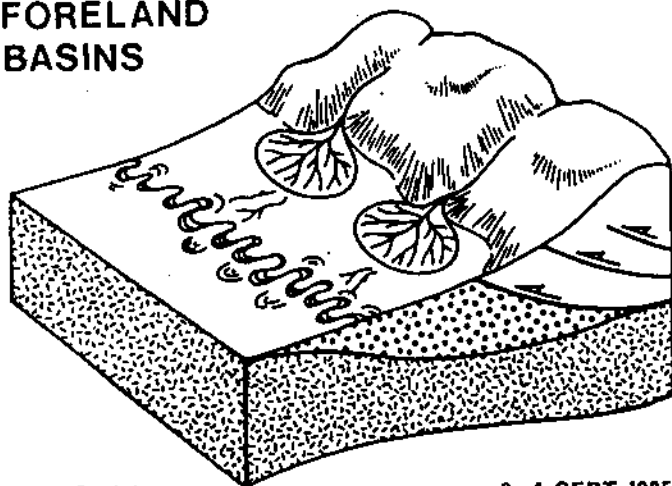


INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS

NEWSLETTER

N° 77 Feb. 1985

FORELAND
BASINS



FRIBOURG

2 - 4 SEPT., 1985

ASSOCIATION NEWS

DENMARK
(from L. Clemmensen)

The Danish Sedimentological Research Group Meeting has held its 8th annual meeting in November the 17th at the Geological Institute in Copenhagen. Some twenty talks were presented, which is one or two less than the previous years. This year the talks mainly dealt with facies analysis and diagenetic studies of clastic sediments. In addition there were two talks on Recent sediments and associated processes and one talk on ancient evaporites. For the first time in many years there was no talk on carbonate sediments. Geographically most talks dealt with sediments from Denmark and surrounding seas. Surprisingly enough there was only one talk dealing with sediments from Greenland.

Facies analysis of glacial and proglacial sediments were as usual one of the dominant subjects at the meeting. For a number of years staff members and research students have studied these sediments in sand and gravel pits and in coastal cliffs. A wide range of glaciofluvial, glaciodeltaic and glaciolacustrine as well as glaciomarine sediments have been studied, but unfortunately only little of these data have so far been published in international journals. In particular the glaciofluvial deposits, which display grain-sizes from large boulders to clay seem to hold the potential for testing many of the facies models established in Recent years for modern braided streams.

Sedimentological research has in the last ten years or so gradually spread from the universities mainly to research institutions and a few oil companies. The 50 people attending this years meeting reflect this trend well, as sedimentologists from both the geological and the geographical institutes at the Copenhagen University (sadly enough no one from the Arhus University showed up this year), the Geological Survey of Greenland, the Geological Survey of Denmark, the Danish Oil and Gas Production Company, the Technical University, and the Agricultural University were present.

The meeting was held at a bitterly cold day, and I feel convinced that all members were happy that they, unlike their British colleagues, did not have to join an excursion at the end of the meeting.

NEW ZEALAND
(from C.Nelson)

Sedimentology is alive and well in New Zealand despite the lapse of 2 years since a news report was made from down-under! A wide variety of sedimentological research is being undertaken in New Zealand, mainly within the geology, earth sciences or soil departments of 6 Universities, and in the appropriate divisions of New Zealand Geological Survey, New Zealand Oceanographic Institute, and Water and Soil Division of Ministry of Works and Development. Despite the lack of a national organization of sedimentologists, contact amongst researchers is maintained by the smallness of the country, lecture visits, and exchange of information at the Annual Conference of the Geological Society of New Zealand (present Secretary: Mr. N.C. Fowke, N.Z. Geological Survey, Ruakura Agricultural Research Centre, Hamilton, New Zealand), which rotates venue among major New Zealand centres.

Two events of special sedimentological significance to New Zealand can be reported briefly here. One involved DSDP Leg 90 in December - January 1982-3 when *Glomar Challenger* obtained a north to south transect of cores along Lord Howe Rise in Tasman Sea, west of New Zealand, as well as drilling a hole off east coast South Island. A record of over 3700 m of high quality, mainly hydraulic piston cored sediment was collected on the leg with a principal intention of elucidating the Neogene paleoceanographic development of the Southwest Pacific through high-resolution lithologic, biostratigraphic and isotopic studies (see *Geotimes* 28 (1983) : 16-19). Sedimentological research on the dominantly foraminifer-bearing nannofossil ooze sequences have concentrated on detailed isotopic, carbonate and grainsize stratigraphies, clay mineral analyses, tephra distributions, bioturbation, and the ooze-to-chalk transition in cores. The Leg 90 cores, and the Initial Report volumes, no doubt will form an important source of geological data relevant to better understanding the widespread Cenozoic sequences in on-land New Zealand.

