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NEWSLETTER

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Cover photo: Control of granite landform by sheeting joints, Po Toi Island (J.M. Nash)

GEOLOGY OF THE PEARL RIVER MOUTH COMPOSITE SEDIMENTARY BASIN

This brief description is extracted with some minor modifications from a recent United Nations publication "ESCAP Atlas of Stratigraphy - People's Republic of China", details of which are given at the end.

INTRODUCTION

The Pearl River Mouth Basin is a large ENE-WSW trending Cenozoic sedimentary basin. It is possible that Late Mesozoic sediments may also be present in some of its depressions. The total area underlain by Cenozoic sediments more than 1 000 m thick is about 150 000 sq km.

According to the interpretation of gravitational, magnetic, seismic and geological data, the Pearl River Mouth Basin can be sub-divided into seven structural elements. Rises (uplifts) alternate with depressions (Fig. 1). The formation and development of the structures as well as variation in sedimentary facies and thickness of the strata are controlled by faults. The total thickness of sediments in the central part of the three major depressions generally reaches 7 500-8 000 m, with a maximum of more than 10 000 m (Fig. 2).

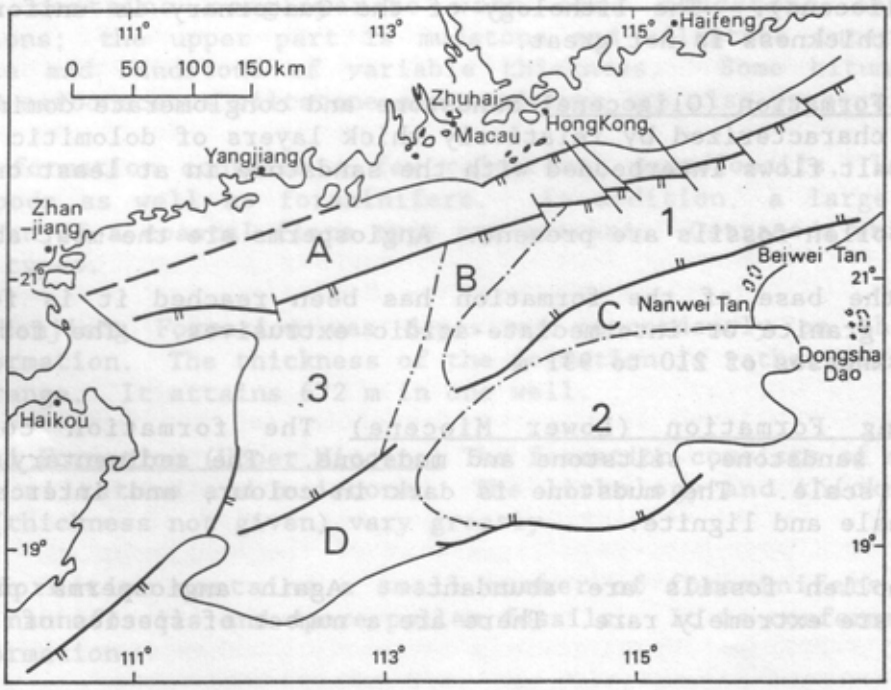


Fig. 1 The main sub-divisions and bounding faults of the Pearl River Mouth composite basin. 1-3: Depressions; A Northern Faulted Terrace Zone; B Central Uplift; C Weitan Shoal Uplift; D Shenhu Shoal Uplift.

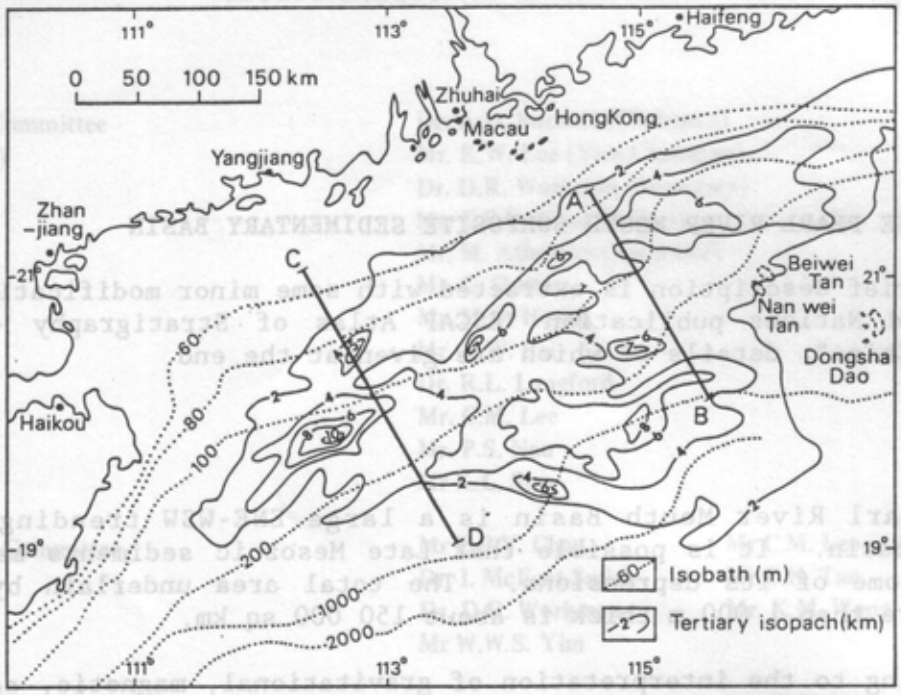


Fig. 2 Thickness of Tertiary sediments in the Pearl River Mouth composite basin. A-B and C-D: lines of sections in Fig. 3.

STRATIGRAPHY

Based on the drilling data, the Tertiary of the northern part of the Pearl River Mouth Basin can be subdivided into the Zhuhai Formation (Oligocene), Zhujiang, Hanjiang and Yuehai Formations (Miocene), and Wanshan Formation (Pliocene). The lithology of the Quaternary is uniform and its variation in thickness is not great.

Zhuhai Formation (Oligocene) Sandstone and conglomerate dominate. This formation is characterized by relatively thick layers of dolomitic sandstone. There are basalt flows interbedded with the sandstone in at least one well.

Spore-pollen fossils are present. Angiosperms are the most abundant.

Where the base of the formation has been reached it is found to be underlain by granite or intermediate-acidic extrusives. The formation has measured thicknesses of 210 to 931 m.

Zhujiang Formation (Lower Miocene) The formation consists of conglomerate, sandstone, siltstone and mudstone. The sedimentary cyclothems are small in scale. The mudstone is dark in colour, and intercalated with bituminous shale and lignite.

Spore-pollen fossils are abundant. Again angiosperms predominate. Foraminifera are extremely rare. There are a number of species of calcareous nannofossils.

Measured sections of the formation are from 665 to 925 m thick. In some places the Zhujiang Formation overlaps unconformably on the underlying Zhuhai Formation but in other places the two are conformable.

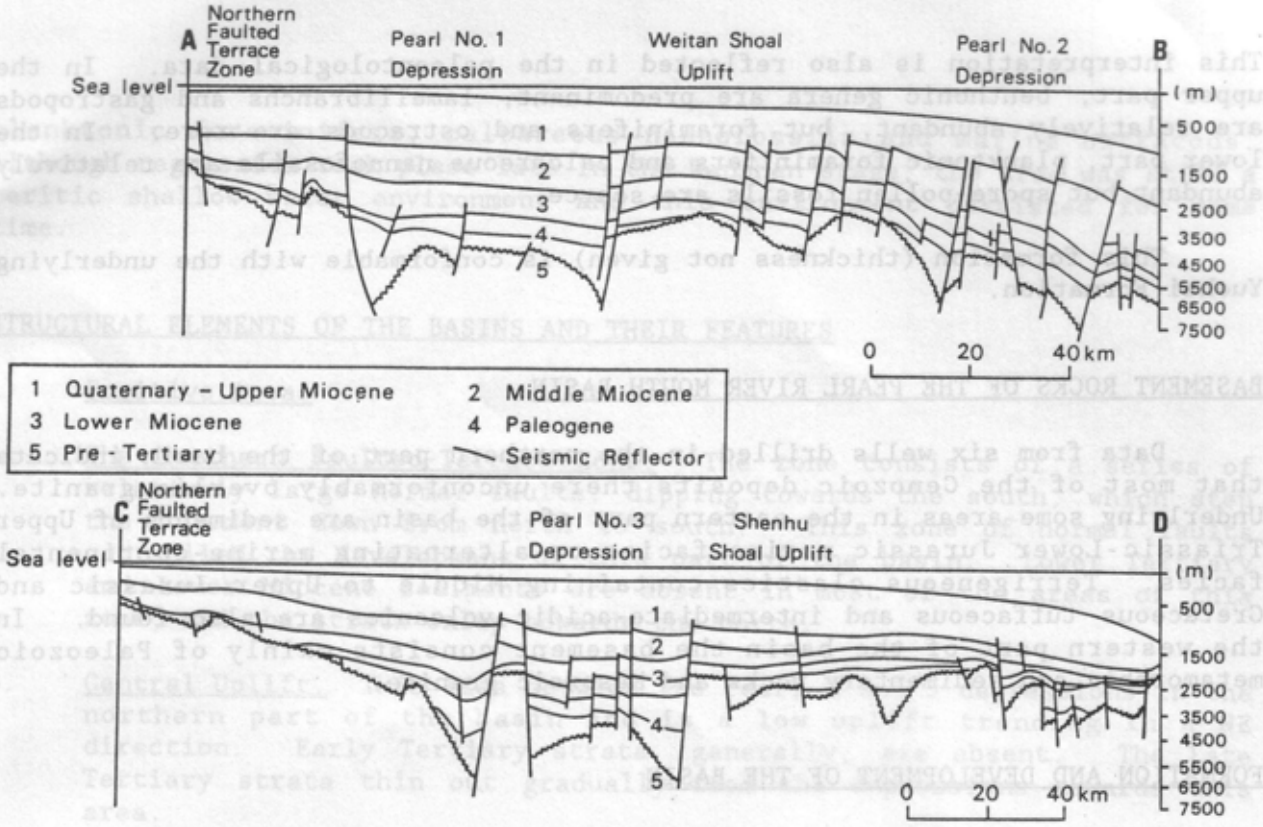


Fig. 3 Sections across the Pearl River Mouth composite basin.

