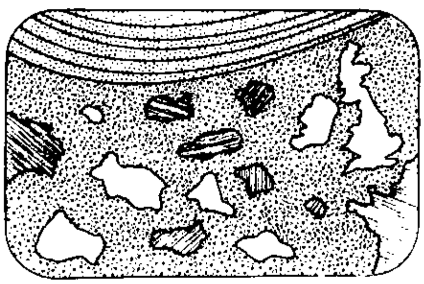
Conference Reports



British Sedimentological Research Group 21st Anniversary Meeting, Liverpool, England

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The British Sedimentological Research Group (BSRG) held its 21st Anniversary Meeting at the University of Liverpool, December 15-18, 1982. Three days of oral presentations were followed by a selection of 5 field trips (Dec. 18) to local Carboniferous, Permian and Triassic outcrops.

The BSRG, as we were reminded by Robin Bathurst, one of the original members, was founded to provide an annual forum for discussion of research in progress. The emphasis on short talks, preferably about unfinished work and problems, particularly by young sedimentologists, and the informal nature of the group (no elected officers, no dues), has proved remarkably successful over the years. This year the meeting featured a series of review talks by invited speakers, commissioned to celebrate the coming of age of the group and to provide an assessment of recent progress in sedimentology. The response was a meeting of nearly 300 people, most of whom listened to 70 short presentations and 11 reviews in the course of three days. The review talks will be published as a special issue of the Journal of the Geological Society of London.

Overall, the standard of presentation was high. The titles and authors of the review papers are listed below in the order in which they were presented: Clastic facies models (R. Anderton); Deep sea sediments and DSDP (J. Leggett and D. Stowe); Carbonate facies models (M. Tucker); Volcaniclastic sediments (R. Suthren); Fluid dynamics and sedimentary structures (J.R.L. Allen); The role of sedimentology in the exploration for, and production of, oil and gas in the North Sea (H. Johnson and D. Stewart); Carbonate diagenesis (A. Dickson); Economic sedimentary ores (H. Clemmey); Recent shelf sediments (I.N. McCave); Carbonate facies analysis in petroleum exploration: a case study from the Middle East (T. Burchette and S. Britton); Clastic diagenesis (B. Waugh). Many of the reviews did not focus on new material, and though interesting and well illustrated, were not particularly stimulating. The major exceptions will be discussed below. Fortunately, some other short papers presented new or innovative ideas and kindled lively discussion.

Dorrik Stowe stressed the importance of slope apron and basin-floor deposits in deep-sea sedimentation, based on DSDP results. He presented important new data on the character of sedimentary blankets produced by contour-current flow on the Scotian margin. Instead of possessing characteristics ascribed by others to contour-current deposition, these major sediment accumulations consist of homogeneous mud! According to Stowe, past preoccupation with submarine fans as analogues for ancient deep-sea terrigenous deposits does not reflect the relatively subordinate importance of fans on modern continental margins. The move away from automatic interpretation of ancient turbidite sequences as fan deposits seems to have a growing following in Britain, where a recent meeting on non-fan turbidites was organized by David MacDonald. The re-evaluation of the fan model is probably a healthy sign, but we wonder whether the detractors are placing too much emphasis on radial geometry, and not enough on the sorting out of channel and non-channel process. After all, there is still little known about the stratigraphic record produced by modern fans, so how can ancient sequences be so casually dismissed as products of fan sedimentation?

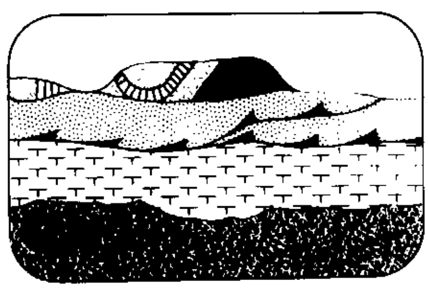
John Allen stressed the importance of orderly structure in the boundary layers of turbulent flows with the aid of several dazzling smoke and cloud visualization photographs from the work of meteorologists. This regular pattern of bursts and sweeps must be responsible for the initiation of suspension, and more attention to publications on the structure of the boundary layer may increase our understanding of the suspension process. Meteorologists like John Simpson have also made important contributions to our understanding of the geometry of lobes and clefts at the front of turbidity currents, and rollers behind the head region. Mike Leeder continued the discussion of sediment suspension by bursts and sweeps associated with the boundary layer of turbulent flows. In his paper, Leeder demonstrated that a net upward turbulent stress results from a differential between the effect of strong, short, upward bursts and weaker, more prolonged, downward sweeps of fluid into the viscous sublayer. This analysis was based on a 1966 theory of R.A. Bagnold, and it is useful as an explanation for the suspension phenomenon.

Nick McCave emphasized controls on the distribution of muds on continental shelves. The simple idea of a graded shelf, with grain size decreasing regularly in an offshore direction, is often completely wrong because mud deposition is controlled almost entirely by concentration in the overlying water column and capacity of the current or wave systems. Once deposited, either near shore or far out on the shelf, the cohesive mud tends to resist erosion. The balance between concentration and physical energy can lead to mud belts on any part of modern or ancient shelves. McCave also challenged Miles Hayes' interpretation of the process by which hurricanes generate seaward-flowing bottom currents that result in graded storm layers on shelves. Moreton (I.A.S. Special Publication 5) has shown that hurricanes do not pile water up against the coastline to later flow seaward as the storm abates. Instead, there is a continuous bottom flow set up which may be directed either offshore or along shore. McCave favours this continuous flow as the mechanism by which storm layers are emplaced.