The other important sedimentological event will be the 12th International Sedimentological Congress, "Sediments Down-Under", to be held in Canberra, Australia in August 1986. The 1st circular should have been received and returned by now (enquiries to 12th ISC, ACTS, GPO Box 1929, Canberra ACT 2601, Australia).

Our Australian colleagues have a great conference planned, the principal New Zealand involvement relating to several pre- and post- Conference field trips in North and South Islands. If you are planning to attend the Conference we invite you to consider also making the short trip across the Tasman to visit New Zealand where exchange rates are likely to be very much in your favour!

The following is a listing of some of the institutions where sedimentological research is carried out in New Zealand, together with the names of contact persons, and some information on current research topics.

Department of Geology, University of Auckland,
Private Bag, Auckland (Dr. P.F. Ballance). Research activities include sedimentation and plate tectonics, especially at strike-slip and subduction margins; flysch basins; New Zealand Mesozoic "greywackes and argillites"; submarine geology in Tonga-Lau region; trace fossils; pyroclastic deposits; coastal pollution.

Department of Earth Sciences, University of Waikato,
Private Bag, Hamilton (Dr. C.S. Nelson). Research activities include modern coastal and shelf sediments and sedimentation processes; temperate-latitude shelf carbonate deposits; carbonate diagenesis; carbon and oxygen isotope stratigraphy; tectonic, climatic and sea-level controls on sedimentation; plate tectonics and Cenozoic sedimentation patterns; pyroclastic deposits; lacustrine sediments, including Dry Valleys, Antarctica; automated size analysis of sediments.

Department of Soil Sciences, Massey University,
Private Bag, Palmerston North (Dr. R.J. Stewart). Research activities include clay mineralogy; oxygen isotopes as provenance indicators of soils and sediments; late Quaternary climate change; loess and fluvial sedimentation; emplacement mechanisms of volcaniclastic deposits and volcanic hazards.

Department of Geology, Victoria University,
Private Bag, Wellington (Dr. P.J. Barrett). Research activities include facies analysis of ancient sediments, marine and non-marine, in New Zealand and Antarctica; modern depositional systems, especially McMurdo Sound and Granite Harbour, Antarctica; Cenozoic history of Antarctic ice sheet; diagenesis of hydrocarbon reservoir rocks.

New Zealand Oceanographic Institute (D.S.I.R.), P.O. Box 12346, Wellington (Dr. L. Carter). Research activities include seismic studies of shelf and slope sediments; sedimentation on the New Zealand shelf and around other South Pacific islands; manganese nodules; marine phosphorites; lake and harbour sedimentation.

Department of Geology, University of Canterbury, Private Bag, Christchurch (Dr. D.W. Lewis). Research activities include sedimentation and petrology of late Cretaceous and early Tertiary coal measures in South Island; Mesozoic and Cenozoic gravity flow deposits in shelf environments; stratigraphy, paleoenvironment and diagenesis of early Tertiary calcilutites in north-eastern South Island; Paleozoic terranes in Antarctica, New Zealand and Australia.

Sedimentation Laboratory, New Zealand Geological Survey (D.S.I.R.), University of Canterbury, Private Bag, Christchurch (Dr. G.J. Van der Linde). Research activities include systematic stratigraphic and sedimentological studies of late Cretaceous and Cenozoic rocks in 10 regions covering New Zealand - the N.Z.G.S. Cretaceous-Cenozoic Project; flysch sedimentology; diagenesis of Tertiary micritic pelagic limestones; heavy mineralogy; coal petrology; Antarctic geology.

Department of Geology, University of Otago, P.O. Box 56, Dunedin (Dr. C.A. Landis). Research activities include sedimentation and tectonics of Permian, Mesozoic and Cenozoic sediments of South Island; Quaternary sediments and environments; sedimentary geochemistry; weathering and sedimentation related to late Cretaceous peneplanation; diagenesis of ophiolitic landslides; sepiarian concretions; modern marine and estuarine sedimentation in association with newly expanded Portobello Marine Laboratory.