Hanjiang Formation (Middle Miocene) This formation is divided into two upward-fining sedimentary cyclothems. The lower part of each of the cyclothems contains conglomerate with some sandstone and siltstone intercalations; the upper part is mudstone and siltstone intercalated with conglomerate and sandstone of variable thickness. Some bituminous shale, lignite and carbonaceous siltstone and sandstone are also present.

This formation contains a few calcareous nannofossils, lamellibranchs and gastropods as well as foraminifera. In addition, a large quantity of fossil pollen of a coastal flora type are present. Ostracods which are found are marine types.

The Hanjiang Formation was deposited concordantly on the underlying Zhujiang Formation. The thickness of the formation is rather constant, in the 400-530 m range. It attains 672 m in one well.

Yuehai Formation (Upper Miocene) The formation consists of conglomerate, sandstone, siltstone and mudstone. The lithology and thickness of this formation (thickness not given) vary greatly.

The formation contains a small number of foraminifers, ostracods, calcareous nannofossils and spore-pollen fossils. It is conformable with the Hanjiang Formation.

Wanshan Formation (Pliocene) This formation consists mainly of conglomerate and sandstone. Mudstone and silty mudstone are found in the lower part. The coarsening upwards of the lithology marks a regressive cycle.

This interpretation is also reflected in the paleontological data. In the upper part, benthonic genera are predominant, lamellibranchs and gastropods are relatively abundant, but foraminifers and ostracods are rare. In the lower part, planktonic foraminifers and calcareous nannofossils are relatively abundant but spore-pollen fossils are scarce.

This formation (thickness not given) is conformable with the underlying Yuehai Formation.

BASEMENT ROCKS OF THE PEARL RIVER MOUTH BASIN

Data from six wells drilled in the northern part of the basin indicate that most of the Cenozoic deposits there unconformably overlie granite. Underlying some areas in the eastern part of the basin are sediments of Upper Triassic-Lower Jurassic marine facies or alternating marine-continental facies. Terrigeneous clastics containing Middle to Upper Jurassic and Cretaceous tuffaceous and intermediate-acidic volcanics are also found. In the western part of the basin the basement consists mainly of Paleozoic metamorphic and sedimentary rocks and Mesozoic granite.

FORMATION AND DEVELOPMENT OF THE BASIN

From Late Cretaceous to Early-Middle Oligocene, a series of small faulted basins were formed, trending in an NE-ENE direction. The basins became filled with fluvio-lacustrine deposits. From the Late Oligocene to Early Miocene, subsidence continued and the area of the lacustrine basins increased. Some of the basins were linked up. The Pearl No. 1, 2 and 3 (Fig. 1) depressions were formed. Judging from the seismic profiles, they were still isolated from one another, except perhaps at times of rising water. The deposits are mainly lacustrine-swampy facies, with evidence of fluvial activity and short-term transgressions.

During the Early Miocene (period of deposition of the Zhujiang Formation) there was continuous uplift of the land to the north and large-scale and abrupt subsidence to the south. As a result of the subsidence the lakes extended further and a unified basin came into being. The lacustrine-swamp facies was still the most important lithofacies. Later, the sea level rose and sea water flooded the northern part of the basin. The areas which were exposed and eroded during the early period mostly were covered by sea water and became subaqueous highs. The exposed part of the Weitan Shoal Uplift was greatly reduced in dimensions. Reef limestone developed south of the Pearl No. 2 depression and on the eastern flank of the Pearl No. 1 depression during these transgressions.

Subsidence continued during the deposition of the Hanjiang Formation (Middle Miocene) and a marine transgression gradually progressed towards the north. On the front of the Pearl River delta prograding sandstone bodies and a reef limestone facies developed. During the period of deposition of the Yuehai Formation (Upper Miocene), regression of the sea occurred. Some areas emerged and were subjected to erosion.

A major transgression occurred in the early Wanshan stage (Pliocene), as shown by widespread overlapping on various uplifts. As the sea in the southern part moved across the seamounts, mudstone of a deeper water facies was deposited. This is reflected, biologically, by the flourishing of

planktonic foraminifers, calcareous nannofossils and marine ostracods. Although regression took place late in the Wanshan stage, the area was still a neritic shallow water environment and this environment persisted for some time.

STRUCTURAL ELEMENTS OF THE BASINS AND THEIR FEATURES

i) Positive Areas

A. The Northern Faulted-Terrace Zone. The zone consists of a series of relatively large normal faults, dipping towards the south, which step the basement down from north to south. This zone of normal faults controlled the development of this part of the basin. Lower Tertiary and Lower Miocene sediments are absent in most of the areas of this zone, and the strata onlap towards the north.

B. Central Uplift. This lies between the Pearl 1 and 3 depressions in the northern part of the basin and is a low uplift trending in a NE direction. Early Tertiary strata, generally, are absent. The Late Tertiary strata thin out gradually from the depressions towards this area.

C. The Weitan Shoal Uplift. This is an area trending nearly EW that has been rising for a long time. The Lower Tertiary and Lower Miocene are absent, but there are carbonate rocks of Early Miocene age on the northwestern slope.

D. Shenhu Shoal Uplift. This structure lies in the south-western corner of the basin. It is separated from adjacent depressions on the northern and southern flanks by major faults. The uplift is tilted, being higher in the west than in the east. During the Early Tertiary, it was probably connected with the Weitan Shoal Uplift, forming a natural barrier which kept the lake waters on the southern and northern sides from mixing. Since the Late Tertiary, a comparatively thin sequence of sediments has overlapped it.

ii) Depressions

Pearl No. 1 Depression. This elongate complex graben is located in the northeastern part of the basin. The Lower Tertiary here is thin, while the Upper Tertiary is thick.

Pearl No. 2 Depression. The sedimentary features are similar to those of the Pearl No. 1 Depression, thus the Lower Tertiary is thin while the Upper Tertiary is thick. There is a large north-dipping fault on the southern flank but no comparable fault on the northern side.

Pearl No. 3 Depression. This depression is separated from the Northern Fault-Terrace Zone and the Shenhu Shoal Uplift by faults. The throw of the northern fault is less than that of the southern fault, and, as a result, an asymmetric graben-type depression formed. In this depression the Lower Tertiary is thicker than the Upper Tertiary in contrast to the other two depressions.

PETROLEUM SOURCE ROCKS

According to the available data, there are two suites of oil-generating rocks: (a) marine argillaceous rock in the Yuehai-Hanjinag Formations; and (b) non-marine argillaceous rock in the Zhujiang-Zhuhai Formations.

The marine argillaceous rocks in the Yuehai-Hanjiang Formations are relatively rich in organic matter with organic carbon amounting to 0.9 per cent, and the total hydrocarbon content over 200 ppm. They are medium grade oil-generating rocks, and the kerogen belongs to the saprophytic-sapropelic type. The burial depth of the maturation stage is 1500-2000 m.

In the non-marine argillaceous rocks of the Zhujiang-Zhuhai formations the organic matter content is higher, amounting to 1.13 per cent, and the total hydrocarbon content is more than 500 ppm. The kerogen again belongs to the sapropelic-saprophytic type. The maximum threshold oil-generating depth is about 2100 m.

RESERVOIR BED AND TRAPS

Overall, nearly 200 traps which are favourable for the accumulation of oil and gas have been identified in this area. Many intervals and beds with oil and gas shows have been discovered, mostly in the Zhujiang and Zhuhai Formations. Only a few producing horizons are found in the sandstone of the Hanjiang Formation.

There are two types of crude oil; one is a paraffin-base type with high paraffin, low sulphur content and low specific gravity; another is a napthene-base type with low paraffin, low sulphur content and high specific gravity. The reservoirs are mainly of the sandstone-porosity type. Both the porosity and permeability of the sandstone are favourable. Judging by the seismic data and the sedimentary environment, it can be inferred that porous biolithites and cavernous-fractured carbonates as well as fractured granites or volcanics are also potential reservoir rocks.

SOURCE

UNITED NATIONS, 1985. ESCAP ATLAS OF STRATIGRAPHY IV (VOLUME X OF STRATGRAPHIC CORRELATION BETWEEN SEDIMENTARY BASINS OF THE ESCAP REGION) 83 p. and a folio of Atlas Sheets. Pearl River Mouth Basin: pp. 45-49 and Atlas Sheet 6, prepared in 1982 by Zhong Shui-xiang and Zhang Xianglan, Ministry of Geology and Mineral Resources, China. U.N. Publication sales no. E.85. II.F. 13, ISBN 92-1-119272-2. Price US$11.50.

