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ABSTRACTS

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Again this year, abstracts from the annual Atlantic Universities Geological Conference are published in "Atlantic Geology". This provides a permanent record of the abstracts, and also focuses attention on the excellent quality of and interesting and varied science in these presentations.

The Editors

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Petrology and tectonic setting of the late Devonian Fisset Brook Formation, Gillanders Mountain area, Cape Breton Island, Nova Scotia

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The Fisset Brook Formation is a sequence of interlayered volcanic and sedimentary rocks of late Devonian age in northern and western Cape Breton Island.

In the Gillanders Mountain area, the Fisset Brook Formation forms an anticlinal structure, with a basal, buff-coloured, medium-grained quartz-rich conglomerate overlain by interbedded rhyolite, basalt, sandstone and conglomerate. The basalts are massive to vesicular and amygdaloidal near flow tops. They contain abundant peperitic structures indicating intrusion over mud. The rhyolites are red, and vary from massive and porphyritic to flow banded. Siltstone interlayered with the volcanic rocks ranges from red to green to grey in colour and is micaceous. Associated buff coloured paraconglomerates contain abundant volcanic clasts. Fine to coarse-grained ophitic gabbro intruded three areas in the hinge of the anticline.

The Fisset Brook Formation in the Gillanders Mountain area is overlain by Carboniferous Horton Group, a sequence of red and grey sandstone, red siltstone, shale, conglomerate and limestone. To the north and east, the Fisset Brook Formation is mainly in faulted contact with Silurian and older metamorphic and plutonic rocks. Farther north, the older rocks have been intruded by an equigranular to granophyric syenogranite proposed to be cogenetic with rhyolite of the Fisset Brook Formation.

Basalt and gabbro in the Gillanders Mountain area display tholeiitic characteristics when plotted on immobile element discrimination diagrams, and formed in a within-plate setting. Clinopyroxene compositions, determined by electron microscope, also suggest tholeiitic affinity and non-orogenic setting for the basalts. The rhyolites also have compositions consistent with an intraplate setting. Magmatism in the Gillanders Mountain area appears to have been related to basin development in an extensional tectonic regime, after the Acadian Orogeny.

Flow patterns in the dendroid graptolite *Dictyonema*: implications for feeding currents and the origin of the planktonic mode of life

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It has been proposed that the origin of the planktonic mode of graptolites evolved from downward-directed ciliary feeding of conical dendroids, such as *Dictyonema*. It was suggested that these currents provided the lift necessary to enter the planktonic mode of life. In order to test this hypothesis, life-sized wire mesh models of *Dictyonema* were tested in a flow tank at low velocities. In each case, unidirectional fluid movement through the models produced the same effect--weak exhalant currents out of the top of the cone. If the sessile dendroids did have downward ciliary feeding currents, as proposed, then these would have had to evolve struggling against the naturally induced passive flow. It is, therefore, unlikely that they produced these currents, so the adaption to the planktonic mode of life must have been achieved by some other means.

The presence of dissepiments has a dual purpose: (1) they provide structural support to the branching stipes of the cone; and (2) by making the rhabdosomal mesh more dense, upward currents are increased. Tests done on a model having only half the dissepiments, thus resembling the earliest planktonic graptolites which required less structural support and probably did not utilize passive flow, produced very little exhalant flow. Greatest upward exhalant currents were suited for maximizing feeding current flow in relatively quiet water. This agrees with the observation that these types of rhabdosomes are normally found in muddy sediments that were deposited in quiet water.

Surficial geology of the area near the Titanic wreck

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The Atlantic Geoscience Center, at the Bedford Institute of Oceanography, has selected seismic and sample data in the region surrounding the Titanic wreck as part of a study of geological evolution and sedimentary processes on the continental rise. This report describes and interprets the new 40 cubic inch sleeve seismic profiles, 3.5 kHz profiles, and samples collected in 1991. The seismic data show two major Pleistocene erosion surfaces resulting from erosion by the Western Boundary Undercurrent, that separate sediments on the rise principally deposited by turbidity currents and slides. Surficial sediment near the Titanic wreck is commonly sandy, partly as a result of deposition from a recent turbidity current down Titanic Valley and partly as a result of winnowing by the Western Boundary Undercurrent.

