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(March-June 1993)



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香港地質學會通訊





Geological Society of Hong Kong

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GENERAL

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TYPESCRIPTS

Typescripts must be accurate, legible and in their final form; two completed copies should normally be sent to the Editor. Typescripts should be double-spaced, including references, on one side only of A4 paper, with 25 mm margins on all sides. All pages should bear the authors name and be numbered serially. Text supplied on diskette using any conventional DOS word processing package (Wordperfect, Wordstar, Multimate, etc) or ASCII text is preferred to a hard copy.

ILLUSTRATIONS

Send the originals of all illustrations, each marked with the author's name, figure number and caption. Illustrations can be in black on tracing material or smooth white paper or board, but clear film positives

to final size are preferred, with a line weight suitable for reproduction. A metric scale should be included, and North Point (or where relevant, coordinates of latitude and longitude) on all maps. Plates should normally be provided as negatives plus prints, or as transparencies. However, half tone plates to final publication size should be supplied if possible. Refer to a recent issue of the Newsletter for size and style of tables, figures and plates, though generally they should be 16 cm wide by no more than 23 cm high.

REFERENCES

The author is responsible for ensuring that all references are correct. The list of references should be given in full, including volume, part and page numbers, with no abbreviations in the title of the paper or journal.

CHINESE TEXT

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OFFPRINTS

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Geological Society of Hong Kong Newsletter

Vol 11 No 1-2 (March-June 1993)

CONTENTS

	Page
EDITORIAL	1
MAJOR FAULT ZONES IN SHENZHEN AND NEARBY AREAS K W Lai	2
GEOLOGICAL SOCIETY OF HONG KONG - MAKING URBAN DEVELOPMENT GEOLOGICALLY SOUND R Shaw	8
FIELD GEOLOGIST ASLEEP, AT FAULT, AT WORK !!	12
GRADUATE THESES IN EARTH SCIENCE	13
REPORT ON THE BRIDE'S POOL FIELD TRIP, 17th APRIL, 1993 D Workman	14
REPORT ON A FIELD TRIP TO HENG GANG, SHENZHEN, 27th FEBRUARY, 1993 M Atherton	16
GEOLOGICAL SOCIETY OF HONG KONG ANNUAL GENERAL MEETING 1992-93	18
INTERNATIONAL ASSOCIATION OF GEOMORPHOLOGISTS	19
FORMATION OF A GEOMORPHOLOGICAL STUDIES GROUP	20
RE-EMERGENCE OF THE TEACHERS GROUP	20

EDITORIAL

That the image of the Newsletter improved dramatically under Richard Langford's stewardship is beyond doubt. Improvements in style, quality of print and the introduction of a colour cover have all received favourable comment. The Society expressed its gratitude for Richard's efforts at a recent General Committee Meeting and we wish him well in his endeavours in Australia. At the same time I would like to express my own thanks (as the new editor) to the Geotechnical Engineering Office for their continuing support of the Newsletter and the Society as a whole.

This is a combined issue (No 1-2), partly because of the lack of submitted articles, and partly because of a need to get the Newsletter back on time. In this issue K W Lai has an interesting article on fault

zones in Shenzhen. As the new editor I would encourage those who undertake visits to Guangdong to submit articles to the Newsletter, particularly if they place Hong Kong's geology within a regional context.

My apologies for the delay in getting this first issue to press - preparing a Newsletter from scratch is, as I have found, no easy task! Yet the conversion to a more flexible desktop publishing system will, in the longer term, make these efforts worthwhile. An equally time-consuming task has been procuring articles. Whilst numerous promising articles are now being offered can I nonetheless continue to urge members to submit articles, items of interest and details of meetings and/or visits. I look forward to your response.

MAJOR FAULT ZONES IN SHENZHEN AND NEARBY AREAS

K W Lai

Hong Kong Geological Survey, Geotechnical Engineering Office, 11/F Civil Engineering Building, 101 Princess Margaret Road, KOWLOON

INTRODUCTION

The major fault zones in Shenzhen and east Guangdong are several hundred kilometres long and up to several kilometres wide. The most important one adjacent to Hong Kong is the Lianhua Shan Fault System (Figure 1).

A joint research group carried out a field visit to Shenzhen and the nearby area to study the fault system from 7-13 June 1993. Participants included:

- C M LEE
Hong Kong Polytechnic
- C H TAN
Mott MacDonald Consulting Engineers
- D R WORKMAN
Hong Kong University
- K W LAI
Hong Kong Geological Survey
- S TAO
Zhejiang Institute of Geology
- T G CHEN
Institute of Geological Science of Guangdong Province
- H N CHANG
Guangdong Seismological Bureau

The purpose of the field visit by the group was to study the characteristics of major fault zones and related rock deformation in the area. The existence of fault networks gives rise to crustal instability, and earthquakes are a common occurrence in Guangdong Province. Study of the evidence for the present and, more importantly, past deformation in the various well-exposed fault zones, is important in understanding the geological history of this well-defined tectonic province, as well as recent tectonic activity in terms of regional stress and related fault movements and seismicity.

GENERAL ITINERARY

7 June 1993 (Monday). Travelled from Hong Kong to Shenzhen. Met to discuss the field work programme.

8 June 1993 (Tuesday). Studied geological sections from Futian quarry to Shanzaxia and Longcun to Henggang. Examined the mylonitized zone in granite, the Devonian staurolite-bearing and garnet-bearing schist, and marble in Carboniferous rocks. Observed the Nigang Fault at Dushucun.

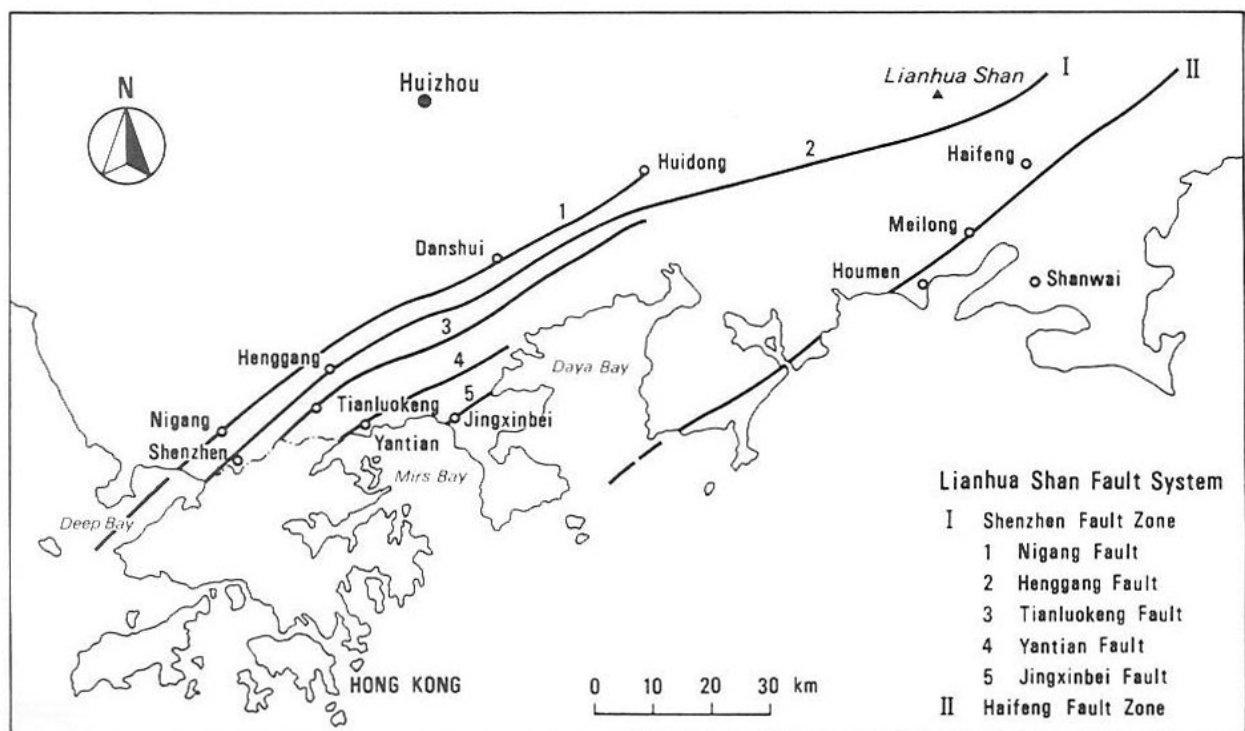


Figure 1 - Sketch map of the Lianhua Fault System

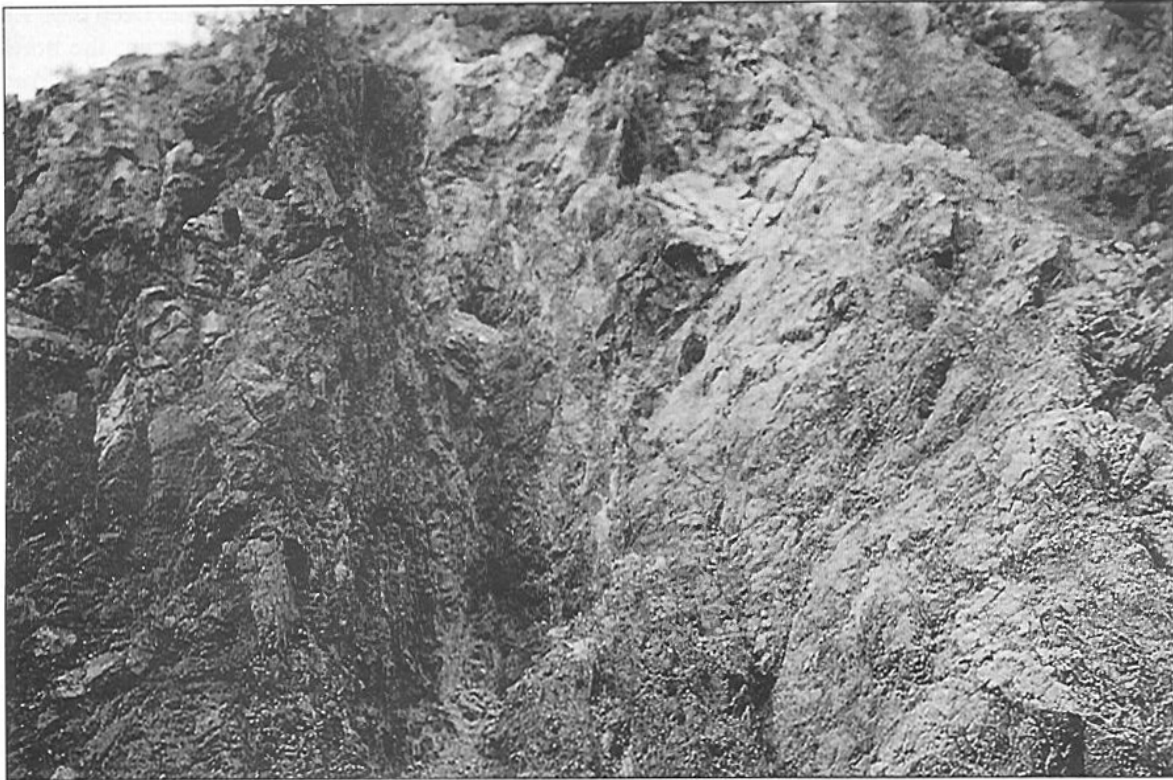


Plate 1 - A narrow fault zone in the centre, and brecciated and crushed zones on both sides of the Nigang Fault. Sandstone on the left and migmatic granite on the right. At Dushucun, Shenzhen.