LANDPLAN III SEMINARS

A feature of the Landplan III symposium last December, as reported previously, was the holding of eight special half-day seminars/workshops over a 2-day period ahead of the symposium proper. This worked well and was favourably commented on as a good way of bringing conference participants together for discussion in relatively small groups in an informal atmosphere. The only snag was in forcing a choice between seminars run simultaneously.

The Landplan III Organising Committee wish to acknowledge the Director of Civil Engineering Services for granting permission for staff of the Geotechnical Control Office to convene and to participate in several of the seminars/workshops and for allowing the facilities of the Department to be used for this purpose.

We include here brief reports on each of the seminars.

GEOLOGICAL MAPPING IN THE URBAN ENVIRONMENT

Convenor: J.L. Neilson (Department of Industry, Technology and Resources, Australia)

Thirty seven people from about a dozen countries attended this seminar at the Geotechnical Control Office.

In his introduction, Mr John Neilson presented many examples of geological maps from around the world. He demonstrated the use of maps to show three-dimensional features, for example thicknesses of various stratigraphic units or depth to bedrock. These contrasted with the usual geological maps, which show the geology in two-dimensions and rely on the reader to produce his own cross-sections of any area of interest. He also showed how the more complex maps could be used by engineers and planners to solve geotechnical problems in small sites or areas.

Dr Robert Addison (G.C.O.) explained how the Geological Survey Section of the G.C.O. was proceeding to map the territory (see separate report elsewhere in this issue). He briefly outlined the geology of the Territory, concentrating on the major rock types such as the volcanic and granitc rocks. This was illustrated with examples from the completed phases of fieldwork, which have covered most of the rock types.

Mr Paul Strange (G.C.O.) spoke next, on 'The Use of Old Maps and Photographs in Urban Geological Survey'. He presented many examples of old topographic maps and photographs, both land-based and aerial, to illustrate the changes in Hong Kong and Kowloon since the middle of the last centruy. The archival data were supplemented by photographs and maps of the current landforms and geology. These old data were invaluable sources for the production of the new geological map of the main urban area of Hong Kong and Kowloon (Sheet 11), particularly in delineating the old coastline, and beach deposits and alluvium. As a result, the pre-development history is accurately known, so the planners and geotechnical engineers have a better idea of possible ground conditions in areas which are now entirely covered by fill or reclamation.

Dr Richard Langford (G.C.O.) gave a presentation on 'Methods of Geological Survey in New Urban Areas' using as his example Tuen Mun New Town in the western New Territories. He presented the methods of recording field data, borehole data and details of rock specimens. This involves the use of data sheets and several maps. Also, old (pre-development) and recent aerial

photographs were compared, and the methods of mapping superficial deposits explained. Having created a superficial deposits map and a solid geology map from the great variety of data sources found in developing urban areas, the provisional 1:10000 scale map was demonstrated.

Footnote: The formal presentations were meant as an introduction to the displays of maps, photographs and rocks in the Geological Survey Section. Each of the aspects covered in the presentations was on display, and the remainder of the seminar was devoted to informal questions and discussion on the methods of geological mapping in urban areas.

R.L.L.

GEOLOGICAL ASPECTS OF SLOPE STABILITY (with accompanying map)
Convenor: T.Y. Irfan (Geotechnical Control Office, Hong Kong)

The Seminar on 'Geological Aspects of Slope Stability' was attended by over 50 geologists and engineers, more than half of whom were from outside Hong Kong.

Dr Yalcin Irfan's introductory talk was on 'Geological Aspects of Slope Stability with Particular Reference to Slopes in Weathered Rocks'. This was followed by a Contributions session in which contributors from the Philippines, India, New Zealand, China and Hong Kong gave illustrated presentations related to the main theme of the seminar. The Panel Discussion was cut short as the overseas attendants were anxious to see the nearby university campus examples of typical slope formation works and construction practice in Hong Kong. Discussions were continued, however, during the brief field trip to the sites.

In his introductory talk Dr Irfan emphasized that an understanding of the geology of a site is of paramount importance in tackling problems concerning slopes and slope development. Indeed, experience from many past failures has shown that slope design must involve consideration of a variety of factors including hydrology, topography, geology and material engineering properties. Appropriate methods of analysis for a safe and economic design can only be applied after an adequate engineering geological model of the slope is established. He re-iterated the statement made by Chowdhury (1978) that 'slope stability analysis is often an inter-disciplinary endeavour requiring concepts and expertise from engineering geology, soil mechanics and rock mechanics' and pointed out that slope stability assessments must necessarily involve geological as well as engineering interpretation of site investigation, particularly in difficult geological ground conditions.

The following aspects of slope stability were then more fully considered:

(i) the importance of obtaining good geological information,

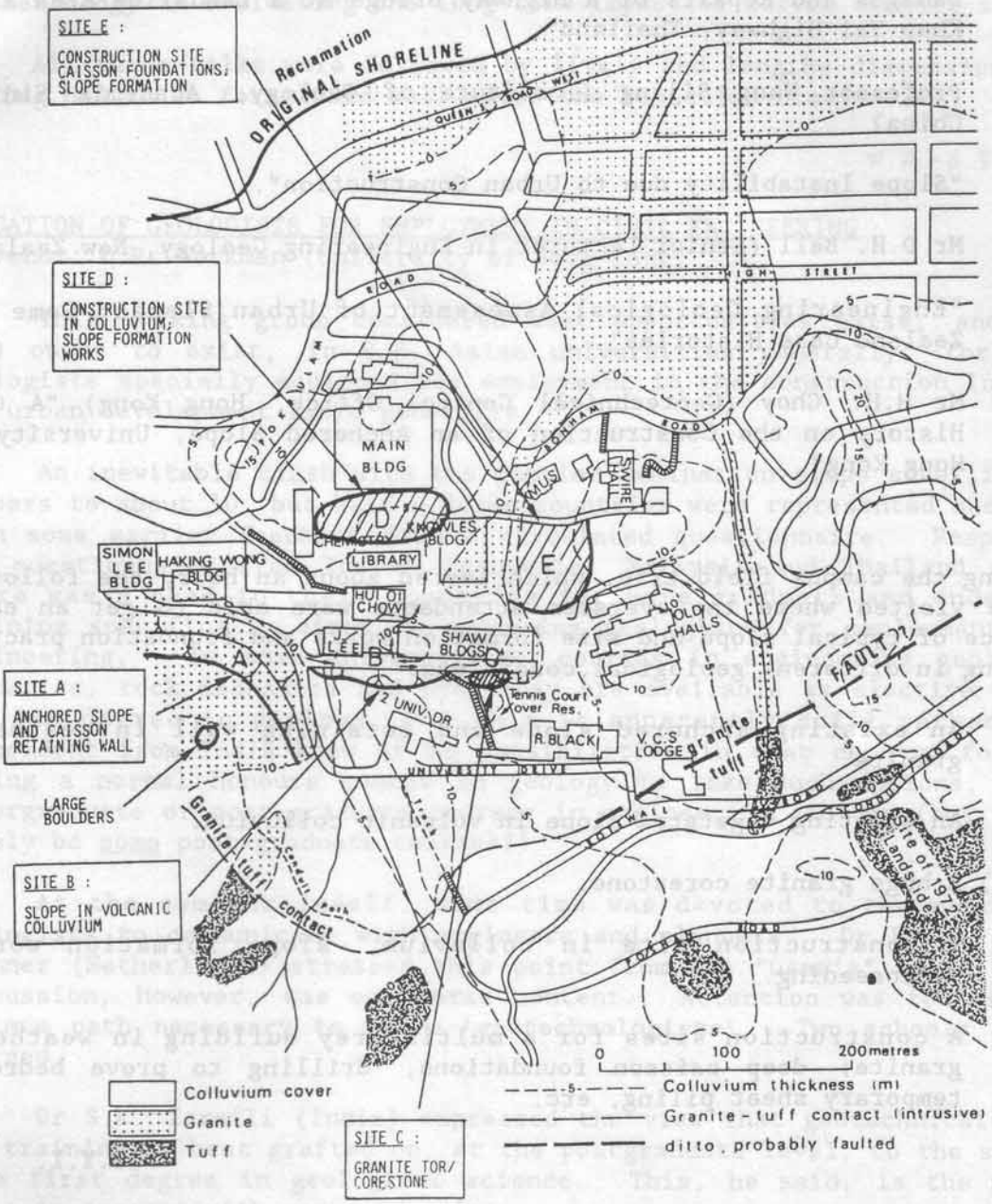
(ii) the geological factors to be considered in slope stability evaluations,

(iii) how much geological data is necessary?

(iv) how much site investigation is necessary?

(v) can all the geological anomalies be detected even during a well planned and executed site investigation?

In the second half of the talk, some special geological aspects of slope stability problems in deeply weathered rocks, particularly the upper layer of



the weathering profile known as engineering soils, were discussed in some detail because of the widespread occurrence of these soils in the tropical subtropical countries of SE Asia and because numerous landslips occur in these materials during the monsoon season, which thus present a significant hazard to life and property in the highly populated hilly areas of these countries. A number of case histories of slope failure from Hong Kong were illustrated with slides.

In the Contributions session, the speakers presented a number of case histories highlighting their own experiences on the success or otherwise resulting from the non-use or misuse, of geological information in slope design. The following contributions were made:

1. Professor Yudhbir (Indian Institute of Technology, Kampur, India) "Engineering Geology and Slope Stability: A Case Study in the Himalayas".

