

fully developed facies model of an estuary, with a seismo-stratigraphic interpretation of extensive data from borings, was that presented by George Allen.

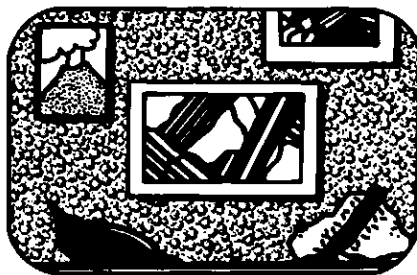
The present phase of interest in tidal rhythmites began with the description by Visser (1980: *Geology*, v. 8, p. 543-546; see also conference report in *Geoscience Canada*, v. 7, p. 33-34) of well preserved neap-spring cycles in "tidal bundles" preserved in Holocene subtidal cross-strata in the Netherlands. Subsequently several good ancient examples were described, but the supply seems to be temporarily exhausted, as no new ones were described at the symposium. Instead, interest shifted to finely laminated silty/fine sandy deposits in Australia (G.E. Williams), Oregon (Kreisa, Leithold and Bourgeois), and the Illinois Basin (Archer and Kvale), where fairly convincing tidal rhythms were related to a model of tidal modulation of prodeltaic (or distal ebb tidal delta) sedimentation. Another example of preserved neap-spring cycles was described from the upper tidal flats in the Salmon River estuary (Dalrymple, Makino and Zaitlin).

Large subtidal bedforms have been a topic of interest at meetings for some years, and the Calgary conference was no exception. At an SEPM conference in Austin in 1987, consensus was reached that use of the terms "megaripple" and "sand wave" should be discontinued in favour of "dune". Most speakers at Calgary seemed to have no serious objection to this proposal, though some had only just heard of it, as publication of the report (now in press in *Journal of Sedimentary Petrology*) has been delayed. The most striking results in Calgary were those obtained by S. Berné from several European shelves. His images of the internal structures of these "giant dunes", obtained using high-resolution seismic studies, considerably advanced our understanding of the internal structures of shelf sand dune fields.

Publications of the Calgary symposium, including the abstracts, several excellent field guides, a core and peel workshop guidebook, and a book of Short Course notes, can be purchased from the Canadian Society of Petroleum Geologists (#505, 206-7th Ave. SW, Calgary, Alberta T2P 0W7).

The next conference will be held in Wilhelmshaven, Germany, in 1992. For information write to B.W. Flemming, Senckenberg Institute, Schleussenstrasse 39a, 2940 WILHELMSHAVEN, West Germany.

Accepted 22 September 1989.



Friends of Igneous Rocks — Fourth Annual Meeting

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The Friends of Igneous Rocks met in Ottawa for a two-day meeting (August 24 and 25), followed by a field trip to the Timmins-Kirkland Lake area. This year's conference was organized by Tony Fowler and André Lalonde of the University of Ottawa and the Ottawa-Carleton Geoscience Centre and was a great success. The "Friends" gather each year (this is the fourth annual meeting) to present and discuss their research interests in igneous petrology. The setting is informal and fosters enthusiastic discussion and feedback.

This year's meeting began with a welcome by Keith Bell, director of the Ottawa-Carleton Geoscience Centre (OCGC). The technical presentations covered a diverse array of topics all very exciting and innovative.

Jim Nicholls of the University of Calgary showed how the Y-intercept on Pearce Element Ratio (PER) Diagrams can be used to discriminate between magma batches in historical lavas of Kilauea. He also explored the use of complex numbers ($X + iY$) in error analysis on PER diagrams. Pete Roeder of Queen's University surveyed the compositional range of chromites using the data in his comprehensive database of published analyses and presented new experimental data showing the strong effect of f_{O_2} , but the limited effect of total pressure, on chromite composition. He also introduced us to his versatile computer program for displaying and analyzing mineral chemistry data, including plotting spinel compositions on a spinel prism. Interested persons can contact Pete for a copy of this program.