Plate 2 - Fault surface on a brecciated quartzite outcrop in the Henggang fault on the westside of the spillway of the Shenzhen reservoir.

9 June 1993 (Wednesday). Visited the geological section from Henggang to Yantianao. Studied the Henggang Fault at Shenzhen Reservoir and the Tianluokeng Fault at Wutong Shan.

10 June 1993 (Thursday). Studied the Haifeng ductile shear zone at Houmen.

11 June 1993 (Friday). Visited the Gaotan - Gongping

section. Examined the mylonitized zone in granite, the Cretaceous basin and the Lower Jurassic sedimentary rocks.

12 June 1993 (Saturday). Visited the Changpu Tin Mine and the earthquake monitoring station at Haifeng. Examined mylonitized tuff in the Haifeng Fault and the raised beach rock at Meilong.

13 June 1993 (Sunday). Returned from Haifeng to Hong Kong.

LIANHUA SHAN FAULT SYSTEM

The Lianhua Shan Fault System includes the Shenzhen Fault Zone in the north (Plates 1 & 2), in Hong Kong named Tuen Mun - Lo Wu Fault Zone, and the Haifeng Fault Zone in the south (Plate 3, Figure 1), in Hong Kong named Po Toi Fault Zone. These faults have been active over a long period and were rejuvenated during each subsequent orogeny up to pre-Quaternary. Along the faults dynamic and thermal metamorphic belts have been formed.

SHENZHEN FAULT ZONE

The Shenzhen Fault Zone comprises five faults. From north to south they are: Nigang, Henggang, Tianluokeng, Yantian and Jingxinbei faults. We examined the first three of these faults.

(1) Nigang Fault

The fault trends 045° dipping northwest from

Danshui passing through Nigang into Deep Bay. An excellent outcrop occurs at Dushucun, the north boundary of Shenzhen City, forming the boundary between Middle Jurassic sandstone and Palaeozoic magmatic granite with a 50 m wide crushed and silicified zone. The fault breccia is cemented by botryoidal limonite. Also intense shear planes, fault gouge and chloritization were encountered in the fault zone (Plate 1).

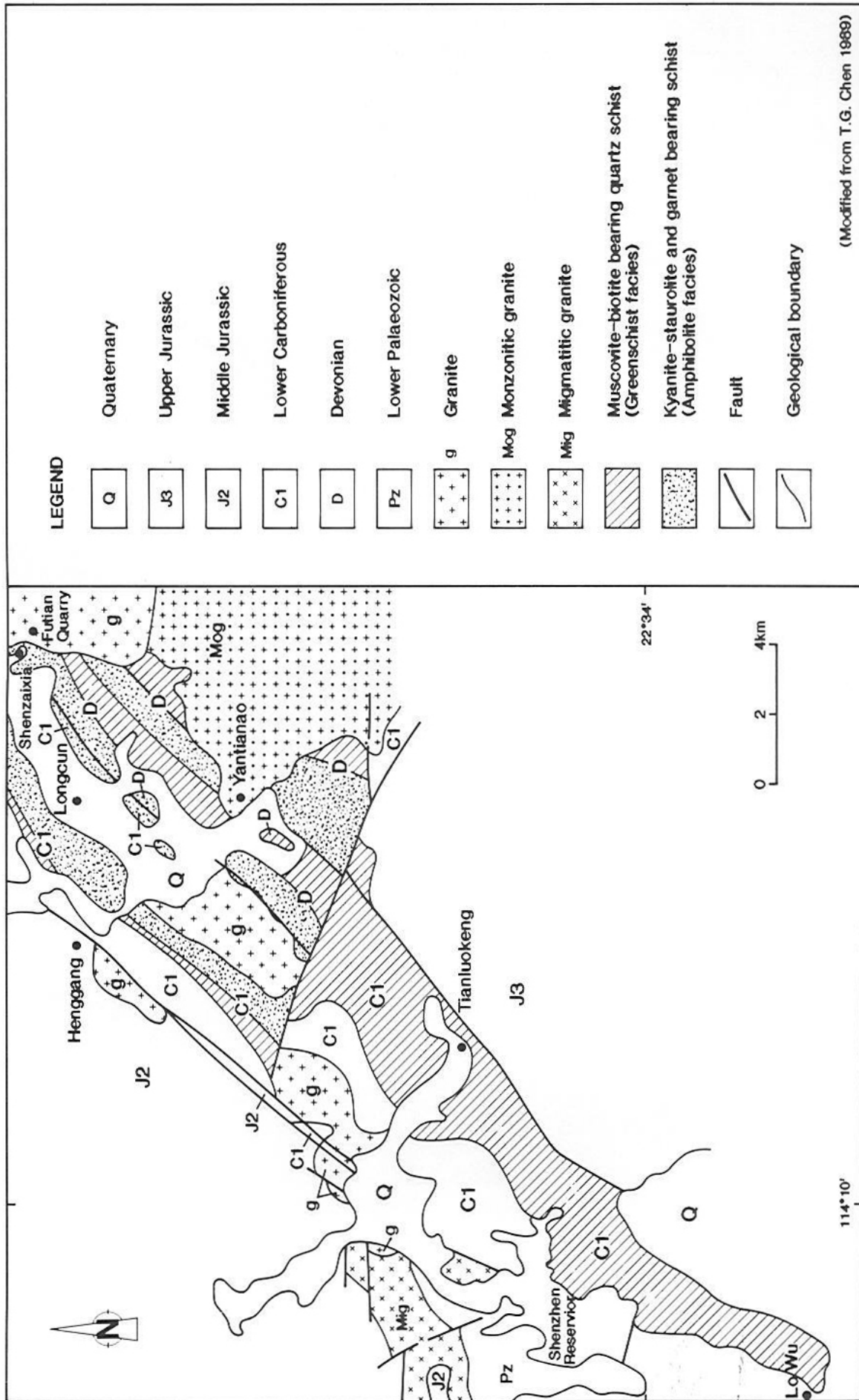
(2) Henggang Fault

This is the largest fault in the Shenzhen Fault Zone, trending 040°, dipping northwest at angles varying from 45° to 65°. To the northeast of Shenzhen it runs along the Shenzhen River and then diverges into three faults: the Lau Fau Shan Fault along the south coast of Deep Bay and the Tsing Shan and Tuen Mun Faults along both sides of the Tuen Mun Valley. The Henggang Fault was visited at six locations: Futian quarry, Longcun, Henggang, Yantianao, Shenzhen Reservoir (Plate 1) and Gaotan (Plate 4). In the Shenzhen area, the Henggang Fault zone comprises a set of nine sub-parallel faults, each having different characteristics and varying in the degree of rock deformation. Three different metamorphic types can be recognized.

(a) **Dynamothermal metamorphic zone.** The Palaeozoic pelitic rocks have been converted into sericite and biotite schist, belonging to the greenschist facies. Subject to further metamorphism they may be transformed to kyanite-, garnet- and



Plate 3 - Mylonitized tuff lava in the Haifeng Fault at Houmen, Haifeng County.



(Modified from T.G. Chen 1989)

Figure 2 - Sketch map showing the dynamothermal metamorphic zones of the Shenzhen area



Plate 4 - Goatan mylonitized granite at Xikeng, Huidong County



Plate 5 - Themolite- and wollastonite-bearing marble in the dynamothermal metamorphic zone at Henggang, Shenzhen.

staurolite-bearing schist belonging to the amphibolite facies. These rocks are intensely foliated, and can be seen at Longcun, Henggang and Yantianao (Plates 5 & 6, Figure 2).

(b) Mylonitized zone. Mylonitization is mainly developed along the faults in Upper Jurassic to Lower Cretaceous granite and volcanic rock forming ductile shear zone tens to hundreds of metres wide. These can be seen at Futian quarry and Gaotan

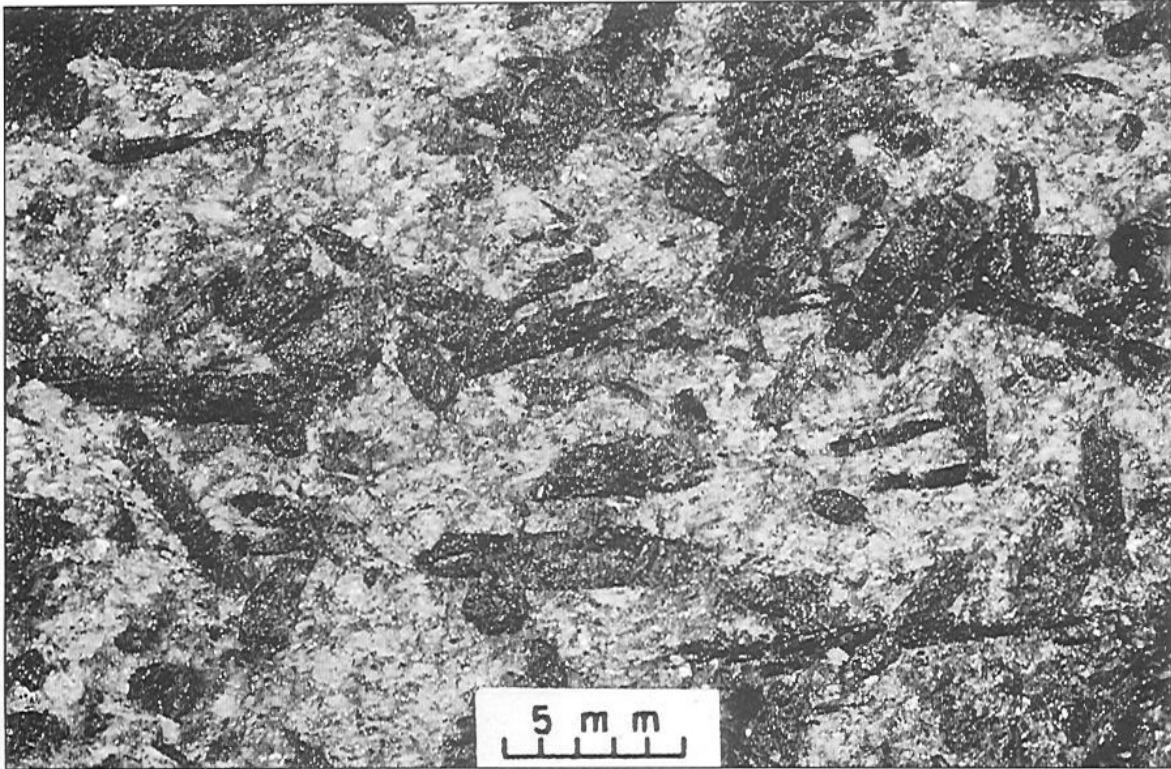


Plate 6 - Prismatic staurolite- and isometric garnet-bearing schist in the dynamothermal metamorphic zone at Longcun, Shenzhen.