2. Dr P.L.R. Pang (Geotechnical Control Office, Hong Kong) "Failure of a Temporary Cut Slope in Hong Kong".

3. Dr D.T. Bergado (Asian Institute of Technology, Thailand) "The Damages and Repairs of a Highway Bridge at a Landslide Area along Khao Yai Highway, Thailand".

4. Professor Wang Sijing (Institute of Geology, Academia Sinica, China)

"Slope Instability due to Urban Construction".

5. Mr D.H. Bell (Senior Lecturer in Engineering Geology, New Zealand)

"Engineering Geological Assessment of Urban Slopes: Some New Zealand Case Histories".

6. Mr H.H. Choy (Geotechnical Control Office, Hong Kong) "A Case History on the Construction of an Anchored Slope, University of Hong Kong".

During the campus field trip, which lasted about an hour, the following sites were visited where the overseas attendants were able to get an early acquaintance of typical slope and site formation works and foundation practice in Hong Kong in different geological conditions:

(i) An existing anchored slope and retaining wall in weathered granite.

(ii) An existing vegetated slope in volcanic colluvium.

(iii) A huge granite corestone.

(iv) A construction site in colluvium, slope formation works, hydroseeding.

(v) A construction sites for a multistorey building in weathered granite; deep caisson foundations, drilling to prove bedrock, temporary sheet piling, etc.

T.Y.I.

APPLICATIONS OF GEOLOGY IN ENVIRONMENTAL PROTECTION

Convenor: M.J. Knight (University of New South Wales)

Thirty eight people from 11 countries attended this seminar.

In his introductory talk, Dr Michael Knight examined the role of the geologist in environmental management. It was clear from his review that geologists had a major part to play which went beyond slope stability and site investigation. More geological input would benefit both urban planning and environmental protection, particularly in minimizing undesirable impacts.

Dr Knight followed his introduction with a lead paper on 'Transport of contaminants in rocks and soils'. Practical examples were given of the use of this knowledge in waste disposal planning.

The next presentation, by Mr Wyss Yim (Hong Kong University) was on 'Applications of Environmental Geochemistry with Examples from Hong Kong'. Among other things, the use of heavy metals as tracers for pollutants was described.

Another presentation with a local flavour was by Mr Paul Holmes (Environmental Protection Department, Hong Kong) on 'Sedimentation - Key to the Disposal of Sewage Solids at Sea'. This talk highlighted the use of sedimentology in evaluating the long-term impact of marine dumping sites.

All three talks were followed by lively and lengthy discussions and the meeting had to be foreclosed well after the scheduled time.

W.W.-S.Y.

EDUCATION OF GEOLOGISTS FOR EMPLOYMENT IN CIVIL ENGINEERING

Convenor: D.R. Workman (University of Hong Kong)

This working group considered what opportunities exist, and what (if any) ought to exist, in S.E. Asian universities generally, for producing geologists specially equipped for employment in the construction industry and the urban development field generally.

An inevitable clash with the popular seminar on slope stability reduced numbers to about 10, but half a dozen countries were represented and there had been some earlier feedback from a circulated questionnaire. Respondents to the questionnaire from India, Indonesia, Malaysia and Thailand all agreed there was a need in their countries for more graduate and undergraduate training specifically aimed at producing geologists for employment in civil engineering. In some universities, courses in engineering geology, soil mechanics, rock mechanics and hydrology are available as elective course for the BSc degree in geology, but this is apparently still rather rare. A respondent from India knew of no possibilities in that country for students taking a normal honours course in geology to take such options, or of any undergraduate or post-graduate courses in engineering geology (but there must surely be some post-graduate courses?)

At the seminar itself, some time was devoted to the need to train geologists to communicate with engineers and planners. Dr E.J.A. Lohman, a planner (Netherlands) stressed this point from the "user's" angle. The main discussion, however, was on course content. Attention was focussed on the optimum path necessary to train 'geotechnologists'. Two schools of thought emerged.

Dr S.K. Israili (India) expressed the view that geotechnical education and training is best grafted on, at the postgraduate level, to the strong stem of a first degree in geological science. This, he said, is the pattern in India in concert with many countries.

Dr Peter Roberts of Hong Kong Polytechnic advocated looking at an alternative approach of geotechnology as an undergraduate training to produce graduates who were neither civil engineers nor geologists but hybrids after the fashion of biochemists.

Support was equally divided, but both camps recognised the inherently specialised and demanding nature of these courses and thus the need to tailor the numbers and capabilities of the graduates to the demands of potential employers.

Dr Sampurno, of Bandung Institute of Technology, indicated that, in Indonesia, post graduate training courses in geotechnology of geological science graduates were now expanding. This was a consequence of a growing need for geotechnologists in the building of the infrastructure in a developing country with immense environmental and geological problems. This is in stark contrast to many parts of the developed world.

P.A.R./D.R.W.

TERRAIN EVALUATION FOR URBAN DEVELOPMENT
Convenor: A. Hansen (Geotechnical Control Office, Hong Kong)

The session was intended to provide the participants with an insight into the diverse field of terrain evaluation and its applications in both the public and private sectors. The seminar attracted 43 registrants, approximately half of whom were from overseas.

The public sector was represented by Messrs A. Hansen and K.A. Styles, both of the Geotechnical Control Office, Hong Kong Government and the private sector by Mr A.J. Brimicombe of Engineering Terrain Evaluation Ltd.

Mr Hansen introduced the seminar by noting that the landscape is a fundamental resource that should be understood if it is to be utilized to its full potential for urban development. Terrain evaluation involves appraising the landscape in terms of its natural resources and hazards both for inventory purposes and for specific development projects.

Noting the range of problems that decision-makers have to face with respect to the terrain, Mr Hansen continued by describing the process whereby the collection of raw data needs to be interpreted and efficiently transformed into products useful to a decision maker. Such products include maps, statistics and reports but must be presented in terms that are meaningful to the user. He stressed that raw data has only a cost in terms of its collection but has no value until the user can understand the meaning and implications of the data. The user must be able to understand the content and successfully apply the results to solve his particular problem. If this is the case then the data becomes <u>information</u> with a significant value to the user. Only at this point can the costs of data collection be offset against the value of the information as a tool for decision making.

A summary of the various sources of data, data collection and methods of analysis concluded the first part of the programme.

Mr Styles continued with a description of the method of systematic terrain evaluation that is in use within the Geotechnical Control Office and which is known as the Geotechnical Area Studies (GAS) Programme. Data is collected by aerial photograph interpretation, field work and desk study to produce Terrain Classification Maps (TCM). In this system, the terrain is delineated in terms of slope angle class, landform, material, erosion, instability and hydrology. Also noting the need for user understanding, Mr Styles continued by describing the range of derivative maps, for example Geotechnical, Physical Constraints and Engineering Geology Maps that are produced to simplify the complexities of the terrain and to promote ease of use. He noted that if as much time and effort was expended in the "selling" or "aftercare" of these maps as in their production, the results would be far more effective.

Mr Hansen gave a brief presentation on the GEOTECS computer data base which forms part of the GAS Programme. Data for nine attributes are stored for each of over 53000 cells on a 2 ha grid and can be retrieved as raw or composite variables in maps form or as summary statistics.

Mr Styles completed this part of the seminar by discussing the application of the results of the GAS Programme, summarising user requirements and noting some of the problems and limitations of this technique.

Mr Allan Brimicombe of Engineering Terrain Evaluation Ltd gave a presentation on "Terrain Evaluation for Project Planning and Implementation". From the view point of a private consultant, terrain evaluation is nearly always project specific with landforms and processes being studied within the context of the design criteria/limitations of the facility to be built. The objective, then, is to identify both the opportunities for safe, easy construction and the constraints to be avoided through careful siting, or overcome through appropriate design. Mr Brimicombe showed how a terrain evaluation in the earliest stages of a project leads to considerable time and cost savings in the investigation and design process and can even reduce long term maintenance costs. The method of terrain evaluation was illustrated with three examples - a public housing estate in steep dissected topography, a light rail transit through an alluvial basin and 400 kV overhead transmission line through rugged mountainous terrain. Particular attention was given to the client's brief, project stage, timing and the engineering design criteria of these diverse projects.

AH, KAS, AJB

WEATHERING PROFILES AND SUBSURFACE EXCAVATIONS IN TROPICAL AREAS
Convenor: Prof. W.R. Dearman (University of Newcastle Upon tyne)

Professor Dearman led the workshop on rock weathering. The presentation was well illustrated throughout with slides. Contributions from the 38 participants were actively encouraged and as a result lively exchanges and discussions ensued. The workshop was organised in two parts, with an intervening tea break during which participants were able to examine several displays illustrating the points made during the talk.

The first part dealt with the historical development of ideas and the general principles of weathering, an understanding of which is necessary in order to produce competent engineering geological descriptions of weathered rocks. This included a detailed examination of the pioneering work of Moye, who devised the first comprehensive classification scheme for weathered granite material. Moye's work for the Australian Snowy Mountain Scheme is the basis from which subsequent schemes have been developed. Prof. Dearman stressed the need to keep things simple, especially with regard to rock names, in order to guard against confusions that may arise from unnecessary complexity.

The second part of the workshop examined mass classifications, dealing at length with the work of Ruxton and Berry in Hong Kong which formed the basis of the scheme presented in BS 5930.

Several particular problems were examined in detail during which contributions from the floor were called for and discussions generated. These included the difficulty of applying any one scheme to different parts of the world, problems of terminology and nomenclature, the concept of the weathering front (whether such a phenomenon exists at all), and the discrepancies that result from considering the percentage of corestones by area rather than by volume. Professor Dearman concluded by saying that although BS 5930 had concentrated upon mass properties his present belief was that material properties were the most important aspect of any weathering classification, profiles and masses comprising combinations of particular materials, and that it was those that governed the behaviour of the rock mass.