SOUTH AFRICA

(transmitted by C.S. Kingsley)

GEOKONGRES 84

Geokongres 84 was held at Potchefstroom University from Monday, July 9, to Friday, July 13 1984, and a total of 68 papers were presented in 19 sessions. Five themes and an open session together with a poster presentation formed the main part of the technical session. One of the themes was "Sedimentology - sedimentary facies analysis in South Africa".

Three excursions were held dealing with the sedimentology of the Natal and Transvaal coal deposits, the geology of the Potchefstroom-Klerksdorp area and the geology of the Pilanesberg. The post-congress workshop reviewed the stratigraphy of the Kimberley-Elsburg succession of the Witwatersrand Supergroup in the Witwatersrand goldfields from the central Rand to Welkom.

Sedimentology

The sedimentology theme was facies analysis in South Africa and the aim was to get as large a spread of papers over the range of geological time. A total of 11 papers were presented ranging from the Proterozoic to the Cretaceous.

The introductory presidential address which was given by Professor A.O. Fuller was entitled "Pre-Silurian facies modelling in fluvial and deltaic settings" and dealt with the role of vascular plants in channel stability and how their absence in pre-Silurian times may have influenced sedimentation in fluvial and deltaic systems. By using Allen's equations for width and depth of channels and comparing the results of these equations with examples from the Platte River, Icelandic braided outwash streams and the Yellow River, it was possible to show how these equations can be used to predict width-depth ratios for unstable banks. From the Einstein bedload function it can be shown that unstable banks lead to reduced discharge in the main channel of a system with consequent braiding. Professor Fuller considered that tabular sands may result from unconfined braided rivers such as those described in the Yellow River and may explain the thick sequences of quartzites observed in the Witwatersrand.

Two papers presented in the sedimentology session dealt with the sedimentology of placers in the Witwatersrand Supergroup and stressed the important role played by sedimentology in the prediction of grade distribution in the gold-bearing reefs of the Witwatersrand. The first paper "The sedimentology and stratigraphic setting of the "A" reef placers, Aandenk Formation" presented by W.P. Karpeta dealt with the modelling of two placers on President Steyn gold mine and the use of these models to predict gold distribution on an intermediate scale by identifying environments of deposition. The second paper presented by M.P. Mullins entitled "Gold distribution as related to sedimentary facies in the Ventersdorp Contact Reef on Deelkraal gold mine" related gold grade to broad sedimentary facies within this reef. He described relationships between gold grade and fluvial facies types.

Three major facies types were identified, the third facies type having three subdivisions. These facies have been used to predict gold grade within the Venterdorp Contact Reef. W.P. Colliston and J.C. Loock presented a paper on "The determination of stratigraphic polarity in Proterozoic metasedimentary rock using sedimentary cycles" which dealt with the use of sedimentary coarsening or fining-upwards cycles to determine "wayup" in metamorphosed sediments where primary sedimentary structures have been obliterated. They identify first order and second order cycles whose polarities can be used in conjunction with conceptual models to determine the stratigraphic facing of beds.

The paper presented by R.McG. Miller, E.E. Freyer and I.W. Hålbich dealt with turbidite succession identified in the Damara Sequence in the coastal arm of the Damara Orogen. Indications are that this part of the orogen had developed into a deep water ocean fed with sediments derived from the east. Ice rafting of glacial debris is suggested by an isolated granite boulder in distal turbidites. J.N.J. Visser presented a paper on facies analysis in the Permo-Carboniferous Dwyka Formation and identified the problems associated with the interpretation of facies in glaciogenic sediments. Two scales of facies scales were identified, those on a unit scale involving lateral and vertical textural grading and structural changes and related to both the depositional environment and sediment source.

On the formational scale, two depofacies were identified in the Dwyka Formation : the valley/inner platform facies and the outer platform facies. The latter is thought to have been deposited when extensive erosion of the inner platform was taking place.

Two papers dealt with the Permian coal deposits of South Africa. The first paper presented by A.D.M. Christie described the correlation and depositional environment of coal seams within the Vryheid Formation of the Klip River coalfield. He described three informal subdivisions each dominated by a number of transgressive-regressive cycles related to the progradation and abandonment of deltas. Coal formation is associated with maximum delta progradation and partings within the coals probably represent crevasse splay, minor distributary channel and fluvial floodplain environments.