(Plates 3 & 4).

(c) **Brecciated zone.** This can be found in all rocks from Palaeozoic to Upper Cretaceous, such as at the Shenzhen reservoir, and was formed at shallow crustal levels (Plates 1 & 2).

(3) Tianluokeng Fault

This fault trends 050° dipping northwest at angles varying from 45° to 80°. Carboniferous metasandstone has been thrust from the northwest over Upper Jurassic mylonitized tuff to the southeast. This can be seen at Wutong Shan.

HAIFENG FAULT ZONE

This fault trends 050° dipping southeast to angles varying from 35° to 60°. It begins at Haifeng, passing through Meilong, Houmen and Pinghai into the sea, and runs along the channel between the Po Toi and Dangan (Lema) Islands. An intensely mylonitized zone can be seen along the fault at Houmen, Haifeng County (Plate 3).

CONCLUSION

The visit to Shenzhen and nearby areas was very useful in relation to the study of the regional fault system of Hong Kong. It provided a good opportunity to directly

examine fault characteristics in the field, and understand the fault distribution in Guangdong and their relationship with faults in Hong Kong. It is important that three different metamorphic types can be identified in association with the fault movements: dynamothermal metamorphism, cataclastic metamorphism and ductile shear metamorphism. These vary with rock type, depth within the crust and geological period. Rock samples were collected from different fault locations and are undergoing detailed examination to compare with similar rocks in Hong Kong. This study will add considerably to the understanding of fault movements, crustal stability and seismicity in the region.

ACKNOWLEDGEMENTS

The author wishes to express his appreciation to D R Workman of Hong Kong University, and I R Basham and R L Langford of the Hong Kong Geological Survey for their invaluable advice and assistance. The paper is published with the permission of the Director of Civil Engineering of the Hong Kong Government.

REFERENCE

Chen T G (1989). Basic Features and Present Activity of Shenzhen Fracture Belt. *Guangdong Geology*. Vol 4, No 1, p 51-61 (in Chinese).

GEOLOGICAL SOCIETY OF HONG KONG - MAKING URBAN DEVELOPMENT GEOLOGICALLY SOUND

Record of an interview with the Chairman of the Society, Dr. Raynor Shaw

Text extracted, with permission, from Green Productivity (Hong Kong Productivity Council), 1991, No 3, p 70-73.

The Geological Society of Hong Kong was established by a group of local geologists in 1982. According to Dr. Raynor Shaw, the current Chairman of the Geological Society, the Society attempts to promote an interest in all aspects of geology by arranging meetings and field trips that enable members to get together to discuss a wide range of geological matters.

The Geological Society of Hong Kong has a membership of about 250 drawn from industry, academia, government, teachers, students and amateurs. The Society regularly organises conferences on various aspects of geology and runs field trips for members to explore geological features both in Hong Kong and overseas.

GEOLOGICAL ACTIVITIES

The Society will be celebrating its 10th anniversary in May, 1992. Dr. Shaw explained that, to coincide with the occasion, the Society hopes to organise a conference on the geology of Hong Kong. The conference will focus on the important geological work that has been carried out in Hong Kong over the past few years. The Society recently organised an International Conference on Seismicity in Eastern Asia, which was attended by almost one hundred delegates from China,



Plate 1 - Lowering geological surveying equipment into the water

the United Kingdom, New Zealand, Australia and Malaysia. Over the last 10 years the Society has organised conferences on site investigation, superficial geology, limestone geology, and urban geology.

The Society organises about six local field trips each year, Dr. Shaw said that field trips visit many interesting places in Hong Kong to look at all aspects of Hong Kong geology. There are three main rock types in Hong Kong including granite, volcanic rocks and sedimentary rocks. The granite formed when molten rock from deep within the earth rose over the surface then cooled and solidified. The volcanic rocks formed when active volcanoes dotted the Hong Kong landscape

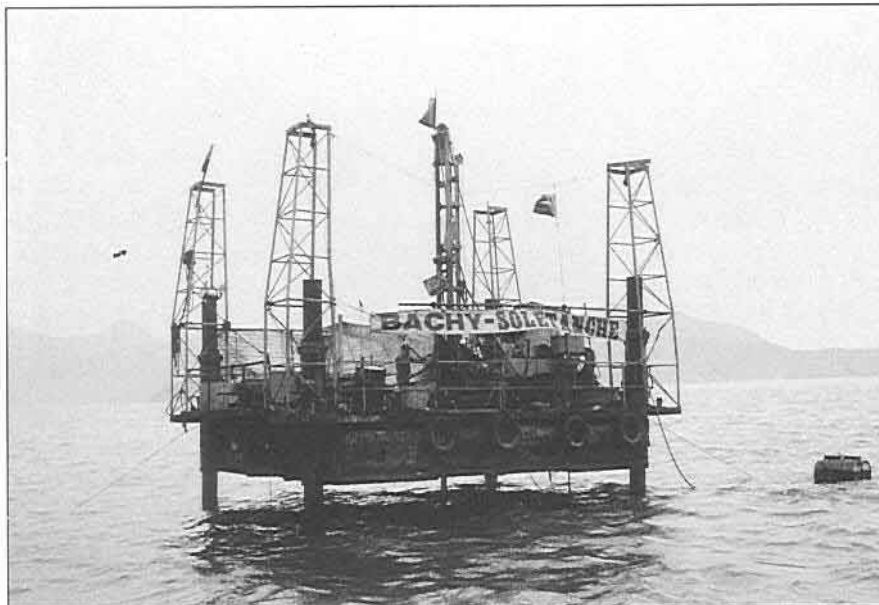


Plate 2 - Offshore site investigation drilling for marine engineering works



Plate 3 - A temporary excavation in marine mud in Junk Bay

erupting ash, blocks of rock and molten lava. The sedimentary rocks, which occur predominantly in the north and north east New Territories around Ping Chau, the Tolo Channel and underlying Yuen Long, were laid down by rivers and shallow seas. The three types of rocks are quite distinctive and each have their own unique interest for the specialist.

The Society has organised many field trips to China. Dr. Shaw explained that it is important that the geology of adjacent areas is understood because geology is not a subject that can be satisfactorily studied in isolation from its regional setting. Visits have been made, for example, to Guangdong and Fujian provinces to examine geological faults and evidence for earthquake activity, to Guilin to study the limestone geology and to Hainan Island to see recent volcanoes and coastal deposits.

Geologists have always played an important role in most engineering and infrastructural developments in Hong Kong, but in recent years their contribution to many other specialist areas as well as site investigations, foundation design, offshore engineering and fill resource investigation is being increasingly recognised.

IMPACT OF URBAN DEVELOPMENT

According to Dr. Shaw, Hong Kong grew to its present economic prominence as a result of its excellent natural harbour on the edge of the South China Sea. Strong tidal currents pass through the harbour keeping the harbour water clean. One potential problem facing Hong Kong is that the areas around the harbour are becoming increasingly urbanised. If the current patterns were changed, by reclamations or other developments, then the quality of the harbour water could deteriorate. As with all natural systems there is a threshold.

Computer simulation models and large physical models have been used for many years in Hong Kong to study the current flows in Hong Kong waters and to examine the effects of various configurations of reclamation on current flows and water quality. Engineers and geologists are aware of the many complex environmental considerations that should be taken into account when designing such reclamation schemes and have contributed all their skills to ensure that the balance of Hong Kong's waters are not adversely disturbed.

DEVELOPMENT OF THE NEW AIRPORT

Geologists were involved in the selection of the most suitable site for the new airport, a study that had been going on for several years. Dr. Shaw explained that the new airport scheme is actually largely an off-shore engineering project which involves marine geologists to assess various geological factors. One major consideration at the site is to assess the thickness of marine mud in the off-shore area. The marine mud that covers most of the seabed in Hong Kong has accumulated over the last ten thousand years. An accurate knowledge of the thickness of the mud layer is very important because the soft, moist marine mud is not strong enough to support loads unless it is treated. In order to complete reclamations on an off-shore site, the marine mud needs



Plate 4 - Placing marine-dredged sand in the Tin Shui Wai Reclamation in Junk Bay

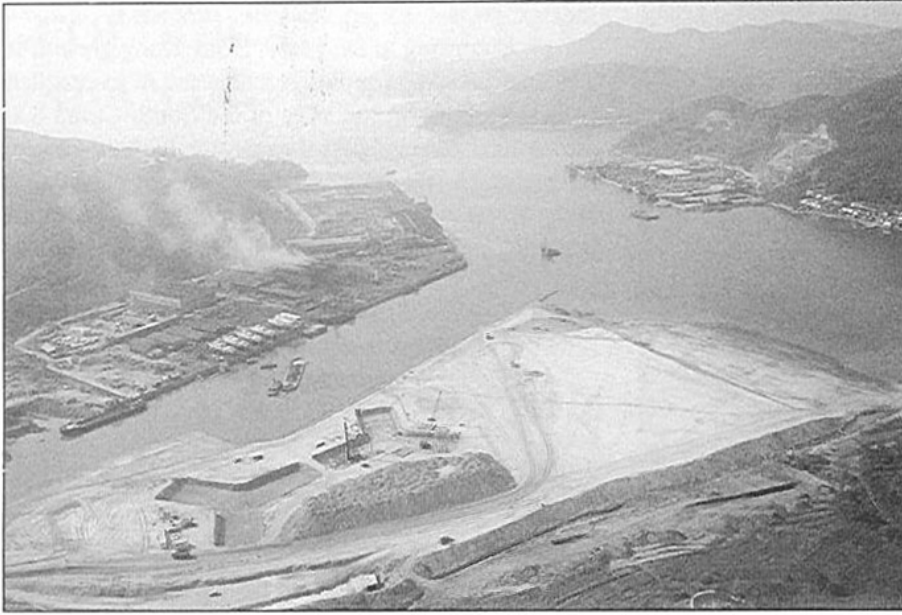


Plate 5 - Coastal land reclamation in Junk Bay

to be either strengthened or removed. Therefore, during the site investigation studies the depth of water, the thickness of the marine mud layer, and other geological factors associated with the site need to be surveyed.

Geologists are also involved in the assessment of the access routes to the new airport site. Dr. Shaw said that geologists are extensively involved in the initial site investigations and design for the Tsing Ma fixed crossing and the access routes to the airport on the northern coast of Lantau, because major cuttings and excavations will be made in hillsides to implement these infrastructures. In the course of work, geologists carry out surveys of rock joints and rock strength and assist engineers to ensure the safety of slopes and the adequacy of foundations for structures.