The displays were assembled by Dr Raynor Shaw. These consisted of specimens of weathered rocks arranged to illustrated the six material weathering grades for each of coarse-, medium- and fine-grained granite, and of the four volcanic rock formations recognised to date in Hong Kong (the Yim

Tin Tsai, Shing Mun, Ap Lei Chau and Tai Mo Shan Formations). A field photograph display illustrated mass features of weathering profiles using Ruxton and Berry's zonal scheme.

R.S.

MARINE GEOLOGY FOR HARBOURS, RECLAMATIONS AND OFFSHORE INSTALLATIONS

Convenor : P. Whiteside (Geotechnical Control Office, Hong Kong - then of Scott Wilson Kirkpatrick & Partners)

Peter Whiteside began by introducing the three speakers : Mr M. Chalmers of Scott Wilson Kirkpatrick & Partners, and Dr R. Shaw and Mr R.S. Arthurton of the Geological Survey of the Geotechnical Control Office.

Mr Chalmers discussed the geological information required for different types of development.

He explained that dredging can be divided as follows:-

(a) to provide navigable depths;

(b) to remove unsuitable material from foundations;

(c) to extract marine fill or material for other commercial purposes.

The needs of each group are different and it is important to consider the type of plant, scale of operation, methods employed etc. to ensure adequate geological data is collected. Determination of variability of dredged materials is especially important, particularly with regard to presence of rock, other firm material or obstacles. Long term stability with respect to side slopes and rates of sedimentation are also relevant to (a).

For reclamations it is important to define land use and hence determine acceptable characteristics of reclamation. Principle questions to be asked are:-

(a) What is the likely rate of reclamation construction and what is the period of time between completion of reclamation and commencement of development?

(b) What are acceptable absolute and relative settlements?

(c) Is there a requirement for subsequent excavations or piled foundations?

(d) What is the magnitude and type of surface loading?

(e) Characteristics of pipeline and methods of installations.

Special problems occur as the pipe comes ashore, especially in the surf-zone, or where outcrops of hard material occur along the pipe profile. Tunnelled outfalls have been used with vertical risers where site conditions are difficult for buried pipes.

For sea defences and flood protection, the following factors relating to geological processes need to be considered:

(a) Changes in offshore and nearshore sedimentation or erosion which can alter the wave climate at seawalls.

(b) Sources of sediment supply for littoral drift of beach deposits.

(c) Ability of foundation material at toe of structure to resist scour.

(d) Long-term secular changes in sea-level.

(e) Tectonic movements.

In general, he explained that coastal areas are by their nature usually dynamically active environments. It is important for the geologist and maritime engineer to work together to understand the nature of the processes which have formed the environment in the past and which are still significant in its development today. This will enable investigations to be specified and directed towards collecting all relevant data needed, enable findings to be correctly interpreted and maritime engineering works constructed which cost effectively serve their intended function throughout their design lives.

Dr Shaw outlined the three main sources of information for the offshore geological survey, namely site investigation borehole records, stratigraphic interpretation of shallow seismic traces and the logging of continuously sampled boreholes. He then showed how each of these techniques has contributed to an understanding of the offshore geology of map sheets 11 and 15 of the Geological Survey of Hong Kong.

Details of the two major lithostratigraphic formations, their lithology, distribution and characteristics were illustrated and an examination made of the roles of pollen analysis and radio carbon dating in determining their environments of deposition and ages.

Finally several examples were used to indicate how an understanding of the recent geological history of an area can assist with the interpretation of apparently anomalous borehole or engineering results.

Mr Arthurton summarized key aspects of the offshore geology in Hong Kong. He described how the top of the (Pre-Holocene) Chek Lap Kok Formation forms a regular, planar surface at between about -20 to -40 mPD over much of the offshore area. This surface is interpreted as a widespread alluvial plain over which the Holocene marine transgression advanced. The surface rises towards present-day coastlines, and west of Kowloon it has been eroded into sharply defined gullies, now filled with marine sediments. The depth of the gullying is known to exceed -40 mPD. More extensive erosion of this surface occurred in the East Lamma Channel (a major channel on the SW of Hong Kong). It is thus inferred that the major sub-aerial erosional event occurred before the Holocene transgression.

Borehole samples revealed no signs of sedimentary structures within the muds of the (Holocene) Hang Hau Formation, but regular layering is apparent in the acoustic reflections displayed on sub-bottom geophysical traces. This layering is displayed in the sediments filling the gullies in the Chek Lap Kok Formation and indicates a rapid but non-turbulent submergence. Traces from the East Lamma Channel show evidence of an important, but perhaps local submarine erosional event in which a downlapping layer of marine mud was largely scoured from much of the channel; the resulting scour hollow was subsequently filled with more marine mud indicating a changing tidal current regime consequent upon a continuing sea level rise. Micropalaeontological

analyses from a continuously sampled borehole in Junk Bay suggest a period of slight shallowing during the deposition of the Hang Hau Formation at that locality.

Following the main speakers a hypothetical proposal for a harbour development formed the basis for discussion of marine site investigation techniques and geological factors relevant to reclamations and pipelines.

P.W.

SITE INVESTIGATION WORKSHOP
Convenor : K. Smith (Geotechnical Control Office, Hong Kong)

The Materials Division of the Geotechnical Control Office (GCO) arranged for a number of visits to active site investigation drilling sites on Hong Kong Island, followed by a visit to the Public Works Central Laboratory (PWCL).

The aim of the workshop was primarily to show visitors to Hong Kong the common drilling techniques employed and the variable and difficult soils and rocks which the drilling contractors were expected to drill and sample. Visits included two sites under investigation as part of GCO's Landslip Preventive Measures programme, also illustrating this important aspect of the work of the GCO. The common types of soils, i.e. colluvium and completely decomposed granite (CDG) and volcanics (CDV) and variably weathered bedrock were well displayed at the two sites and registrants were able to inspect some core and samples of these materials.

At the PWCL, the group were able to see at first hand the range of tests, including effective stress tests, carried out on the soils they had just observed in the field.

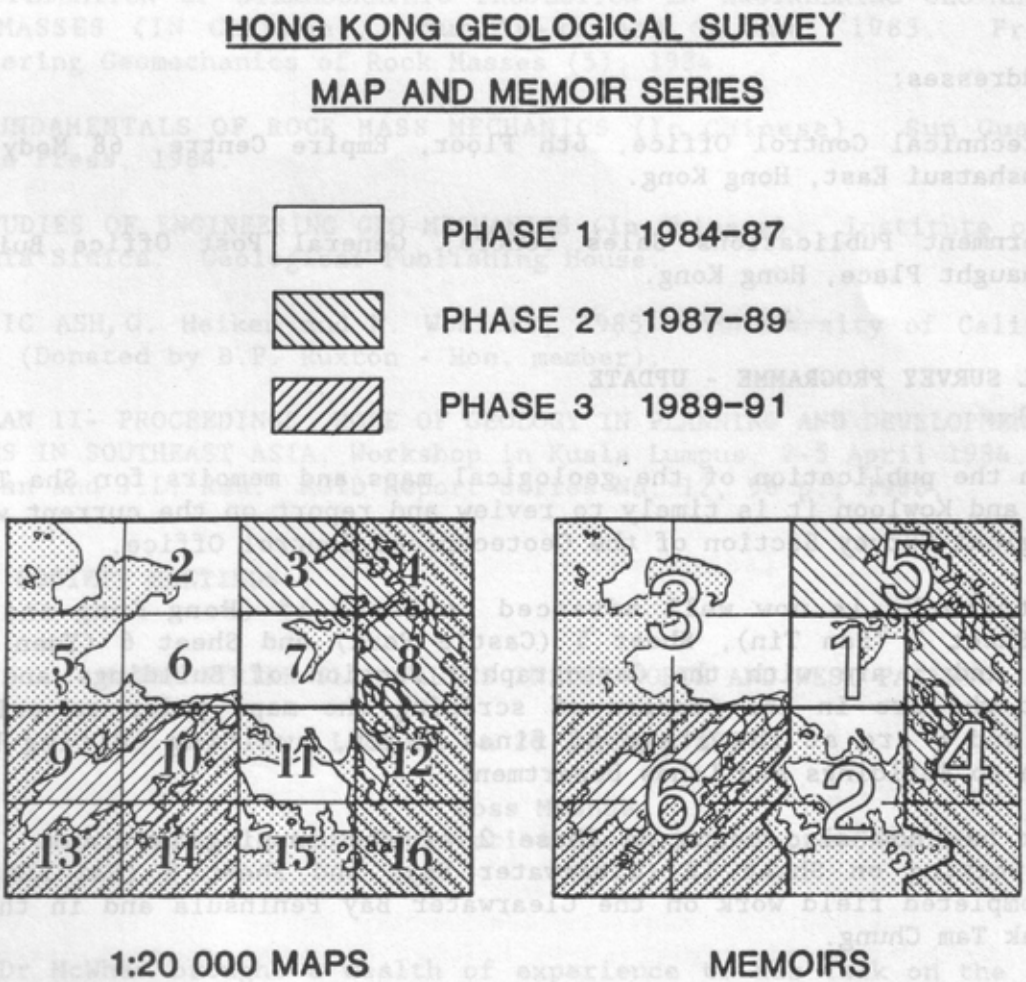
One slightly disappointing aspect of this workshop was the small number of registrants (approximately 15), of which only 4 were from overseas.