Richard Ernst of the University of Ottawa and the OCGC interpreted magma flow in mafic dykes using the technique of anisotropy of magnetic susceptibility. In the Mackenzie dyke swarm (1270 Ma) in the vicinity of the Muskox intrusion, the magma was injected vertically while in the Great Abitibi

Dyke of the Abitibi swarm (1140 Ma) magma flow was subhorizontal. André Lalonde covered biotites in granites. Using data from the Hepburn and Bishop granites of Wopmay Orogen, he showed that biotite composition ($Fe/Fe+Mg$ ratio versus Al) is a sensitive measure of oxidation state and peraluminosity, parameters which are fundamental to granite origins and classification.

Tom Pearce from Queen's University gave a potpourri of current research topics: the possibility and potholes on the road toward automated interpretation of laser interferograms; application of PER diagrams to identify the composition and distribution coefficients of plagioclase crystallizing from liquids within plagioclase grains; and some startling applications (e.g., to feldspar zonation patterns) of the emerging new science of self-organization and chaotic systems. Keith Bell of Carleton U and the OCGC reviewed the Rb-Sr, Nd-Sm, Pb-Pb data on carbonatites and gave us the latest news on SCUM (subcontinental upper mantle). Canadian carbonatites seem to be wholly derived from SCUM while African carbonatites are explained by mixing of SCUM with asthenospheric mantle.

Sara-Jane Barnes from the Université du Québec à Chicoutimi detailed (with excellent field photographs) the internal structure of komatiite flows, and she outlined the evidence that spinifex-textured rocks represent crescumulates rather than quench textures. Tony Fowler and Robert Thériault discussed their work (done in collaboration with Dan Roach) on the applications of fractal geometry to disequilibrium rock textures. Tony Fowler gave a basic introduction to fractals. After reviewing various deterministic fractals such as the Koch Curve and the Cantor set, he described how to determine the fractal dimension of textural features such as dendrites, as well as of boundaries (e.g., crystal boundaries). The fractal dimension of the latter can be used as a measure of crystallinity. Robert Thériault described unusual branching pyroxenes from the Centre Hill gabbro (a stop on the field trip). These pyroxenes are fractal objects and Robert demonstrated various techniques for determining their fractal dimension.

In addition to the presenters, this year's conference was attended by Bob Baragar (Geological Survey of Canada (GSC), Ottawa), Mavis Stout (U of Calgary), and numerous students from both the Ottawa U and Carleton U campuses of the Ottawa-Carleton Geoscience Centre.

The field trip to the Timmins-Kirkland Lake area began immediately following the meeting. The morning's field work was devoted to rocks showing disequilibrium igneous textures and began with a stop at an outcrop of pillowed meta-basalt (Kinojevis suite) containing plagioclase spherulites (varioles) formed during crystallization of a liquid. Discussion centred around the mechanism of

under-cooling and the older liquid immiscibility hypothesis. The group next observed the spectacular spinifex-textured komatiites of Pyke's Hill in Munro Township. Various origins for spinifex texture were discussed and consensus favoured the dynamic model presented by S-J. Barnes during the conference portion of the meeting. The final stop in the morning was at the Centre Hill gabbro (R. Thériault's thesis area) where equally spectacular, 40-50 cm long, branching (fractal) pyroxenes were seen. Here, discussion centred on the timing of events and the mechanisms of differentiation-infiltration that could give rise to such unusual features in a gabbro.

In the afternoon, the group travelled to the Matachewan area to visit a couple of alkali-feldspar syenite plutons and associated gold mines. At the Young-Davidson Mine (abandoned), gold had been extracted from a small trachytic syenitic body. Also visited was a large syenite body, the Cairo stock, which has associated gold and barite deposits. Recent work by S. Rowins and A. Lalonde (U of Ottawa and OCGC) on ferromagnesian silicate minerals has shown that these syenitic magmas evolved under unusually oxidizing conditions. Aware of this, the group discussed the relationship between these syenites and the gold deposits of the area, since the latter can be related to oxidized fluids.

This year's Friends of Igneous Rocks meeting was a great success. The "Friends" are looking forward to next year's meeting which will be hosted by Roger Nielsen, Ocean. Admin. 104, College of Oceanography, Oregon State University, Corvallis, Oregon, 97331-5503; telephone (503) 737-2484. If you wish to be on the mailing list for next year's conference contact Roger Neilson, or Kelly Russell (U. of British Columbia).