MARINE FILL RESOURCES

In view of the extent of the major reclamation works to be implemented in several coastal areas of Hong Kong, the demand for sand for reclamation purposes has increased tremendously. Dr. Shaw said that suitable material can be found from both on-land and off-shore sources. Quarrying land is potentially more damaging visually because the operation removes the whole hillside and hill top. The quarry site

is difficult to conceal. After the quarry is exploited, the site is commonly either re-vegetated to improve its visual impact or utilised as a site for housing, residential areas or other uses. Exploiting marine sand resources obviously causes less visible impact because the sand is extracted from under water. However, there is the possibility of adverse consequences such as alteration of current flows resulting from the change of sea bed level.

Geologists and engineers are working together in trying to maximise the use of the filling materials in Hong Kong. Dr. Shaw explained

that many development projects are going on at the moment in Hong Kong. One of the techniques that is currently being adopted is filling the reclamation site with surplus sand and rock waste produced by other projects. In most cases, off-shore projects need to remove a layer marine mud from above the layer of sand. The marine mud removed from the sea bed needs to be dumped somewhere. Attempts are now made to coordinate the projects so that after marine sands have been extracted leaving a hole on the sea bed, the extracted sand is then replaced with marine mud removed from another project. Filling up the hole with mud returns the sea bed surface to its original condition and minimises adverse effects



Plate 6 - Extensive marine geological investigations are in progress around Chep Lap Kok island, the site of Hong Kong's new airport

on the sea bed. Much of the large quantity of fill required for the Chep Lap Kok Airport project can probably be taken from the sea bed by adopting these procedures, thereby having a minimal impact on the sea bed regime. One subject of concern is the temporary disturbance of the water column during the dredging process. Contractors undertaking these projects are required to take steps to minimize the amount of sea bed materials into suspension and to continuously monitor the condition of the water to ensure the minimum disturbance of the offshore environment.

CONTROLLED TIPS FOR URBAN WASTE

Waste management is an important field in which geologists are involved in Hong Kong. Dr. Shaw said that a big step has been taken with the recent development of controlled tips for urban waste. For example, several large-scale landfill sites are being developed in the New Territories. Many landfill sites are built off-shore or in coastal areas. One important aspect of the design is to examine the deposits on the sea bed and the stability of the foundations for the surrounding seawall.

Leachate control is an important design consideration in both off-shore and on-shore landfill sites. Dr. Shaw said that leachate leakage is related to the geological materials at the site, particularly the rocks underlying the site. Geologists need to examine the geological characteristics of the landfill site in order to design effective measures for preventing leachate leakage. The joint pattern of a landfill site can actually extend into an adjacent area. If the landfill designer overlooks this geological factor, leachate from landfill site could pollute not only the area around the landfill, but also the areas adjacent to the landfill site. Therefore, geologists play an important role in assessing the underground joints and water flow of the landfill site and are involved in all stages of planning and construction to prevent underground water pollution of the local area.

SEWAGE DISPOSAL SCHEME

Sewage disposal is another important issue in Hong Kong. According to Dr. Shaw, it is geologically feasible to construct an ocean outfall to disperse treated sewage. There are several successful examples in other parts of the world, such as in Boston and Sydney. An important component of the sewage disposal scheme is that sewage would be treated to an acceptable standard by sewage treatment plants before it is put into the ocean. Hong Kong is not a pioneer in this respect. In the planning stage, the people working on this project have studied experiences from other parts of the world. The tidal effects and current regime both within and just outside Hong Kong waters are essential design factors. The project designers are working with geologists to ensure that the end of the outfall is located in a position that would not have an adverse environmental effect on Hong Kong or Chinese waters. To achieve the de-

sired result, the treated sewage should be dispersed into currents that would harmlessly dissipate it into the ocean.

Dr. Shaw expressed the opinion that the alternative of putting sewage into Hong Kong waters is potentially quite damaging because the daily production of wastewater from six million people in Hong Kong is vast. The current wastewater disposal facilities are barely adequate. The long ocean outfall is a major project requiring input from oceanographers, geologists, hydrologist and engineers and would be very expensive, involving a range of geological investigations in deep water. However, the project is a challenging engineering undertaking that would provide an effective solution to Hong Kong's growing wastewater problem.

EARTHQUAKE POTENTIAL

When asked about the possibility of earthquakes occurring in Hong Kong, Dr. Shaw said that the whole world is potentially prone to earthquakes, they are not a phenomena unique to any particular part of the world, although they do occur more concurrently in certain geological localities. Hong Kong is not one of these areas. Earthquakes occur largely as a result of movement along faults, which are dislocation in rocks. Historically Hong Kong has been free from any damaging earthquakes. Tremors have been recorded here, but most of them are connected with earthquakes caused by dislocations along faults along the South China coast to the north east of Hong Kong. Hong Kong is a relatively stable area geologically and there is no evidence of active faulting for at least the last 10,000 years.

Geologists are involved in site investigations for

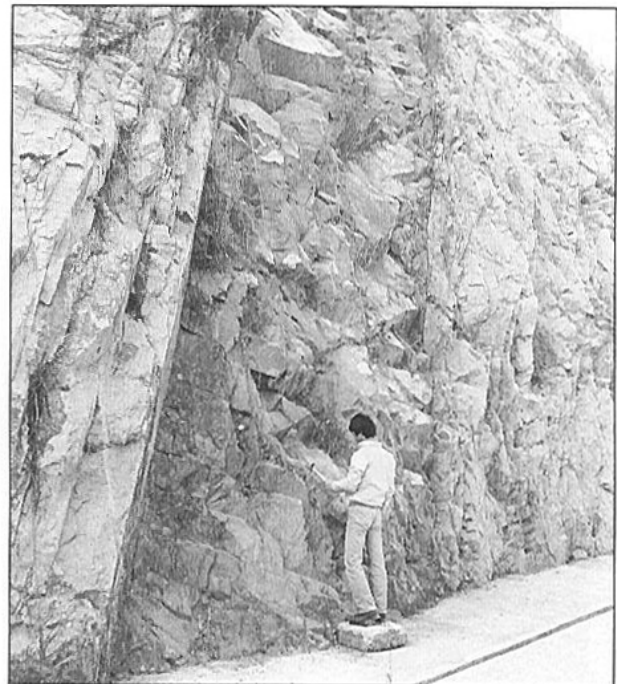


Plate - 7 Geologists are involved with engineers in rock joint surveys to ensure the safe design of cut-slopes



Figure 8 - Geological Society of Hong Kong field excursion to Ma Shi Chau, Tolo Channel

a wide range of projects in Hong Kong. Dr. Shaw said that geologists are commonly called upon to examine earthquake risk, depending on the nature of the project. If they are assessing a site for the construction of a large power station or bridge, they always take into account the geological structure of the area and map out the pattern of faults in detail to ensure that the struc-

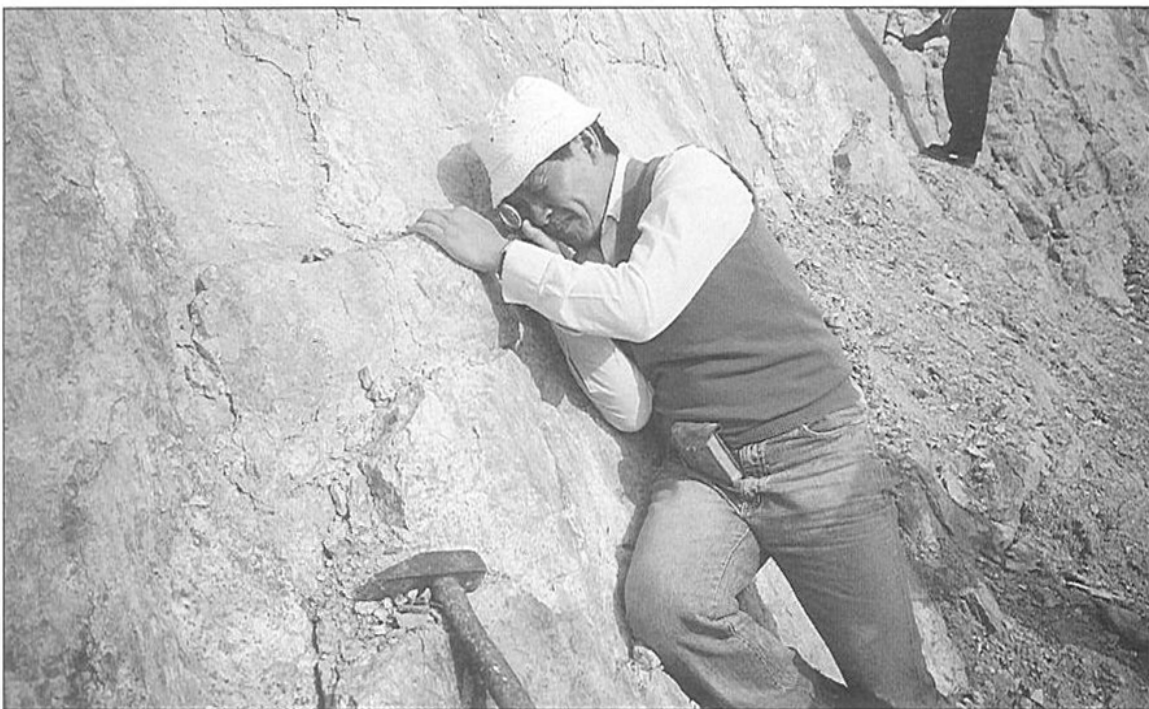
ture is located and built safely.

CONCLUSION

Dr. Shaw concluded that many projects require that multi-disciplinary studies are carried out before construction actually commences. Depending on the nature of the project, hydrologists, engineers, geologists and other professionals will be involved to contribute to the study. My personal impression of town planning in Hong Kong is that it is very good. All the urban areas are very well provided with a wide range of facilities for the residents.

The pressure of population in Hong Kong could cause disastrous environmental problems if the developments were not well planned. For example, residential developments in Hong Kong's New Towns and at Discovery Bay are attractively laid out and are interspersed with parks, trees and green areas to make them pleasant environmentally.

FIELD GEOLOGIST ASLEEP, AT FAULT, AT WORK !!



K W Lai, presumably at work - see article on p2 (Photo courtesy of D Workman)

UNIVERSITY GRADUATE THESES IN EARTH SCIENCE

The following is a list of completed graduate theses in earth science held in the Department of Geography and Geology at the University of Hong Kong and in the Department of Geography at The Chinese University of Hong Kong. It covers the fields of geology, geomorphology, soils and hydrology, but not climatology (of which there are numerous theses in both institutions).

UNIVERSITY OF HONG KONG

Master of Arts

So, Chak-lam (60 S1), 1960
Some geomorphological problems related to Hong Kong and the New Territories with special reference to the coastline.

Woo, Ming-ko (67 W2), 1967
The influence and controls of climate and ecology on landforms, with special reference to the Castle Peak District.

Tam, Sai-wing, Selwyn (71 T1), 1970
Landforms in Sai Kung Peninsular and the adjacent islands.

Ho, Kee-hau (72 H1), 1972
Some geomorphological problems of the Patsin Range and adjacent areas, North-Eastern Hong Kong.