K.S.

GEOLOGICAL MAPS AND MEMOIRS

A.D. Burnett, Geotechnical Control Office

Two new geological maps with their accompanying memoirs have recently been published by the Geotechnical Control Office of the Civil Engineering Services Department. The maps and memoirs are the first published results of the new geological survey of the Territory which is being carried out by the Planning Division of the Geotechnical Control Office. The survey was begun in 1982 and, when complete in 1991, will comprise a series of fifteen maps and six memoirs, which will provide detailed descriptive and 1:20000 scale map coverage of the entire land and sea area of the Territory. The coverage, relationship and phasing of the maps and memoirs are shown on the accompanying figure. The new publication series will replace the current reference geological document, namely the memoir and 1:50000 scale map, which resulted from the last major survey programme undertaken between 1967 and 1969 by P.M. Allen & E.A. Stephens of the British Geological Survey.



The first published map and memoir of the new series, Sha Tin (Sheet 7 and Memoir No. 1) describes the geology of the areas around Tolo Harbour, including the towns of Tai Po, Sha Tin and Tsuen Wan and the Country Parks of Tai Mo Shan, Shing Mun and Ma On Shan. The second map and memoir, namely Hong Kong and Kowloon Sheet 11 and Memoir No. 2, describes the geology of the urban areas of Kowloon and Hong Kong and the surrounding peaks. The geology of both on and off shore areas is not only shown in considerably greater detail than has been previously presented by using the new larger scale colour maps, but is described and discussed in considerable depth in the well illustrated, easily read memoirs. Chapters of the memoirs typically deal with stratigraphy, petrography, structural geology, metamorphic rocks and superficial deposits including the sea bed stratum.

The survey work has involved extensive field traverses and mapping and the collection and identification of thousands of rock samples, many of which have been subjected to intense petrographic study and geochemical analysis, the results of which are included in the memoirs. In addition, compilation of the maps, particularly of the urban and off shore areas, has been based on the plotting up and evaluation of a large number of borehole records which are held by the Geotechnical Information Unit of the Geotechnical Control Office. The borehole data and the collections of rock samples, rock thin sections and field records, as used by the mapping geologists in the survey, forms the basis of a permanent archive of geologically oriented information which is available to bona fide enquirers from government departments or the general public.

As the new maps and memoirs are completed and printed, they will be made available through the normal Government Publications Sales Centre and from Survey and Mapping Office Map Sales Centres of the Building and Lands Department.

Contact Addresses:

Geotechnical Control Office, 6th Floor, Empire Centre, 68 Mody Road, Tsimshatsui East, Hong Kong.

Government Publications Sales Centre, General Post Office Building, Connaught Place, Hong Kong.

GEOLOGICAL SURVEY PROGRAMME - UPDATE

R. Addison

With the publication of the geological maps and memoirs for Sha Tin and Hong Kong and Kowloon it is timely to review and report on the current work of the Geological Survey Section of the Geotechnical Control Office.

Cartography is now well advanced on Sheet 15 (Hong Kong and Lamma Island), Sheet 2 (San Tin), Sheet 5 (Castle Peak) and Sheet 6 (Yuen Long). Sheets 15 and 5 are with the Cartographic Section of Buildings and Lands Department who are in the process of scribing the maps prior to printing. Sheets 2 and 6 are at the stage of final draft, awaiting editing before submission to Buildings and Lands Department.

Work has now also begun on Phase 2 of the mapping programme. Paul Strange, working on Sheet 12 (Clearwater Bay) and Sheet 8 (Sai Kung) has already completed field work on the Clearwater Bay Peninsula and in the area west of Pak Tam Chung.

Work on the NE quadrant of Sheet 10 has been brought forward into the second phase and field work is complete for Tsing Yi, Ma Wan and northernmost Lantau.

Later this year K.W. Lai and Richard Langford will start field work on Sheet 3 (Sheung Shui) and Sheet 4 (Kat O Chau) respectively.

Raynor Shaw is actively involved in offshore geological studies and is responsible for compilation of offshore data for each map sheet produced. He and Peter Whiteside will also be deeply involved with the geological interpretation of the geophysical survey and borehole exploration carried out as part of the search for offshore fill commissioned by the Urban Area Development Authority.

RECENT LIBRARY ACQUISITIONS (DONATIONS)

ENGINEERING GEOLOGICAL PROBLEMS IN ASIA
Editor-in-chief: Wang Sijing
Science Press, Beijing, 1984, 500 pp., 150 figs.
(donated by Prof. Wang Sijing)

PROCEEDINGS OF QUATERNARY COASTLINE SYMPOSIUM, CHINA 1982 (In Chinese with English abstracts). Ocean Press, 255 p, 1985.

GEOLOGY OF THE BOHAI SEA (In Chinese with English contents list). Institute of Oceanology, Academia Sinica, 232 p, 1985.

THE APPLICATION OF STEREOGRAPHIC PROJECTION IN ENGINEERING GEO-MECHANICS OF ROCK MASSES (IN Chinese). Sun Yu-ke and Gu Xun, 1983. Problems on Engineering Geomechanics of Rock Masses (5), 1984.

THE FUNDAMENTALS OF ROCK MASS MECHANICS (In Chinese). Sun Guang-zhong. Science Press, 1984.

THE STUDIES OF ENGINEERING GEO-MECHANICS (In Chinese). Institute of Geology, Academia Sinica. Geological Publishing House.

VOLCANIC ASH, G. Heiken and K. Wohletz, 1985. (University of Calif. Press), 246 p. (Donated by B.P. Ruxton - Hon. member).

LANDPLAN II- PROCEEDINGS: ROLE OF GEOLOGY IN PLANNING AND DEVELOPMENT OF URBAN CENTRES IN SOUTHEAST ASIA, Workshop in Kuala Lumpus, 2-5 April 1984. Editors: B.K. Tan and J.L. Rau. AGID Report Series No. 12, 96 p., 1986.

RECENT SOCIETY MEETINGS

MAJOR STRIKE-SLIP FAULTS IN THE NORTH AND WEST PACIFIC

Lecture on 26 January 1987

Ross McWhae
former Senior Exploration Geologist, Petro-Canada

Dr McWhae brought a wealth of experience to his talk on the structural geology of areas as far apart as the Pecific coast of Alaska and Canada, the South China Sea and Indonesia.

Major strike-slip faults in Alaska/Canada with a considerable data base, including seismic survey data, were used as models for major lineaments known to be predominantly strike-slip (often transforms) in Indonesia. Examples of the latter were the Sorong and Tarera-Aiduna Faults of New Guinea. These project the Australian craton and its envelope of shelf sediments in a wedge for 1,500 km westward, into the strongly disturbed obducted oceanic volcanics and melange of Sulawesi.

Dr McWhae went on to discuss the Late Cretaceous to Recent history of the South China Sea rifting and the evolution of the Pearl River Mouth basin on the passive, rifted continental margin of South China. He proposed that pre-existing lineaments in Southeast Asia have greatly influenced this development. A remarkable alignment of the Balabec Fault (a terminal left-lateral splay off the New Guinea faults that is situated at the northeastern end of Borneo) with the Red River lineament west of Hainan Island was demonstrated. According to Dr McWhae, this lineament is a rejuvenated right-lateral fault off the eastern end of the Himalayan collision zone, with its displacement reducing to zero in the central South China Sea.

The speaker also referred to recently published work on the geology of the South China Sea, notably that of Ru and Piggott (1). The talk concluded with a discussion of some aspects of the petroleum prospects of the Pearl River Mouth Basin.

Reference

1. Ru, Ke and Piggott, J.D., 1986. Episodic rifting and subsidence in the South China Sea. Amer. Assoc. Petroleum Geologists Bull. 70, 1136-1155, 21 Figs.

ANCENT LANDSCAPES AND THE EVOLUTION OF THE SOUTHEASTERN AUSTRALIAN HIGHLANDS

Lecture on 18 February 1987

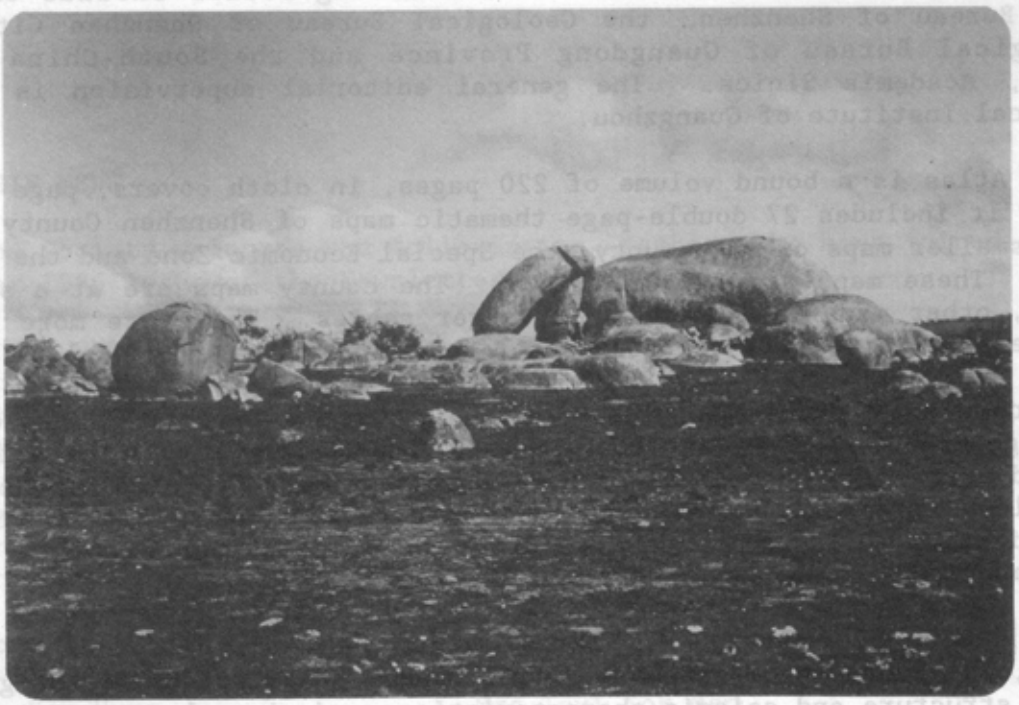
Graham Taylor
Department of Geology
Canberra College of Advanced Education

Dr Taylor's talk dealt with the topic, very relevant for Hong Kong, of the age of highlands, the time, cause and rate of uplift and landscape evolution subsequent to uplift. An area of the Southeastern Highlands of Australia in Southern New South Wales, with tightly-folded Palaeozoic bedrocks, granitoid plutons, Mesozoic sedimentary basins and Early Tertiary volcanics provided the case history.