The most fascinating, and potentially most significant, aspect of this meeting was the general discussion of hummocky stratification. Philip Allen proposed three possible mechanisms for production of this poorly understood structure: 1. supercritical unidirectional flow; 2. intense oscillatory flows causing rolling-grain ripples; and 3. combined oscillatory and steady unidirectional flows with the waves propagated either with or against the current. Allen did not consider seaward-flowing density currents to be a reasonable alternative. After discussion of the problems associated with generation solely by oscillatory currents, he concluded that the best model for the production of hummocky stratification should be based on the combined effect of waves of moderate height and energy, and gentle steady currents. In the ensuing discussion, two additional mechanisms were suggested. Trevor Elliot noted that hummocky stratification resembles an interference pattern, and wondered if it might be produced by waves propagated at some angle to a steady bottom current. This model is remarkably like that suggested by Nick McCave on the basis of modern shelf studies. John Allen suggested that this structure could be the result of an attempt to form megaripples under waves. Chris Pound, in a later presentation, emphasized that the currents that produce hummocky stratification are commonly erosive, as scour and drape is the most commonly observed feature in the field. Clearly there is no agreement yet on the origin of hummocky stratification, but some of the suggestions presented at this BSRG meeting may yet supplant current explanations.

The 70 short papers, which were interspersed between the reviews, provided a complete cross-section of sedimentological topics, ranging from the practical (reservoir properties) to the academic (Zechstein subtidal stromatolites) and from ancient to modern. Most were well-presented and illustrated, and on time, so that a succession of chairmen, in what was largely a single-session meeting, were able to guide us through an almost bewildering variety of topics.

This meeting was an excellent 21st birthday party for the BSRG. Much of the enthusiasm seen in formal and informal discussions is due to the participation of young researchers and students, and the general acceptance of their views on a par with those of established experts. This format is different to that of many North American meetings, and certainly to that of most specialist meetings like Penrose Conferences and SEPM Research Conferences, where the major participants are predominantly from academia, industry or government agencies. We find the BSRG format very appealing and intellectually stimulating. Perhaps meetings of this type should be encouraged in the Canadian geoscience community.



Evolution of the Ancient Continental Margin of Western Newfoundland

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The 1983 spring meeting of the Newfoundland Section, Geological Association of Canada, took place from April 7-8. The program of 30 papers was organized by Chris Barnes and included all aspects of the Paleozoic geology of western Newfoundland. Registrants were provided with a formal program, including abstracts in GAC formt. Copies of these abstracts may be obtained from Chris Barnes, Program Chairman, Memorial University of Newfoundland.

Only two papers presented at the symposium broke away from the main theme. Phil Rice (Petro-Canada, CSPG Special Lecturer) presented a seismic journey through the modern continental-margin sequence of the Grand Banks, complete with aerial photographs of modern analogues of coastal and terrestrial ancient environments. Rice showed a novel three-dimensional seismic record depicting the upper surface of one of the Mesozoic reservoir sands. This intriguing technique allowed recognition of the form and plan-view features of a braided distributary complex. The perspective was much like that of an aerial photograph. Wayne Goodfellow (GSC, GAC Robinson Fund Special Lecturer) carefully documented the occurrence and genesis of lead-zinc deposits associated with starved basin sedimentation during rifting of the western Canadian Selwyn Basin. He stressed the importance of basement break-up faults in providing conduits for metalliferous fluids in their journey to a site of precipitation at the sediment-water interface.

The Paleozoic talks were preceded by two general keynote papers. Chris Beaumont, Steacie Fellow from Dalhousie University, provided a stimulating discussion entitled "Rifting, collision of plates and the formation of sedimentary basins", as an introduction to the mechanisms of basin formation at both passive and convergent continental margins. He emphasized that the mechanical properties of the lithosphere can largely account for various aspects of basin development, including subsidence history. Thick, cool lithosphere acts like a stiff spring and flexes for a greater distance away from the continental margin than does thinner, hotter lithosphere. The peripheral bulge associated with flexure during emplacement of thrust sheets at active continental margins is found furthest from the margin when the lithosphere is thickest. If true, then the width of foreland basins produced by flexure would be a function of lithosphere thickness, and indirectly a function of the time interval between rifting to form a passive continental margin and subsequent destruction of the margin. Although in Phanerozoic orogens we commonly have good biostratigraphic control on the timing of these events, this relationship between foreland basin width and "age" of the passive margin could be useful in unravelling the timing of Precambrian continental-margin tectonics and in estimating the properties of the Precambrian lithosphere. It might also be possible to calculate from such data the approximate width of Precambrian oceans. Beaumont illustrated his talk with examples from the Scotian Basin, the western Canadian foreland basin and the Appalachian foreland basin. In the latter example, Beaumont considered interaction with nearby intracratonic basins. When the peripheral bulges associated with foreland and intracratonic basins overlap, intermediate arches are elevated, and when the bulges pass by one another, as a result of increased thrusting and widening of the foreland basin, the