Luk, Sui-hung (72 L4), 1972
Some aspects of the form and origin of hillslopes in western New Territories, Hong Kong.

Master of Philosophy

Luk, Shiu-hung (72 L4), 1971
Some aspects of the form and origin of hillslopes in western New Territories, Hong Kong.

Lam, Kin-che (74 L1), 1974
Some aspects of fluvial erosion in three small catchments, New Territories, Hong Kong.

To, Ka-yan (78 T1), 1977
Beach profile and sediment changes in Tai Long Wan, Hong Kong.

Nau, Pak-sun (84 N), 1984
Joint systems in granite of Hong Kong Island and neighbouring areas of Hong Kong.

Brimicombe, Allan J. (86 B8), 1985
The application of geomorphological triangular data bases in geotechnical engineering.

Ou-yang, Chiu-mei (85 O), 1985
A mineralogical study of Burmese jadeite jade.

Lee, Cho-min (92 L), 1990
The tectonic framework of Hong Kong and vicinity and its relationship to regional seismicity.

Master of Science (Engineering)

Lee, Chak-fan (70 L1), 1970
A study of the clay minerals in Hong Kong soils.

Doctor of Philosophy

William, Allan Thomas (73 W1), 1972
Some beach changes at selected bays in Hong Kong.

THE CHINESE UNIVERSITY OF HONG KONG

Master of Science/Master of Philosophy

Liu, Ah-chuen, 1982
Chemical quality of River Indus in Hong Kong

Yuen, Yuk-man, 1983
Groundwater quality in the Fanling-Sheung Shui area: a chemical and perception study.

Lo, Chuk-ching, 1986
An investigation of the colluvium morphology in Hong Kong.

Chan, Kong-sang, 1986
A study of drainage basins on various lithologies in Hong Kong.

Ng, Sai-leung, 1990
Soil column study on five Hong Kong soils on purifying livestock slurry.

Choi, Chi-hoi, 1991
Land degradation and rehabilitation in severely eroded granitic area of south China: A case study of Deqing.

Leung, Yu-fai, 1992
A study of trail degradation along the Pat Sin range, North New Territories, Hong Kong.

REPORT ON THE BRIDE'S POOL FIELD TRIP, 17th APRIL, 1993

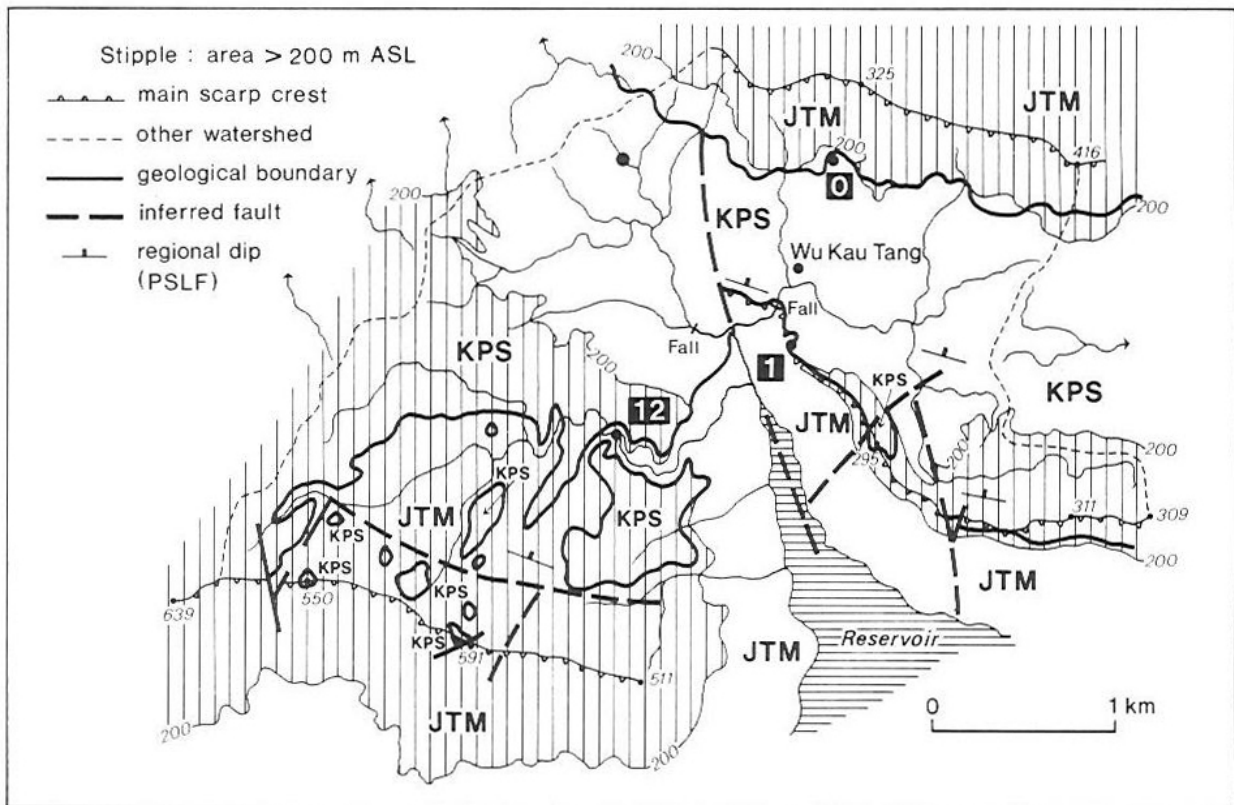
D Workman

The following notes are extracted from a field guide given to participants on the day.

Start (Stop 0 on map below). Contact between the two rock formations which are exposed in this area, the volcanic Tai Mo Shan Formation and sedimentary Pat Sin Leng Formation (see also note 1). The structural relationship between these two formations is to be examined at this location.

the entire Pat Sin Range including its extension eastwards to Bluff Head where streams rising on the northward (dip) slope of this 16 km long ridge join a system which cuts through the ridge and flows south. There is a geological reason for this: a fault provides the line of weakness along which the valley has been incised through the ridge.

Stop 1A. Escarpment exposures of beds of the Pat Sin



General location of field trip area

Stop 1. Lookout westwards over the Bride's Pool area and towards the Pat Sin Range. We are standing on a ridge formed of sedimentary rocks with a dip slope to the NNE and opposing scarp slope facing SW.

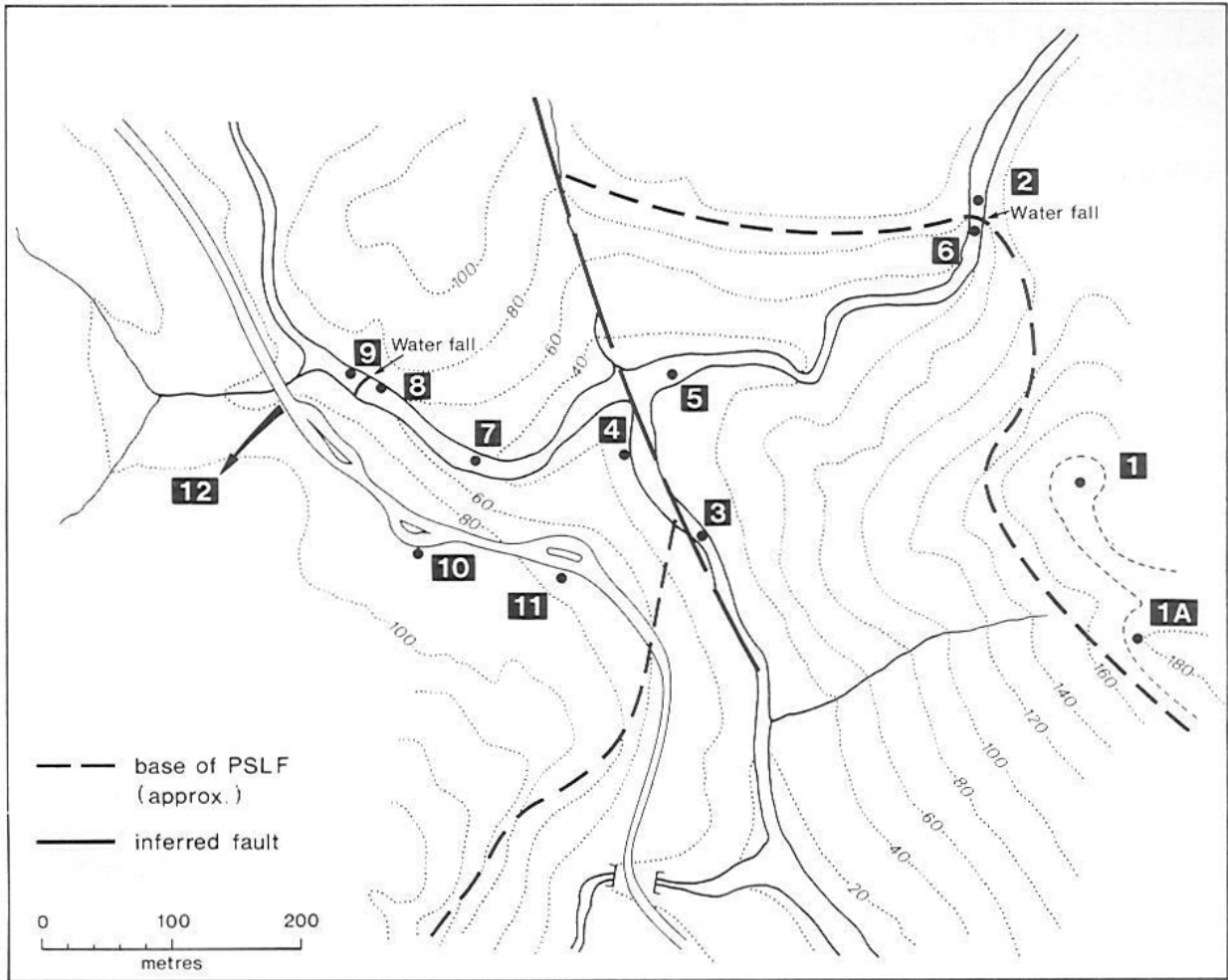
The slope extending northwards from the crest of the Pat Sin Range is a dissected dip slope on the same sedimentary rocks which belong to the Pat Sin Leng Formation (PSLF (formally known as the Port Island Formation)). The PSLF sedimentary rocks dip quite uniformly at 15-20° N/NNE (generally 5-15 degrees east of north). In the stream valleys, at lower elevations, tuffs (pyroclastic rocks) of the Tai Mo Shan Formation (Repulse Bay Volcanic Group) are exposed. The Bride's Pool valley is the only location along

Leng Formation. Various rock types can be found: conglomerate, sandstone and shale.

The base of the Formation is not too far down this slope (by extrapolation from its exposure at Location 2, according to the prevailing dip). However, it is concealed by scree (colluvium).

Stop 2. The top of the Mirror Pool waterfall. Conglomerates. Note erosion along joints and pothole formation. The base of the PSLF is immediately below the second ledge of the fall. This is, however, INACCESSIBLE!!