Dr Taylor explained how earlier cyclical models of landscape evolution (repeated uplift) in Southeast Australia have been called into question as a result of recent studies. Thus, the idea of rapid Pilo-Pleistocene uplift ("Kosciuskan Orogeny") has lost favour. The more prevalent view now is that there was progressive gradual uplift over at least the last 80 million years.

What is not yet clear is how much uplift, if indeed there has been any significant amount, has occurred during the Cainozoic. Different current theories advocate different rates and different starting times. One hypothesis recently advanced (and disputed) is that the coastal lowlands on the coast of Southern New South Wales are at least pre-Oligocene and that there has been no significant relative uplift of the Highlands since then.

The present-day landscape is now seen to be essentially very old - originating in the Earlier Tertiary if not before. Modern rivers still follow pre-Eocene courses and are still in about the same relative vertical position (elevation) compared with the Eocene. Dr Taylor referred to Eocene basalts filling present-day valleys, young-looking granite tors (seemingly related to present-day weathering) partly drowned by Eocene basalts (see Plate), and the same basalts flowing down over a 500 m escarpment which still stands. Fossil forests also support the idea of a relict palaeo-relief: rain forest at low elevations, conifers up.



Granite tor emerging from and partly submerged by an Eocene basalt flow, near Cooma, Southeast Australia (G. Taylor).

The drainage system itself is believed to have evolved in the Mesozoic. Since then, erosion rates have broadly corresponded to sedimentation rates. Post-basalt erosion rates in studied areas range from zero to 0.005 mm/yr. These rates appear to be too slow by at least 100 per cent to be linked to the contemporaneous (Late Cainozoic) external base-level changes required by recent-uplift theories.

All the inland basins have sediments going back to the Mesozoic, with provenance in the Eastern Highlands. This argues in favour of an ancient, perhaps Palaeozoic, highland. The question arises: what caused the uplift? Was it, for example, collision-related? (One idea for which no supporting evidence has been obtained is that there was uplift associated with the rifting away of New Zealand at 80 Ma). More work is needed in regions flanking the Highlands on both sides before the history of the uplift can be worked out, but it is clear that it is very long and that Cainozoic events have been relatively unimportant in establishing either the elevation or the relief.

D.R. Workman

PUBLICATION NEWS

NEW ATLAS AND BOOK ON THE NATURAL RESOURCES OF SHENZHEN

Two works dealing with the natural resources of Shenzhen have recently been published, in Chinese, by the Science Press, Beijing (Year of publication, 1985).

They are an atlas and a book, each entitled the Natural Resources and Economic Development of Shenzhen. Contributing bodies include the City Planning Bureau of Shenzhen, the Geological Bureau of Shenzhen City, the Seismological Bureau of Guangdong Province and the South-China Botany Institute, Academia Sinica. The general editorial supervision is by the Geographical Institute of Guangzhou.

The Atlas is a bound volume of 220 pages, in cloth covers, page size 29 x 27 cm. It includes 27 double-page thematic maps of Shenzhen County and 17 pages of smaller maps of the county, the Special Economic Zone and the city of Shenzhen. These maps are all in colour. The county maps are at a scale of 1:200,000, other maps at 1:100,000 or larger scales. There are more than 40 pages of explanatory text, sections and legends and 58 pages of colour plates.

There are 17 double-page maps covering various aspects of geology and physical geography. They include maps of the geology (with stratigraphic column and sections), geological structure, seismology, hydrogeology, climate, geomorphology, drainage pattern, runoff, soil types, land classification and land utilization. There is also a series of false-colour satellite images with explanations.

The book, 370 pages, has three parts: Natural environment, Natural resources, and Economic development. It includes descriptions of the geology, including structure and seismic characteristics, and mineral resources.

The atlas and the book are available from the Xin Hua (New China) Book Co. in Shenzhen. The Hong Kong agent is The Joint Publishing Co., 9 Queen Victoria Street. The publications are a good deal more expensive in Hong Kong than in Shenzhen:-

Atlas - RMB 72 HK$500
Book - RMB 6 HK$50

They contain a wealth of information about our immediate neighbouring area and are good value even at the Hong Kong prices - in RMB, a real bargain.

ENGINEERING GEOLOGY ABSTRACTS

Published by: Geo Ref Information System, American Geological Institute
4220 King Street, Alexandria, Virginia 22302-9990

Annual subscription: $30.00 (individual); $35.00 (library rate)

Each quarterly issue contains abstracts and references to recent geotechnical articles, books, theses, maps, and reports.

EGA provides

- nearly 200 abstracts per issue
- complete references to new literature
- 22 subject categories for easy scanning
- cross-references to related entries
- four issues each year

MEMBERSHIP NEWS

The Society welcomes the following new members who have joined since the September 1986 issue of the Newsletter went to press:

Miss Au Man Chong
Chiu Man Kam (st.)
Miss Chu Kok Kam
P. Fowler
D.A. Houghton
Hui Tung Man
Miss Hung Wai Lan
S.A. Jonasson
Kam Chi Lap
Miss Kwong Tsoi Yin
Miss P. Lai (st.)
Miss Lau Sau Hung
Miss Lau Sau Lan
Miss Lau Sau Ling
Miss Lau Wai Lan
Lau Yiu Tsang
Miss Leung Lai Fong
Miss Leung Tsz Yin
Li Chun Wah
Luk Man Heung
Mok Yin Kit
Miss Pang Miu Kuen (st.)
R. Pulley
W.G. Roberts
Miss Sue Phig Choy
Tam Hoi Sang
Tang Kwok Cheung
R.B. Tate
Tsui Chi Shing
Mrs Tsui Sok Man
Wong Kin Nam
Wong Wing Keung
Woo Wai Kit
Wu Chi Man
Yau Hok Wing
Zee Yan Kwok (st.)

Any recently joining member (up to 31 March 1987) who has not been included in this list or the previous one is requested to inform the Secretary.

* * * *

Another of the diminishing band of founder members still in Hong Kong, Michael Howat, left at the end of February. Mike served on the General Committee for 1986-87.

Throughout these five years, Mike has been one of our most active members and a great stimulator of, and contributor to, debate and discussion. An engineer as interested in geology as any geologist, he has constantly kept the geologists on their toes and he will be sorely missed at our meetings. We wish Mike and his wife, Daphne all the best in their new life in California.

FUTURE INTERNATIONAL MEETINGS
(see also Newsletter vol. 4, no. 4, December 1986)

6-8 November 1987
INTERNATIONAL SYMPOSIUM ON PETROLEUM GEOLOGY IN NORTHERN CONTINENTAL SHELF AREA OF SOUTH CHINA SEA (Guo Chunfu, Guangdong Petroleum Society, 116 Yuehua Road, Guangzhou, Tel. 334234 or S.W. Chan or S.T. Lai China Oil Magazine, 19/F Vicwood Building, 125 Gloucester Road, Hong Kong, Tel. 5-738391)

2-4 December 1987
CASE HISTORIES IN SOFT CLAY - INTERNATIONAL GEOTECHNICAL SEMINAR, Nanyang Technological Institute, Singapore (Applied Research Corp., 303 Tanglin Road, Singapore 1024; Prof. Bergt B. Broms, School of Civil & Structural Engineering, Nanyang Technological Insititute, Nanyang Avenue, Singapore 2263).

14-18 December 1987
ENGINEERING FOR MITIGATING NATURAL HAZARDS DAMAGE (US-ASIA CONFERENCE), Bangkok. (Prof. A.N.L. Chiu, Dept. of Civil Engineering, University of Hawaii at Manoa, 2540 Dolo Street, Honolulu, Hawaii, USA 96822 or Prof. P. Nutalaya, Asian Institute of Technology, GPO Box 2745, Bangkok 10501, Thailand)

(note the 9th Southeast Asian Geotechnical Conference will held in Bangkok 7-11 December, as previously announced, with just a weekend between the two meetings).

1987 SUBSCRIPTIONS

Members are reminded of the Society's By-Laws with respect to annual subscriptions.

By-Law I Society Dues

Section 1: The fiscal year of the Society shall correspond with the Calendar Year.