The second paper presented by B. Cairncross described the depositional environments of the Vryheid Formation in the Witbank coalfield and their relationship to coal distribution and quality. Sediments below the number 1 seam reflect fluvial sequences and are mainly fining upwards. The numbers 1 and 2 seams are

separated by a parting composed of fluvial sands and the number 2 seam itself shows a number of clastic influxes. Above the number 2 seam coarsening-upwards cycles imply prograding delta formation.

N. Stavrakis and N. Hiller describe an arid-zone anastomosed fluvial deposit from the middle Triassic Burgersdorp Formation in the North Eastern Cape. The Burgersdorp Formation shows many features which are similar to Rust's arid-zone model based on Cooper's Creek in Australia. Only the occurrence of numerous crevasse splay sandstones is different and this may be due to the presence of stable banks, low slopes and high aggradation rates.

Two papers dealt with the role of trace fossils in palaeo-environmental interpretation. T.R. Mason and A.D.M. Christie described the occurrence of the ichnogenus Diplocraterion in the Vryheid Formation in Natal. They concluded that Diplocraterion was a suspension-feeding organism that enlarged its burrow both laterally and vertically and preservation of these fossils indicates alternating erosional and depositional events during the accumulation of the Vryheid Formation.

T.R. Mason in a second paper described the occurrence of the trace fossil Isopodichnus from the late Triassic Clarens Formation of the Natal Drakensberg. He considered that this occurrence was probably traces of branchiopods in shallow ephemeral lakes or lacustrine margins.

I Gerrard, K. Stallbom and P. Unstead identified late Aptian to Cenomanian-age submarine fans off the South African west coast. The accumulation of these fans was related to the rate of subsidence of the proto-Orange Basin, following the onset of drifting associated with the opening of the South Atlantic.

Professor I.C. Rust gave a lecture on the concept of sedimentary facies and stated that the systematic study of sedimentological processes and modern environments has greatly enhanced the geologist's capability to recognise and reconstruct the environment. By skilful use of two slide projectors Prof. Rust was able to show the parallels between the Jurassic Robberg Formation of the Southern Cape and the nearby Keurbooms River estuary and how the latter throws light on the former.

In all, the sedimentology session illustrated the variety of sedimentary environments present in the South African rock sequence and the close relationship between sedimentology and the exploration for and exploitation of economic minerals.

Post-Congress Workshop

The post-congress workshop reviewed the stratigraphy of the Kimberley-Elsburg sequence of the Central Rand Group. Borehole cores from various localities over the basin were studied in an endeavour to correlate the various units within the Witwatersrand goldfields. The idea was to attempt to recognise and utilise unconformity-bounded cyclical sequences and tectonostratigraphy to correlate these rocks on a basin-wide scale.

This workshop certainly marked a number of firsts, it being the first time that geologists from several mining houses got together during a congress to examine each other's core and to discuss each other's ideas and correlations. Another first was the use of modern geological concepts to attempt to correlate and identify units by tectonostratigraphic means in the Witwatersrand Basin and marks a departure from the "crystal ball-type" of geology practised by some mining geologists up till recently. Though the results were somewhat controversial, possibly owing to the gaps between the goldfields, it is felt that this workshop marks a significant contribution to the geology of the Witwatersrand Basin.

Thanks go to Willo Stear, Frank Gregory, Charles Kingsley, Piet Schoeman and Rod Tucker for organising a very interesting and very significant workshop.

(written by W.P. Karpeta)

Pre-Congress Excursion to the Transvaal and Natal Coalfields of South Africa

Guides : A.B. Cadle, R. Tavener-Smith and A.B. Smith

Thirty delegates representing all of the major mining groups in South Africa as well as some prominent academics attended.

We first visited a modern-day barrier beach-lagoon setting on the Natal South Coast. We were then shown an example of this in the rock record, namely in the Permian Vryheid Formation at Effingham quarries north of Durban where a very thin coal seam had formed in such an environment.

Then followed a conducted tour of the classic coal zones of the Vryheid Formation in Northern Natal. Of special interest here were the exposures of giant planar cross-bedded sandstone units in the Ngwebini Cliffs. Sets up to 20 metres thick are common. These form a major part of the regressive sequence in the lower part of the Vryheid Formation and show an off-shore palaeocurrent direction here. The entire sequence is interpreted as a Gilbert-type delta probably formed as a transverse mouth bar near the seaward limit of a large estuary (Tavener-Smith).

