠壓繼續增强，中央海盤的洋殼繼續向東消亡(俯冲)，而菲律賓島弧繼續向西仰冲。則必然導致菲律賓島弧不斷向西增生而馬尼拉海溝不斷向西後退，最後發生島弧與大陸碰撞，南海封閉。從而結束了邊緣海的演化旋迴。

1. 中國科學院南海海洋研究所在南海的地質、地球物理調查研究工作

劉昭蜀　1984年6月中文未刊稿

2. 南海地質構造與陸緣擴張

劉昭蜀，楊樹康，何善謀，黃慈流，陳森强(英文未刊稿，附二張表及一張演化示意圖)

上述資料保存於地質學會的資料室中。

※　　※　　※

劉教授還贈送給地質學會一套南海地區的地圖和地形圖，比例尺由五百萬分一到千萬分一。並且贈送了中國最近出版的中英文各一套的圖：

中國及鄰區海陸大地構造圖　　1:5,000,000

主編：張文佑教授(科學出版社1983)

亞洲大地構造圖　　1:8,000,000

中國地質科學院　1982

香港地質學會衷心感謝劉昭蜀教授贈送的這些資料和他給我們一個非常有趣和有幫助的報告。學會也謝謝李坤榮先生和陳兆湖先生，向不會中文的聽衆提供的非常寶貴的口譯及筆譯服務。

劉昭蜀教授的演講

一九八四年六月二十六日

中國科學院南海海洋研究所負責人劉昭蜀教授在香港大學給大約四十名香港地質學會會員作了一個精彩的講演，介紹了南海所多年來的研究工作及講述了南海的地質構造特徵。

下文是根據劉教授講演時由李坤榮先生即時譯成的英文內容紀錄及陳兆湖先生譯成英文的文字材料由Dr. D. R. Workman整理而成。

(一)科學院南海所的簡介：

中國科學院南海海洋研究所於1959年在廣州建立。是一個多學科的綜合性的海洋研究所，主要對象是研究南中國海。

研究領域包括海洋環境特徵、生態系統、地質演化、河口海岸、海洋生物學、環境保護等。目前設有九個學科研究室：海洋生物室、海洋儀器應用室、電子計算機應用室、海洋物理室、海洋水文氣象室。此外，還設有中心實驗室、情報研究室和編輯室。此外，還在湛江、汕頭和海南島的鹿回頭建立了臨海實驗站。

該所還出版了兩份學術刊物："南海海洋科學集刊"和"熱帶海洋"。

1961年成立的海洋地質研究室，到1979年劃分爲海洋地質構造研究室，海洋沉積研究室及河口—海岸研究室。從1961年以來，海洋地質的研究，可分爲兩個階段。

第一階段（1961—1974），主要在南海北部大陸架工作。包括：華南沿海第四紀地質及新構造運動調查；對南海北部大陸架海區，包括瓊州海峽，進行了海底地形、海底底質調查，對南沙羣島部分島嶼進行了地質地貌和重力測量，參加了地質部第二海洋地質調查大隊主持的"北部灣"地質構造基本特徵與含油氣遠景預測"的工作；特定海區的與工程地質有關的海底地形及海底底質調查等等。

第二階段（1975年至今），主要進入了深海陸坡區和中央海盆區的工作。包括：在南海開展了大面積的地球物理測量（測深、重力和磁力測量等）和海底底質取樣工作，對西沙羣島和中沙羣島開展了地質、地球物理測量工作，參加了張文佑教授主編的"中國及鄰區海陸大地構造圖"的編制工作；完成了"珠江口外盤地基底構造"的專題研究等。（註：劉教授還詳細談了許多研究成果。將由陳兆湖先生譯成英文摘要，在以後的通訊中刊出。）

(二)南海的地質構造綱要

劉教授指出，南海和其他許多西太平洋的邊緣海不同的地方有：台灣弧和北呂宋弧凸向邊緣海；馬尼拉海溝位於邊緣海並具有向東的反向俯冲帶；中央海盤的主要構造線垂直交與島弧。

劉教授認爲：當區域性壓應力場鬆弛後，大陸的邊緣由於斷裂作用而走向消亡時，由陸緣的地塹系統形成了南中國海。其中包含了多期多軸的海底擴張和解體陸塊（島嶼）向洋擴散。它是中生代强烈活動的一種大陸邊緣——安底斯山型，只不過南海的强烈活動却是中生代末期至新生代。

南海的北部大陸架具有一系列階梯狀正斷層及其圍限的基底地塹和地壘。基底地塹控制的新生代盤地中，充填了巨厚的沉積物。

南海海盤的南部邊緣，是巴拉望海槽。它是特提斯海的殘餘部份。自燕山期開始，特提斯海依次向南海消滅。它在加里曼丹北部，形成向南凸出的弧形斷褶帶及一系列叠瓦狀冲斷層。前第四紀地層遭受不同程度的變形和變質。因此，南海海盤南部邊緣不同於北部邊緣，爲擠壓型或聚斂型。

南海海盤西部邊緣爲狹窄的越東陸架，呈南北向展布，與海岸線大致平行。陸架上有一系列平直的階梯狀正斷層。

南北向的台灣—北呂宋弧和馬尼拉海溝位於南海海盤東緣，凸向南海。據地震資料，馬尼拉海溝處的貝尼奧夫帶向東傾斜。

南海海盤邊緣的上述基本特徵，大體反映了陸緣從西北向東南擴散，後緣拉張，前緣擠壓，兩側剪切的基本運動特徵。

南海內部的斷裂構造幾乎全爲鋸齒狀張斷裂。其中以北東向和近東西向兩羣爲主。北東向者爲規模較大的地殼斷裂和岩石圈斷裂。控制了整個南海的外形輪廓和展布方向。近東西向的斷裂羣包括北東東向和東西向兩組。前者主要分布在南海北部陸架和陸坡區，自燕山期起多次活動，具繼承性和多旋迴性特點，後者主要分布在中央海盤爲喜山期新生斷裂。兩者都較北東向者爲小。

南海中央海盤的地殼厚度爲5～9公里，地殼性質爲洋殼。根據重力異常推算的地殼厚度與聲納

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通　訊

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