Section 2: The annual dues of Members shall be $100.00. The annual dues of Students Members shall be $25.00. Members and Student Members elected between May 1st and September 30th shall pay half of the annual dues for the remainder of the current fiscal year (up to December 31st). Those elected after October 1st shall pay the full annual dues, which shall be credited to the next calendar year (i.e. will cover the period up to December 31st of the following year).

By-Law II Resignation or Suspension of Members

Section 1: Any Member or Student Member may resign from the Society at any time. Such resignation shall be in writing and shall be accepted by the General Committee.

Section 2: Any Member or Student Member who is in arrears of payment of dues after 1 March of the year for which the dues are payable shall be suspended from the mailing list of the Society. Such persons shall be reinstated immediately upon receipt of the arrears before 30 June of the current year but will receive any society documentation issued between suspension and reinstatement only on request and only if copies are available. A Member or Student Member who fails to pay his dues for any fiscal year by 1 July of that year shall be deemed to have resigned on that date.

FORTHCOMING SOCIETY MEETINGS

Previously announced

7 MAY 1987 — ANNUAL GENERAL MEETING

17 MAY 1987 — FIELD EXCURSION: NORTHERN NEW TERRITORIES

21 JUNE 1987 (SUNDAY) — FIELD EXCURSION: COAST OF LANTAU NE OF TAI O
(leader D.R. Workman)

Tai O Formation coastal section, Tai O - Sham Wat. Sedimentary features. Folded and faulted strata (sandstones, siltstones and mudstones). Colluvial and waterlain deposits near Po Chue Tam (Tai O).

For this trip, take the HYF ferry from Central to Tai O, leaving Central at 8.15 a.m. This ferry calls at Tuen Mun (9.40 a.m.). If weather is bad, a decision will be taken at Tuen Mun whether or not to proceed. For anyone wishing to go to Tai O via Mui Wo, we will meet at Tai O Market Street (outside Hong Kong Bank, at the hand-operated ferry in the centre of town) at 11.15 a.m., unless trip cancelled at Tuen Mun (see below).

Leader will join this trip at Tuen Mun. If weather is bad, a decision will be made at Tuen Mun whether or not to proceed.

Trip will end back at Tai O for Tuen Mun/Central direct ferry or bus to Mui Wo (Silvermine Bay). The Tuen Mun/Central ferry can also be picked up at Sha Lo Wan beach if preferred, by proceeding there from Sham Wat at the end of the trip.

BRING FOOD AND DRINK. NO BOOKING NECESSARY

Note: original destination for this date, the Brothers Islands, has been put off to later in the year. Summer-season hiring of a boat from Central or Kowloon would cost not less than $60 per person, much more expensive than it will be in the autumn. Hence the postponement.

11 JULY 1987 (SATURDAY)

BOAT TRIP: LOCATIONS IN TOLO CHANNEL

Today marks one of the year's lowest afternoon tides (zero Chart Datum in late afternoon). We hope to be able to get ashore on several small islands in Tolo Channel, also the Heanley ammonite locality near Fung Wong Wat, and stop off at Lai Chi Chong in the afternoon for maximum exposure of the shelving rocky beach.

Depart Ma Liu Shui ferry pier (near the Chinese U.) at 9.30 a.m. Return there about 5 p.m.

BRING FOOD AND DRINK
BOOKING NECESSARY (COMPLETE AND RETURN BOOKING SLIP)

Cost: $30
Max. number 35 (one boat).

25 JULY 1987 (SATURDAY)

SHENZHEN EXCURSION
(leader C.M. Lee)

08.15 Assembly outside east entrance, Kowloon Station, Hunghom
09.00 Direct train to Lowu

Travel in Shenzhen by hired minibus:

a) Wutong Shan (el. 944 m, road to top), north of Sha Tau Kok (volcanic rocks)
b) New mechanized marble quarry northeast of Shenzhen
c) Metmorphic rocks near Henggang
d) Visit Kwomau Building (52 Fl., tallest in Shenzhen)

BOOKING NECESSARY (COMPLETE AND RETURN BOOKING SLIP).
CLOSING DATE 28 JUNE.

BOOK EARLY. IT MAY BE NECESSARY TO LIMIT NUMBERS. FIRST COME FIRST SERVED.

Cost $120 (Member)
$140 (Non-member)

CANCELLED: Proposed seminars on June 29 (U.S. speakers' change of plans).

BOOKING FORM

TOLO CHANNEL 11 JULY

I wish to reserve ..... place(s) on this excursion. I enclose payment of HK$ ..... ($30 per person).

NAME : .....

NAME(S) OF ACCOMPANYING PERSON(S):

.....

Contact Tel. Nos. ...../.....
(Home) (Office)

SEND THIS BOOKING FORM WITH PAYMENT TO P.S. NAU, DEPT. OF GEOGRAPHY AND GEOLOGY, UNIVERSITY OF HONG KONG (Tel. 5-859 2832). MAKE CHEQUES PAYABLE TO THE GEOLOGICAL SOCIETY OF HONG KONG

新香港地質圖和地質報告開始面世(土力工程處地質組)

兩幅新的香港地質圖和有關的地質報告最近已由土木工程署土力工程處出版。地質圖的重新測繪是由該處的規劃部地質組負責。1982年已開始工作，預計至1991年分三階段全部完成，出版全港海陸範圍1:20,000的地質圖15幅和地質報告 6 份。這些地質圖和地質報告的範圍和完成期限可查閱索引圖(附於英文稿)。新地質圖和地質報告完成後將代替1967－1969年由英國地質調查所P.M. Allen 和 E.A. Stephens 測繪的1:50,000地質圖和地質報告。

第一張新地質圖沙田幅(圖幅編號 7)和第一號地質報告介紹了大埔、沙田和荃灣等市鎮，大帽山、城門水塘和馬鞍山等郊野公園的地質。第二張新地質圖爲香港及九龍幅(圖幅編號11)介紹了港九市區的地質全貌。新地質圖爲較大比例尺的彩色圖，比舊地質圖更詳細地展示了陸地和離岸地區的地質實況。新地質報告則作了深入淺出和詳盡的地質論述，其內容包括地層、岩石、構造、變質作用和陸上與海底的第四紀沉積。

這次地質調查包括詳細的地質路線觀測和野外製圖，同時採集了數千塊岩石標本。許多岩石標本都切了薄片並做了偏光顯微鏡的鑑定。有些標本還作過地質化學分析。所有地質成果都反映在地質報告中。另外地質圖的滙編，尤其在市區和離岸地區，廣泛應用了土力工程處岩土工程資料室保存的大量鑽孔資料於地質測繪工作。地質組在野外地質測量過程中搜集到的鑽孔資料、岩石標本、岩石薄片和野外紀錄等寶貴地質資料都會保存成爲永久性的檔案。以便提供給有需要的各政府部門和公衆查閱。

新地質圖和地質報告將由政府刊物銷售處和屋宇地政署測繪處各售圖處發售。欲知詳情，可向下列機構聯系：

香港尖沙咀東部麼地道68號帝國中心六樓土力工程處。

香港中區康樂廣場郵政總局大廈政府刊物銷售處。

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地質調查組工作進展近況

土力工程處地質組具體負責香港新地質圖的測繪工作。目前，沙田幅和香港九龍幅新地質圖已出版，新的測繪工作繼續在開展中。

圖幅15(香港南部和南丫島幅)、圖幅 2 (新田幅)、圖幅 5 (青山幅)和圖幅 6 (元朗幅)均已完成野外製圖工作。其中圖幅15和圖幅 5 已交由屋宇地政署測繪處負責清繪，很快就會出版。圖幅 2 和圖幅 6 亦已基本定稿即送給屋宇地政署。

第二階段的野外地質製圖工作亦已開始。薛政泉負責圖幅12(清水灣幅)和圖幅 8 (西貢幅)，其中清水灣半島和北潭涌西部已完成了野外工作。

圖幅10(銀礦灣幅)東北部亦提前放在第二階段進行測繪工作。其中青衣島、馬灣和大嶼山東北已完成野外工作。

今年稍後林富達等將開展圖幅 3 (上水幅)和圖幅 4 (吉澳島)的野外工作。

因受市區拓展署委托爲新的填土區，從海底中尋找填土資源，簫偉立和P. Whiteside 將會負責將探土所得的地球物理調查和鑽探的資料作地質分析。

投稿本會通訊簡則

概　則：請將所有稿件，查詢及通訊寄香港地質學會秘書收（煩香港大學地理地質系轉）。本會並不負責刊登在本通訊內文章之版權。如寄來的文章或資料有在過去曾引用過，或現時及將來可能會引用到的話，作者請於來稿時特別註明。

我們歡迎一些專門性的稿件，有趣事項的報導，書評或專題討論等。來稿以簡爲主。雖然有些時候本會可作出例外，但普通稿件請以一千二百字爲限。請盡量減少插圖及附表等，而所有圖表請另外分頁。

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所有插圖請只寄影印本，待本會通知時始可將原版寄來，而必須註有來稿者姓名。圖表必須用黑色繪在描圖紙或滑面白紙或紙板上；所有綫條或字體之粗幼必須能縮影後仍可保持清晰，所有地圖必須附有公制比例，正北指向及如適用的話附有經緯綫座標。

援　引：來稿者須負責確定所有援引的準確性，而公報之簡寫須以現藏於倫敦地質學會圖書館內倫敦地質學會1978年出版之定期出版物目錄爲準。

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封面圖片：蒲台島蓆裂節理形成的花崗岩地形(J. M. Nash)

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香港地質學會

通　訊

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