The second stage of the excursion involved a look at the coal seams and their related settings of the Transvaal. Here the coalfields are geographically separated, there being a Witbank, Highveld and Eastern Transvaal coalfield. In the former two fields coal seams accumulated within an upper delta plain setting with its associated fluvial sediments. In the Eastern Transvaal field the coals occupy a lower delta plain environment. At the Steenkoolspruit locality southeast of Ermelo the "A" coal seam is exposed, approximately 15 cm thick at this locality. The entire succession here underneath the coal seam consists of an arkosic sandstone (4 m thick) at the base which is planar cross-bedded and represents deposition by migrating sand waves. This is overlain by a laminated unit (3 m thick) of fine-very fine-grained micaceous sandstones and siltstones which show flaser bedding, ripple lamination and wave ripple lamination. Skolithos and Siphonichnus burrows are present. Wave and current action and a protected embayment with crevasse splays are invoked here. The "A" coal seam caps the underlying crevasse splay sediments. Above the coal lies a light green glauconitic sandstone which is seen throughout the Natal and Transvaal coalfields in this stratigraphic position and indicates a basinwide transgressive event. This unit and the overlying interbedded siltstones and sandstone accumulated in a shallow-water shelf environment above wave base.

All in all this excursion was a well presented and informative introduction to the coalfields of the Transvaal and Natal.

(written by G. Wheelock)

ANNOUNCEMENTS

THE INTERNATIONAL GROUND WATER MODELING CENTER

The International Ground Water Modeling Center (IGWMC) has been established to enhance the utilization of ground water models. IGWMC is an information, training and research center on modeling flow and transport processes and related phenomena in ground water systems.

History

In the period 1975-1977 Holcomb Research Institute (HRI) at Butler University, Indianapolis, Indiana USA, conducted an inventory and assessment of ground water models for the Scientific Committee on Problems of the Environment (ICSU/SCOPE), sponsored by the U.S. Environmental Protection Agency (EPA). Following the recommendations of an international group of modeling experts gathered in Indianapolis in spring 1979 to discuss the results of the inventory, HRI established in 1979 the International Ground Water Modeling Center (IGWMC). After initial contact in 1980, HRI and Groundwater Survey, Delft, The Netherlands, part of the Dutch Organization for Applied Scientific Research (TNO), agreed to cooperate regarding IGWMC, early 1981, appointing a TNO staff member as head of IGWMC at HRI in Indianapolis. The successful cooperation between Holcomb Research Institute and TNO Groundwater Survey has led to the development of a new IGWMC office in Delft, The Netherlands, to be in operation in November 1983.

Model Information

To perform its clearinghouse function, IGWMC has developed computerized data bases containing up-to-date information on hundreds of analytical and numerical ground water models, both from the U.S. and abroad. By means of a search and retrieval system, information stored on ground water models is easily accessible for the IGWMC staff. Currently the Center is rapidly expanding its collection of documented programs for use on micro-, mini-, and mainframe computers. To perform its information tasks, the Center keeps track of new developments in modeling related fields as computer hardware, software for data handling and graphics.

Many hundreds of information requests from individual modelers, consulting organizations, research institutes, governmental, federal and state agencies and groups themselves engaged in summarizing the available model literature, are processed annually.

Training and Education

To enhance the qualified use of ground water models, IGWMC offers annually a comprehensive program of short courses, workshops and seminars in which principles, concepts, theories and applications of ground water models is stressed. New programs are under development, to facilitate individual oriented, computer-interactive training.

Research

To support the information and training activities, IGWMC conducts a program of applied research in ground-water modeling. Topics to be covered in this program are model screening and testing, evaluation of model use and model needs, and model development and improvement.

In addition to these activities, IGWMC publishes the Ground Water Modeling Newsletter, featuring new developments, courses and meeting calendars and new publications in groundwater modeling.

IGWMC In Delft, The Netherlands

In November 1983, the International Ground Water Modeling Center will start the operation of its Delft office, serving Europe, Asia, Africa and Australia, while the Center's activities in Indianapolis, Indiana USA will focus on North, Central and South-America. Both offices will feature IGWMC's full line of services, adapted to specific needs of each region. The Delft office will have extensive clearinghouse services, including the use of automatized data-bases for model information and with increasing availability of software for distribution. It will develop, in cooperation with the Indianapolis office, its own program of training courses. The Delft office of the International Ground Water Modeling Center will be operated by TNO Ground Water Survey, one of the 35 institutes and numerous research groups that together constitute the Organization for Applied Scientific Research in The Netherlands (TNO).