Stop 3. Outcrop of crystal tuff in the stream bed with



Map of Bride's Pool area

sandstone nearby (right bank).

Stop 4. Outcrop of sandstone.

A fault is inferred to run along this valley, to account for the differences in elevation of the base of the PSLF on the western side (coming down to stream level here at around 30 m ASL) and the eastern side (at around 160 m ASL along the strike direction from this point, i.e. a relative vertical displacement of something like 130 m). Note that with the beds dipping in the same general direction as the strike of the fault, this displacement could be caused by either dip slip or strike slip (or a combination of the two).

Stop 5. Out crop of crystal tuff in the stream bed.

Stop 6. Mirror Pool. Outcrops of tuff, which form the cliff of the waterfall (immediately below stop 2).

Stop 7. Along this section are continuous outcrops of PSLF sedimentary rocks, all the way up to stop 8. All the various rock types can be seen.

Stop 8. Bride's Pool. The waterfall here is entirely on sedimentary rocks, the dip of which, obliquely upstream and to the right, can be clearly seen.

Stop 9. At the top of Bride's Pool waterfall (N.B. to get there from stop 8 it is necessary to go back downstream and then up the path on the eastern side of the valley, or up the road).

The rocks forming the lip of the Bride's Pool waterfall are conglomerates like those at the Mirror Pool fall, but are higher up in the PSLF succession. In fact these appear to be the uppermost conglomerates in the PSLF, the succeeding part of which is more fine-grained (sandstones, siltstones and shales).

Stop 10. Outcrop behind the car park. Sandstone overlying red shale. Dip out of the slope.

Stop 11. Roadside outcrop. Conglomerate, sandstone and shale. Note the fracture cleavage at the top of the main shale layer.

(The Highways Department, having indiscriminately shotcreted the whole of this slope, thereby ruining a well-known geological section as well as creating an eyesore in the country park - as at other locations further up the road - acceded to requests by geologists to have the shotcrete removed from this small area, so that it could continue to serve as an easily accessible exposure of typical PSLF).

Continued p21

REPORT OF A FIELD TRIP TO HENG GANG, SHENZHEN, 27th FEBRUARY, 1993

M Atherton

Some 25 members and guests gathered at Kowloon KCR terminal on a pleasant morning to travel by train to the Lo Wu border crossing. Having eventually succeeded in crossing into the PRC the group re-assembled in Shenzhen, to begin the tortuous journey across Shenzhen Special Economic Zone, which appears to be one continuous expanse of construction activity. 3 and 3/4 hours after departure we arrived at our first locality.

We were fortunate to be introduced to Messrs Xu Yimin and Zheng You-ming of the Guangdong Geological Survey who led the way to a hillside exposure of muscovite schist. Maurice Atherton pointed out an exploratory trench which had been excavated by a Soviet exploration team some 20 years previously.

We were then guided along a footpath which seemed to cross metamorphic isograds at a remarkable rate, progressing from muscovite schist (greenschist facies?) through garnet mica schist, staurolite schist and garnet staurolite schist (seemingly well into amphibolite facies). This footpath brought us to the brow of a dip slope, along the crest of which, were exposed a wide range of metasediments. A welcome lunch break was taken here.

Considerable debate was aroused when the party wandered a few metres down the scarp slope. All were surprised to find the heavily metamorphosed pelitic strata resting on apparently undeformed laminated sandstones and siltstones. Although the contact could be seen, no



Plate 1 - Garnet mica schist



Plate 2 - Laminated sandstone

discrete geological boundary was immediately apparent. Alan Fyfe and Frank Connor pointed out the presence of occasional small garnets in a massive sandstone unit immediately below the contact. Explanations cited included:

- i. inverted sequence, with derived garnets in sandstone
- ii. thrust contact putting older metamorphics on sedimentary rocks
- iii. localized response of different rock types to regional metamorphism

Our hosts then suggested we move on to our next stop, to see an active marble quarry. After a mercifully brief drive we arrived at the said quarry.

The quarrying operation operates on a relatively small scale, but appeared to be very efficient. A wire saw is used to cut large blocks of marble in-situ. These are then detached from the rock mass by a combination of feathering and light blasting. The main interest to those of us from Hong Kong was the well exposed karst features. Clearly visible was the rapid lateral variation of

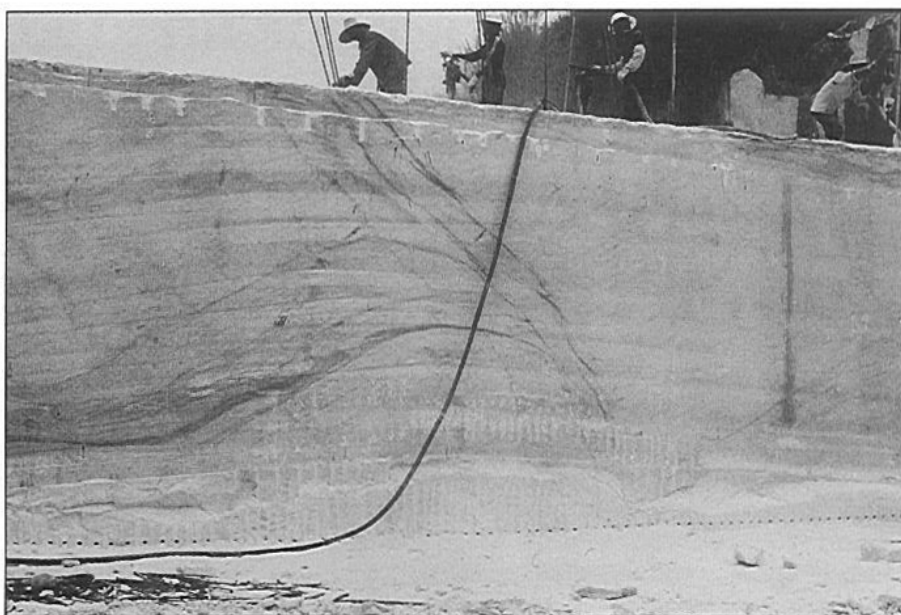


Plate 3 - Marble being worked

LOG	GEOLOGY	DEFINITION OF CONTACT	
		ARGUMENT FOR	ARGUMENT AGAINST
█	Garnet staurolite schists, garnet phyllites and rare kyanite schist	Thrust Fault (Klippe)	
.....	Massive, garnet bearing fine grained sandstones	High grade over lower grade (older on younger?). Sympathetic foliation in underlying phyllite discordant with preserved bedding.	Absence of discrete contact, no slicks etc.
.....	Fine grained laminated sandstone with occasional pelitic strata preserved as sub-horizontally foliated mica schist, bedding dips 30° towards the north-west	Inverted Sequence (unconformity)	
.....		Garnet in sandstone secondary derived and redeposited? High grade over lower grade.	No obvious u/c boundary. No clear basal conglomerate or fining upward sequence.
.....		Regional M/mphism (compositional response)	
.....		Foliation in mica schists within pelitic horizons in sandstone. Absence of discrete boundary.	Presence of garnet in upper sandstone unit. Considerable change from apparent lower amphibolite to greenschist facies over 2m vertical distance. Details of structure preserved in sandstone.

GEOLOGICAL SOCIETY OF HONG KONG ANNUAL GENERAL MEETING 1992-93

The Annual General Meeting of the Society, held on 28 May, 1993 in Room W709 of the Hong Kong Polytechnic, was attended by 18 members.

MINUTES OF THE LAST MEETING

Accepted

CHAIRMAN'S OPENING COMMENTS

After welcoming those present, the Chairman expressed his thanks to the general committee for their support throughout the previous year. In particular he expressed special thanks to C M Lee for organising a number of highly successful international field trips and to R Langford for the significant improvements to the Newsletter.

On a more general level the Chairman noted that there had been numerous successful field trips and talks throughout the year and he expressed a hope that the following year would continue to see the Society prosper. The Chairman then requested that the Secretary present the details of the past year.

SECRETARY'S REPORT

There are currently 126 paid-up member of the Society, compared to 184 at the end of 1992. Nevertheless there has only been one notice sent to members and as per previous years a reminder is necessary. A secondary school membership drive has been initiated and to date 33 teachers from 29 secondary schools have made enquiries concerning the activities of the Society. This highlights a need to re-evaluate the needs of secondary school teachers, an issue that could well be addressed by the incoming committee. Membership fees have remained at \$150 for full members and \$50 for student members.

Under the editorship of Richard Langford the Newsletter has undergone marked improvements over the past year. Better quality paper, and the use of smaller font and double columns, have reduced the total page requirements and significantly improved the overall image. The colour covers, to mark the tenth anniversary of the Society, have received favourable comments.

Members will also note that the logo of the Society was altered (see Newsletter Vol 10, No 2, p 10) and incorporated for the first time in the Newsletters.

Other major publications underway include the final editing of the seismicity conference proceedings - edited articles are being returned to the authors for final comment. David Workman has also initiated a field guide to the geology of Hong Kong. As part of a sales drive Maurice Atherton has recently mailed a list of the Society's publications to Librarians and Geology Professors throughout the UK and the USA. The Marine Studies Group of the Society also helped organise

a workshop on the logging and interpretation of transported soils in offshore boreholes.

The Society has organised several local and international field trips (see below). A special thanks to C M Lee for his organisation of the international field trips. A Winter Talks Series, organised by Raynor Shaw, included six speakers (see below) and following the introduction of postcard reminders the attendance was significantly improved.

The Society also became an affiliate/associate member of the Federation of Science-Related Associates of Hong Kong.

Questions raised after the Secretary's report pertained to aspects of the printing of the Newsletter, such as the number of reprints and the colour cover.

Local Field Trips

October '92	The Brothers
January '93	South Lamma Tsing Ma Bridge
April '93	Bride's Pool
May '93	Fan Lau

International Field Trips

July-August '92	Tibet
December '92	North Guangdong
February '93	Shenzhen

Talks

October '92	Ian Basham <i>Uranium in the old red sandstone of northern Scotland</i>
Nov. '92	Bernie Owen <i>Saline lakes in British Columbia</i>
Dec. '92	Alan Fyfe <i>The continental shelf of Scotland - a neolithic perspective</i>
January '93	Jonathan King <i>The effects of slope stability on mining development in Papua-New Guinea</i>
February '93	Raynor Shaw <i>The Quaternary geology of the north China loess plain</i>
March '93	Lee Cho-min <i>Volcanoes in Indonesia</i>

Marine Studies Group Talks

June '92	Ron Neller, Raynor Shaw and Bernie Owen <i>The palaeogeographical evolution of Hong Kong's offshore environment</i>
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June '92 Corelogging Course
The logging and interpretation of transported soils in offshore boreholes

May '93 Ceri James
Marine geology off the north Lantau coast.

Vice Chairman C M Lee (HK Polytechnic)
Treasurer K M Wong (Watson Hawksley)
Secretary Bernie Owen (Baptist College)
Editor Ron Neller (Chinese University)
General Committee Maurice Atherton (HK Polytechnic)
 Michael Chan (Acer Consultants)
 Stewart Gilbert (GEO)
 Phil Kirk (GEO)
 K W Lai (GEO)
 K Y To (Education Department)
 David Workman (HK University)

Ex-officio member Alan Fyfe (GEO)

TREASURER'S REPORT

Statement of income and expenditure for the year ending 31 December, 1992.