CANQUA 1989 Late Glacial and Post- Glacial Processes and Environments

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On 25-27 August 1989, 94 participants from across Canada and the US attended the biennial CANQUA (Canadian Quaternary Association) conference in Edmonton. No doubt remains that CANQUA has come of age as a viable scientific association. This conference was well attended and extremely well organized, with a wealth of excellent presentations on a variety of Quaternary interests. Each province and territory was represented by participants, in addition to several US states. Participants were split between industry, government, and university research personnel.

The conference kicked off with a mixer on Friday night at which many old friends had an opportunity to catch up on recent events. Bright and early Saturday morning, the scientific sessions started with a welcome from Nat Rutter. He then recalled the career of, and some anecdotes about, the late Lou Bayrock, to whose memory the conference was dedicated. Bayrock (1930-1989) spent most of his career studying the Quaternary geology in Western Canada.

The first session concentrated on Quaternary landscapes and their sediments. Tom Morris discussed his discovery of several eskers and related subglacial fan deposits near Windsor, Ontario. Derald Smith presented both a talk and a poster session on the catastrophic paleoflood channel and deposits in the Fort McMurray area. The flood was caused as glacial Lake Agassiz drained at about 9.9 ka during the Campbell phase. Eric Neilsen described flutes, striae, and iceberg scours found in the Interlakes district, Manitoba. Rene Barendregt and Archie Stalker delivered Part 2 of their thesis on the origin of hummocky moraine. They feel donut moraines are caused by pingo-like development associated with water-saturated sediment at the glacier margin. Alexis Dreimanis with John Elson showed at least three different processes which form fluted

ground moraine. Vic Levson with Nat Rutter discussed the sediment deposited in tributary valley lakes dammed by ice in the Athabasca Valley. Using examples from the Bugaboo Glacier, BC, Gerry Osborn demonstrated how complex lateral moraine sequences can be built when a moraine is overtopped by later ice advances. P.T. Davis compared Neoglacial sediment from moraines, and debris flows on Baffin Island. In the Cypress Hills, Rudy Klassen identified evidence of at least three moraines from two or more advances, plus a pre-late Wisconsin scabland development. Pollen from that area studied by D.J. Sauchyn shows that the Altithermal occurred locally at 7.2 ka, in agreement with TL dates from Dinosaur Park.

Bob Young kicked off the afternoon session on Quaternary environments with an animated discussion of the glacial features in the Hand Hills, Alberta. Ice thrusting and flutes on the summits of the hills overlying a mid-Wisconsin prairie dog town, led him to discount the controversial ice-free Corridor hypothesis. J.R. Desloges with June Ryder used tree ring dating to determine that the Neoglacial began earlier and ended later in the Coastal Ranges. Brian Luckman synthesized several years of tree ring study in the Rockies. Bill Mahaney described the glacial features found on Mt. Kenya, noting that there were no early Holocene advances until the Neoglacial. G.T.S. Gill with Jim Teller analyzed the sediment in the Assiniboine Delta of glacial Lake Agassiz. Oswald Sawicki with Derald Smith described a pre-Fraser Glaciation delta into glacial Lake Invermere dated at 36 ka. W.J. Vreeken with Rene Barendregt determined that loess deposition in the southern prairies did not change appreciably after the Mazama ash deposition at 6.6 ka. Alan Morgan wrapped up the day with series of marvellous cartoons and photos shot from space. Unfortunately, his message was anything but a joke. For example, with details such as the fact man moves more rock each year than all the forces of nature, that more than 1000 towns in Canada, including Halifax and Victoria, dump raw sewage into the environment, that we loose 1% of our topsoil each year, that Canada was not self-sufficient in food production last year, he reminded us of the need for input from geologists into the global change program.

The CANQUA Annual General Meeting followed, during which the W.A. Johnston Medal was presented to Professor Alexis Dreimanis. In the evening, participants went to a reception hosted by the Alberta Provincial Museum. Included in the entertainment was a particularly appropriate play put on by the staff entitled "Indiana Bones and the Lost City of Ice".

Sunday morning's session continued the theme of Quaternary sediment and landscapes. Lynn Halsey discussed the form and development of dunes found in the Grande Prairie dune field, Alberta. Bob Fulton