Annual Short Course Program 1985

- Basics of Ground Water Modeling

February 28-March 1, Module I : Introduction to
Ground Water Modeling

March 4-8, Module II: Basics of Modeling
Ground Water Flow
and Pollution

- Finite Element Modeling and Field Investigation of
Contaminant Transport in Ground Water Systems.

May 20-25.

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ICE ISLAND SAMPLING PROGRAMME, CANADIAN POLAR CONTINEN-
TAL SHELF

An advisory committee for Ice Island Sampling met in Edmonton, Alberta to set up a sampling, drilling and monitoring scheme to study the Canadian Polar Continental Shelf from a new ice island (derived from offshore Ellsmere Island), presently adrift in Nansen Sound. Sampling will commence May, 1985, from a base camp established on the ice island.

Major topics that were addressed include :

1. Geology of the Shelf
 - Seismic studies, dredge, bit and rock drilling, downhole well-logging (Ashton Embry, ISPG, Calgary & Nancy Van Wagoner, Acadia Univ.)
2. Cenozoic History and Biostratigraphy of the Shelf
 - Dredging, palynology, micropaleontology, paleomagnetism (Peta Mudie, Atlantic Geoscience Centre, Dartmouth and Van Wagoner)
3. Surficial Sediment Mapping and Seafloor Geomorphology
 - Detailed bathymetry, shallow seismic reflection, bottom grab samples, gravity cores and piston cores, bottom photographs (Frances Hein, Univ. Alberta, Edmonton)
4. Sedimentation Processes and Sediment Budgets to the Shelf
 - Ice cores, suspended sediment samples, bottom grab samples, gravity cores and piston cores, bottom photographs (Hein)

5. Basin Analysis Studies

- Rock drilling, bit drilling, seismic studies, dredge sampling, downhole well-logging (Embry & Van Wagoner)

The advisory committee is looking for interested researchers to work on the samples and other data after sample recovery. Researchers will have to acquire their own funding for transportation, accomodation and subsequent analyses of the samples. Presently, the advisory committee has only set up the monitoring scheme. Samples will be stored at the Atlantic Geoscience Centre as an access centre for interested workers. Please contact Ruth Jackson, Atlantic Geoscience Centre, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, if you are interested in working on the samples as part of your own research programme or if you want to go to the ice island yourself for field studies.

(transmitted by F.J. Hein)

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September 30th-October 8th, 1985

FRG (Freiburg)

Inter-University course by T. Bechstädt (Freiburg), H. Kulke (Clausthal) and H. Meyer (Esslingen)
on :

"INTERPRETATION OF SEDIMENTARY FACIES FROM THE SURFACE AND SUBSURFACE" (in German)

The aim of this course is to present modern facies-models for siliciclastics, carbonates and evaporites as well as the potential usefulness of litho-, porosity- and dipmeter-logs for facies interpretation. Participants work on a number of practical exercises.

Tuition fees : Fees include tuition, course manual, welcoming party, costs for a one-day excursion but not costs of living. Tuition fees are : 220,-DM for students; 340,-DM for self-paying participants and/or members of federal institutions; 660,-DM for companies, sending participants.

Locality : "Fachschaftshaus" of the Univ. of Freiburg, Schauinsland near Freiburg, some 900 m above the city of Freiburg. The "Fachschaftshaus" is a former rustic Black Forest inn.

Accommodation : In the vicinity (more comfortable and more expensive) or in the "Fachschafts-haus". Price for board and lodging (multi bed rooms) in the "Fachschaftshaus" : 20,-DM per day.

Information from : Thilo Bechstädt, Geol. Inst. Univ.,
Albertstr. 23 B, 7800 Freiburg,
FRG. Tel. : 0761-203-2407 (2410).

FUTURE MEETINGS
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August 26-28, 1985 THE NETHERLANDS (Utrecht)

MODERN AND ANCIENT CLASTIC TIDAL DEPOSITS

Contact : Dr. S.D. NIO
Comparative Sedimentology Division
Institute of Earth Sciences
Budapestlaan 4
3508 TA Utrecht
The Netherlands

September 2-4, 1985 SWITZERLAND (Fribourg)

FORELAND BASIN (I.A.S. THEMATIC MEETING)

Contact : Dr. P.A. ALLEN
Department of Geology
University College
Cardiff CF1 1XL
U.K.

Editor

Cl. MONTY,
General Secretary