	<u>Income (\$)</u>	<u>Expenditure (\$)</u>
Subscriptions	25,421.25	
Bank Interest	6,393.13	
Publications	6,412.70	25,325.10
LITSOB Workshop	10,030.00	6,844.15
GBGP Visit HK		20,925.00
Tibet Trip	130,000.00	130,000.00
Guangdong Trip	55,215.68	52,800.00
Local Trips	7,365.00	6,900.00
Lecture Room		1,560.00
General Expenses	918.50	6,546.06
Total	241,756.26	250,900.31
Excess Expenditure		9,144.05

Accumulated Funds (\$)

		<u>31/12/92</u>	<u>Income-1992</u>
143,767.54	Bank Deposit Account	32,696.28	6,393.13
46,806.85	Bank Current Account	32,696.28	-14,110.57
6,011.38	Petty Cash	4,584.77	-1,426.61
196,585.77		187,441.72	-9,144.05

A question concerning the GBGP visit was raised. The treasurer responded that this was unaccounted debts from the previous year.

ELECTION OF EXECUTIVE AND GENERAL COMMITTEE

The following were elected unopposed:
Chairman Raynor Shaw (GEO)

ANY OTHER BUSINESS

The formation of a Geomorphological Study Group, the re-activation of the Teacher's Group and the continuing role of the Marine Studies Group were discussed and approved. Raynor Shaw, K Y To and Alan Fyfe were appointed as the respective convenors.

A working panel of Stewart Gilbert, Maurice Atherton and Alan Fyfe was selected to review the constitution of the Society and to report to the general committee on any suggestions for change.

Numerous suggestions for change concerning the Newsletter were discussed. These include broadening the scope of the Newsletter to include more material from Guangdong, producing only two issues in 1993 and the use of limited/relevant advertising on the back cover to defray the costs of production, thereby keep membership fees down. The suggestion for a change in the title of the Newsletter so as to more accurately reflect its increasingly technical content is also under review.

POST MEETING ENTERTAINMENT

The meeting was followed with four short illustrated talks by M J Atherton (Philippines), D Workman (Italy), R Shaw (Tibet) and C Ford (Chile).

After the talks the group retired for a meal and copious quantities of excellent wine and champagne at the Hong Kong Polytechnic Staff Club.

INTERNATIONAL ASSOCIATION OF GEOMORPHOLOGISTS

The International Association of Geomorphologists was formed in 1989, and aims to promote the study and development of all aspects of geomorphology and to foster the dissemination of knowledge of geomorphology. In 1992 the Association was accepted as an Affiliate member of the International Union of Geological Sciences.

The Association advises that there has been a change in its Hong Kong representative. Dr. C L So, who has served the Association since its inception, has

been replaced by Dr. Raynor Shaw (Geotechnical Engineering Office).

To minimize costs, the Association does not communicate directly with members - instead, material is disseminated within a country or region by its representatives. For this reason Raynor needs to hear from those who might be interested in the Association. If you desire further information please contact Raynor on 7625384 during office hours.

FORMATION OF A GEOMORPHOLOGICAL STUDIES GROUP

R Shaw (Convenor)

Geomorphologists are increasingly being employed in Government, tertiary education establishments, schools, and consultancies throughout Hong Kong. Despite the expanding role of geomorphologists and the growing recognition of their contribution to a wide range of studies there has not been an appropriate forum in Hong Kong. In contrast, overseas developments have included the establishment of the British Geomorphological Research Group, an expanding range of geomorphological journals, the regular International Geomorphology Conference and the creation of an International Association of Geomorphologists (IAG) which has compiled an International Directory of Geomorphologists.

The Geomorphological Studies Group (GSG) was inaugurated at the May 1993 Annual General Meeting as a special interest group of the Geological Society of Hong Kong. Its intended purpose is to draw together geomorphologists, encourage scientific exchanges via talks and field visits and to explore and document the rich and varied landforms of Hong Kong. As part of this documentation the GSG is planning a new irregular series in the Society's Newsletter. Entitled the Hong Kong Landform Series, each article will focus on a specific type of landform or process, describe its

origin, nature or morphology, and give the location of typical Hong Kong examples. The series will provide an aid to teachers and an inventory for geomorphologists and geologists in the Territory.

A regular series of talks by Hong Kong-based geomorphologists has been organized to serve as a focus for the group. In addition, overseas geomorphologists are being encouraged to stop over in Hong Kong to present accounts of recent developments and projects. This is being achieved partly through personal contacts and partly by a notice in the IAG Newsletter. These latter talks will necessarily be irregular and often take place at short notice.

As with the other special interest groups of the Geological Society, there are no specific qualifications for membership and there will not be a formal list of members; talks by any of the special interest groups are open to all Society members. It is, however, planned that a list of regular attenders will be compiled. These will be given priority at any events where numbers are restricted, or will be contacted in any limited mailings occasioned by the arrival of distinguished visitors at short notice.

The group is looking for speakers, local (or overseas) field trip leaders and enthusiastic participants.

RE-EMERGENCE OF THE TEACHER'S GROUP

K Y To (Convenor)

The Society is pleased to announce that the Teacher's Group, dormant for some years now, has been reactivated by K. Y. To of the Education Department. The aims of the group are to promote the interest in geology and geomorphology amongst teachers and to provide a channel for the sharing of experiences and resources so as to enhance teaching on relevant topics of earth science.

Activities

Talks and field trips on geologic and geomorphologic themes relevant to the existing geography syllabus will be organised. It is also hoped that a collection of resource materials such as slides, photo-

graphs, field study guides and relevant published materials will be available in the near future for loan or duplication to members of the group.

The first of these seminars will be on hillslope processes and is tentatively tabled for January. It will involve a half day seminar followed by a field visit to a landslide site. Further details of this and forthcoming activities will be announced through circulars to all members.

Those wishing further details, and those who are interested in assisting with future activities of the Teachers' Group, should contact Mr. To, Ka-yan of the Curriculum Development Institute (Tel: 8925862, Fax: 5735299).

MARINE STUDIES GROUP

A Fyfe (Convenor)

The Marine Studies Group was formed in 1983 and arose out of a common interest in the Hong Kong offshore area among members of the Geological Society. This common interest encompasses a broad spectrum of topics including sedimentology, palaeoenvironments, archaeology, hydraulics and the engineering characteristics of all superficial deposits that are currently covered by the sea as well as marine deposits found above present sea level.

Technical discussion meetings are held from time to time throughout the year. In the past a wide variety of subjects has been covered, including offshore geological mapping and palaeoenvironmental interpretation of Hong Kong, offshore geophysical surveys and their interpretation, offshore site investigation, hydraulic modelling, the characteristics and distribution of tidal channels, the design of highways and airports on reclaimed ground, and the geotechnics of offshore oil and gas platform design. Most of the more recent talks have been convened to take advantage of the presence in Hong Kong of a specialist worker in the offshore field. For this reason, no regular lecture programme is organized and meetings tend to take place

at short notice.

The Marine Studies Group has held five conferences in Hong Kong. In September 1985, a conference on the marine geology of Hong Kong and the Pearl River Mouth allowed workers in both Hong Kong and Guangzhou to present their research results. In May 1986, the group held a meeting on sea level changes in Hong Kong during the last 40,000 years. In December 1987, a seminar on marine sources of sand attracted a large audience to hear papers on the offshore geology of Hong Kong, geophysical profiling, and dredging and its environmental impact. In April 1988, a seminar was held on future sea level rise and coastal development and in June 1992 a workshop on the logging and interpretation of transported soils in offshore boreholes was held at the University of Hong Kong.

Anyone who is interested in hearing more about the Marine Studies Group, or who knows of a potential speaker who is visiting Hong Kong should contact the convenor: Alan Fyfe, Hong Kong Geological Survey, 11/F Civil Engineering Building, 101 Princess Margaret Road, Homantin, Kowloon.

Continued from p15

Path to Stop 12. This is at first a steady climb up the dip slope of the PSLF. The various PSLF rock types are seen in exposures along the path. Near the start of the climb the downslope dip of the beds can be seen clearly on the other side of the gully to the right.

Near the top of the climb you get a good view looking back to stops 1/1A. Note that the deep notch in the ridge at Wu Kau Tang where the Mirror Pool stream cuts through it.

When we reach the top, we are on a dissected plateau at about 220 m ASL where there was once a farming settlement. This is now completely abandoned (some way ahead is the derelict hamlet of Wang Shan

Keuk Ha Tsuen). The stream which meanders across this plateau in a slightly incised valley soon plunges more than 150 m down a series of falls and rapids, to the Bride's Pool valley. At the stream, we turn left to go a short distance downstream to stop 12. On the way we cross extensive streambed outcrops of PSLF, mainly sandstones.

Stop 12. The boundary between the PSLF and the RBVG is exposed here and it usually generates some interesting discussion. It is also a lovely spot to lie on the rocks and reflect on other things or merely recover from the rigours of the day, with only the return (downhill) journey to the bus remaining.

CONFERENCE PROCEEDING NOW AVAILABLE

At the time of going to press the following conferences/meetings were complete - they are listed here for those wishing to obtain copies of abstracts or proceedings.

Hazards-93: Fifth International Conference on Natural and Man-Made Hazards. Contact Prof. Sun Honglie, Deputy President, Chinese Academy of Sciences, 54 San Li He Road, Beijing 100862, China.

IAVCEI General Assembly: Ancient Volcanism and Modern Analogues. Contact IAVEI ACTS, GPO Box

2200, Canberra ACT, 2601, Australia.

5th International Conference on Fluvial Sedimentology. Contact Chris Fielding, Department of Geology, University of Queensland, St Lucia, Qld., Australia.

The Eighth International Symposium on recent Crustal Movements. Contact Prof. Torao Tanaka, Disaster Prevention Research Institute, Kyoto University, Uji, Kyoto 611, Japan.

Continued from p17



Plate 4 - Marble bedrock

the former bedrock level, and a fine example of an abandoned solution cavity developed along the line of a fault.

There remained only the journey home, made memorable by the delays due to passport checks (re-entering the SEZ), and a 40 minute delay while our driver was read the riot act after committing a minor traffic offence.

Thanks are extended to our hosts in the PRC, and also to C.M. Lee and K.M. Wong who organized the visit.

FOURTH ANNUAL FRIDAY LECTURE SERIES

Meetings will be held at the Hong Kong Polytechnic in Room 709 (7/F Block W), from 6.00pm to 7.30pm. There will be an opportunity to retire to the bar and restaurant after each meeting.

15th October 1993

Recent geological disasters in the Philippines

Maurice Atherton (Hong Kong Polytechnic)

3 November 1993

Influence of geology on the economic and social development of South Wales

Keith Nicholls (Geotechnical Engineering Office)

10 December 1993

Jungle geology: examples from Malaysia, Indone-

sia and Fiji

Norman Woods (Geotechnical Engineering Office)

14 January 1994

Tephra correlation in volcanology

Sue Donahue (University of Hong Kong)

25 February 1994

Where plates collide: GSHK field trip to Tibet (Summer 1992)

Presentation by Team Members

18 March 1994

Members evening

Slide Pot Pourri or Invited Guest Lecture (Details to be announced)

GEOMORPHOLOGICAL STUDIES GROUP MEETINGS 1993-94

Meetings will be held at the Hong Kong Polytechnic in Room W709 (7/F Block W) from 6.00pm to 7.30pm. There will be an opportunity to retire to the bar and restaurant after each meeting.

22nd November 1993

Some applications of geomorphology to highway engineering: case studies from Spain, Nepal and the United Kingdom

Dick Martin (Geotechnical Engineering Office)

24 January 1994

The application of optically stimulated luminescence to the dating of sediments

Michael Short and S H Li (University of Hong Kong)

28 March, 1994

Late Quaternary landscape evolution in southwestern North Island, New Zealand

Alan Sewell (Binnie Consultants Ltd, Hong Kong)

FORTHCOMING MEETINGS

International Inter-INQUA Field Conference and Workshop on Techrochronology, Loess and Paleopedology. February, 1994. Contact Dr. D J Lowe, University of Waikato, Private Bag, 3105, Hamilton, New Zealand.

Gas in Marine Sediments (Third International Conference). September 1994. Contact the Secretariat, P.O. Box 59, 1790 AB Den Burg - Texel, The Netherlands.

Fourth International Conference on the Evolution of the East Asian Environment. January, 1995. Contact the Secretariat, Centre of Asian Studies, The University of Hong Kong, Pokfulam Road, Hong Kong.

Commission on Continental Paleohydrology (GLOCOPH). September, 1994. Contact Dr. Julia Branson, Geodata Institute, University of Southampton, Southampton, SO9 5NH, UK.

4th International Association of Geomorphologists Conference. 1997. Italy.

GAS IN MARINE SEDIMENTS (THIRD INTERNATIONAL CONFERENCE) GEOLOGY - CHEMISTRY - MICROBIOLOGY

Methane from biodegradation of organic matter in near surface sediments, or emitted by and migrated from deeper sources, influences the seismic and acoustic characteristics and may affect the morphology of the seabed and the subsurface layers. It is the purpose of this conference, an initiative of the shallow gas group, to critically examine the related processes, pathways and products, and to study global change and climatic impacts.

Topics include cold seeps and gasvents, migration and fluxes, mud-diapers and mudvolcanoes, seis-

mic and acoustic characteristics, hydration formation, (bio)cycling of methane, (bio)cycling of sulphur, microbial communities, chemosynthesis, oxic-anoxic boundaries, carbon, oxygen and sulphur fluxes.

To be held in September, 1994. Abstracts should be submitted by 30 June 1994. In addition to a proceedings the more significant papers will be published in a selected volume of a scientific journal. For further details contact the Secretariat, P.O. Box 59, 1790 AB Den Burg - Texel, The Netherlands.

FOURTH INTERNATIONAL CONFERENCE ON THE EVOLUTION OF THE EAST ASIAN ENVIRONMENT

Papers on all aspects of the Cainozoic environment of east Asia are invited but contributions dealing with the following topics are particularly welcomed:

- recent advances in chronology
- marine/terrestrial correlation
- correlation between east Asia and elsewhere
- biogeography and environmental change
- new discoveries pertaining to the origin and movements of early humans
- palaeoceanography and global change
- palaeomonsoon

- palaeosols and landscape evolution
- loess stratigraphy
- humans and environmental change in the Quaternary
- Quaternary coastal evolution
- historical floods and droughts
- glaciers and glaciations

East Asia is defined as the area within latitude 0 and 50 degrees North and longitude 75 and 150 degrees East. To be held in January 1995. Contact the Secretariat, Centre of Asian Studies, The University of Hong Kong, Pokfulam Road, Hong Kong.

SEISMICITY IN EASTERN ASIA

Geological Society of Hong Kong Bulletin Number 5

The proceedings of the International Conference on Seismicity in Eastern Asia, held at the Hong Kong Polytechnic 23-26 October, 1991, will shortly be available. Some of the papers to be published include:

- Ding, Y.Z., Liang, L. and Guo, Q.H. Seismic risk for the faulted zone of the South China coastal area.
- Ding, G. Characteristic behaviours of active faults in China.
- Feng, Q. and Xiong, Z. Prediction of damage to urban buried pipelines.
- Gong, S., Chen, P. and Yang, G. Research on the time changes of inter-station transfer functions for the horizontal geomagnetic field and their relationship with the Hualian '78 earthquake in the Taiwan region.
- Huang, Y., Wang, M. and Zou, H. An approach to the activities of NW trending faults and recent tectonic stress fields in south Fujian and east Guangdong.
- Lao, Q. The seismic-geological implication of the NW trending faults in the Shanghai area and its western vicinity.
- Lao, Q. and Wu, J. The deepstructure and dynamics in the formation of the shelf basin of the east China Sea.
- Li, J., Wu, Y., An, Z., Wang, Y. and Jia, S. A study of geomagnetic anomalies and their relations with geological structure and seismic distributions in China.
- Li, X.T. Seismic activity and deep faults in the South China coastal region and islands.
- Lin, C., Shi, L. and He, Y. The application of microstructural analysis to seismogeology.
- Liu, Z., Xue, W. and Li, W. Results of an offshore engineering geological investigation in the Pearl River mouth basin of the South China Sea.
- Liu, Y., Zhan, W., Qui, X., Zhong, J. and Lu, C. The basic features of contemporary tectonic stress field and earthquake activities in the South China Sea and its adjacent regions.
- Ruxton, B.W. Alive earthquakes
- Shun, C.M. The PC-based seismic data acquisition system for the Hong Kong short-period seismograph network.
- Wang, B., Fan, H., Yang, J., Wang, C. and Chen, P. A study of earthquake precursors and prediction of strong earthquakes.
- Whittaker, A., Musson, R.M.W., Brereton, N.R., Busby, J.P., Evans, C.D.R., Evans, C.J. and Evans, R.B. Crustal structure and seismotectonics pertinent to Hong Kong.
- Zhao, X. Seismic damage countermeasures adopted in Shanghai.

Orders for Bulletin No. 5 can now be sent to

The Secretary,
Geological Society of Hong Kong,
c/o Department of Geography and Geology,
University of Hong Kong,
Pokfulam Road, HONG KONG.

GEOLOGICAL SOCIETY OF HONG KONG PUBLICATIONS

- Bulletin* No 1 (1984) Geology of surficial deposits in Hong Kong, 177 p.
Yim W W S (Editor)
- Bulletin* No 2 (1985) Geological aspects of site investigation, 236 p.
McFeat- Smith I (Editor)
- Bulletin* No 3 (1987) The role of geology in urban planning, 601 p.
Whiteside P G D (Editor)
- Bulletin* No 4 (1990) Karst geology in Hong Kong, 239 p.
Langford R L, Hansen A and Shaw R (Editors)
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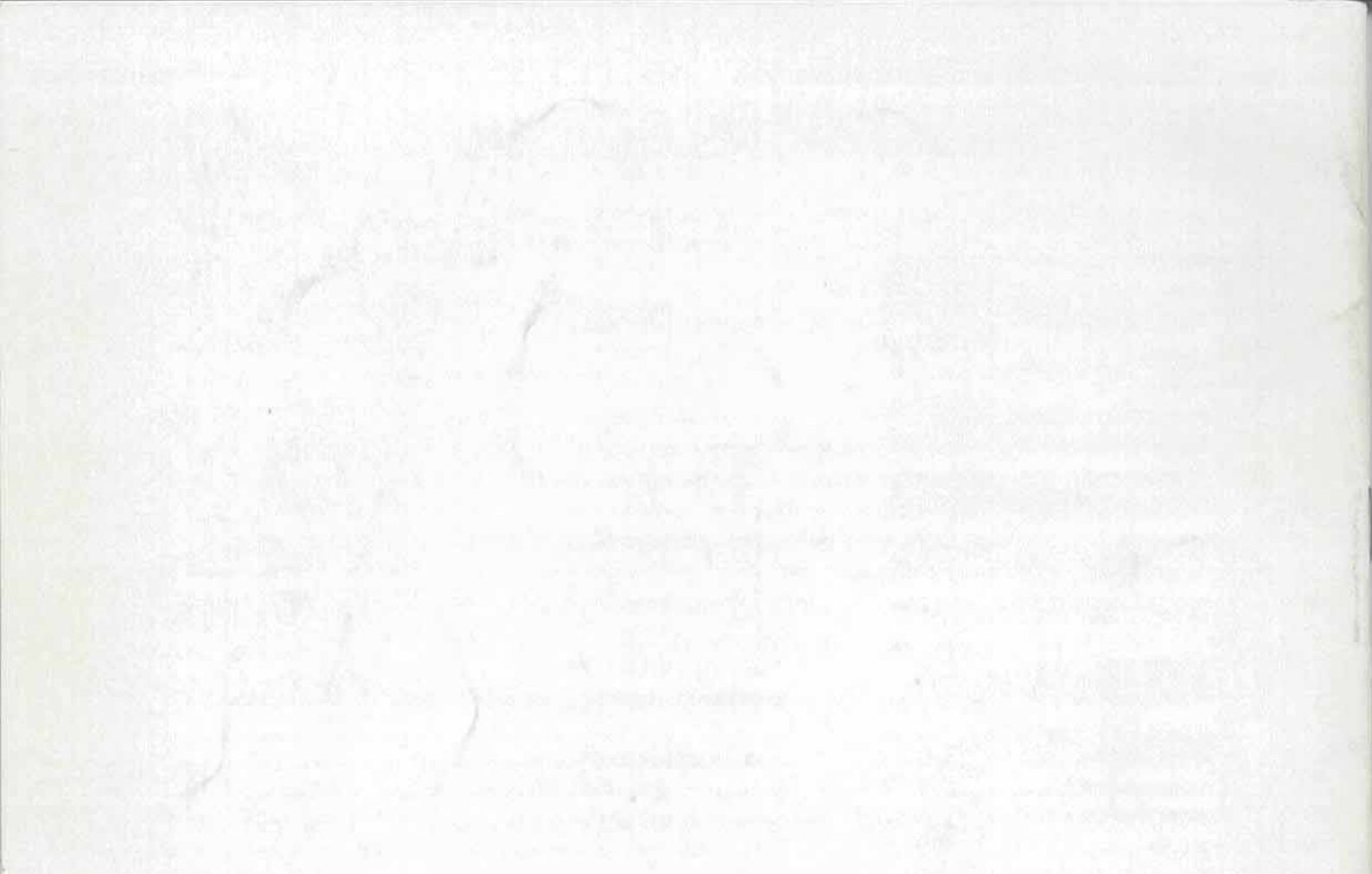
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