Sedimentology and mineralogy of a reduction sphere occurrence in Hopewell Group strata at Dorchester Cape, New Brunswick

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Reduction spheres at Dorchester Cape occur as roughly spherical haloes surrounding dark mineralized cores in a detrital hematite-stained host rock. The ores contain several mineral species with native elements, oxides, sulfides and sulfates being predominant.

Preliminary optical microscopic analysis indicate various mineral phases of elements. Copper mineralizes as native copper (Cu), cuprite (Cu_2O) and chalcocite (Cu_2S). Iron is present as pyrite (FeS_2). Vanadium and uranium are also evident as carnotite [$K_2(UO_2)_2(VO_4)_2{*}3H_2O$]. Other work has suggested silver and mercury mineralization.

Several episodes of reduction sphere formation appear to have occurred as indicated by different mineral assemblages at various intervals in the section. Well developed paleosols and bioturbation at these intervals suggests that diagenesis took place during a diastem.

The sedimentological evidence supports other studies which suggest that formation of reduction spheres began soon after deposition of the detrital material.

Unveiling the secrets of the Queen Charlotte Basin

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In July 1988, a large seismic reflection and refraction survey was carried out in the Queen Charlotte Basin, north of Vancouver Island, in order to study its structure and evolution. The refractions and wide angle reflections from a 6300 cubic inch airgun were recorded on 19 land-based single channel seismometers placed along the basin. Thirteen seismic lines were modelled. The results of line 3 are the focus of this presentation.

The Queen Charlotte Sound is situated in an area containing a large plate-boundary transform fault, a triple junction and a subduction zone. Previous lines showed that the Sound is extensional with Moho depth ranging from 26 to 28 km in the northern part of the Sound and 18 km in the south. Line 3 lies in the northern Sound and was modelled using both seismic and gravity data.

The seismic modelling gives upper, mid and lower crustal velocities very close to those adjacent lines, one of which intersects line 3. The Moho depth is also comparable to the previous established depth of 26 to 28 km.

The gravity model defines the boundary between the oceanic and continental crust as well as constraining the seismic model.

The origin of laminated intervals in the Ben Nevis sandstones of the Grand Banks: a preliminary report

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The talk discusses the repeated occurrence of laminated intervals in core obtained from the West Ben Nevis (WBN) B-75 and North Trinity (NT) H-71 wells. The core corresponds to the Ben Nevis Formation just above the Aptian unconformity, with depth ranges between 2004 m to 2094 m and 1997 m to 2168.9 m for wells WBN B-75 and NT H-71, respectively.

The core is composed of repeated intervals of lag-like layers overlain by a variety of laminations; among others are cross, vague and distinct parallel laminations. The laminations could either be very tiny (1 mm) and distinct or relatively thicker (up to 1 cm) but vague. They can also be solitary or concentrated. Tidal bundles and mud couplets are also suspected to be present within these laminated intervals. These intervals are then topped by bioturbated units which were later eroded by the lag-like layer starting a new cycle. The goal of this study is to identify the depositional environment and the corresponding mechanism of deposition. Most probable depositional environments are lower shoreface, beach or washover sands.

It is the intention of this talk to show to the audience the different types of laminations and their relationship to each other in a given interval. Slides will be the main presentational method. Only preliminary results of this study will be presented and the bulk of talk will deal with the description of the core.

Geochemistry and petrogenesis of late Cretaceous bentonites from the Kanguk Formation, Axel Heiberg and Ellesmere islands, Canadian High Arctic

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Late Cretaceous explosive volcanism in the Canadian High Arctic deposited blankets of volcanic ash over much of the Sverdrup Basin region. These ash layers have been altered to bentonitic clays and are interbedded with organic-rich mudstones of the Kanguk Formation on Axel Heiberg and Ellesmere islands. Initial fieldwork in 1990 revealed seven individual bentonites on the Kanguk Peninsula, Axel Heiberg Island. A more comprehensive sampling was undertaken during the 1992 field season and documented 26 individual bentonites from the Fosheim Peninsula, Ellesmere Island. Remnant volcanic minerals have been separated for radiometric dating and geochemical work. Preliminary $^{40}Ar/^{39}Ar$ dating of sanidine crystals, combined with micropaleontology on the interbedded sediments (undertaken at the University of Calgary), yield a late Turonian to early Campanian age for this formation. Detailed major and trace element geochemistry on both volcanic minerals and bulk bentonites will be used to investigate the tectonic setting and provenance of the original ashes, as well as the nature of the parent volcanism. Analysis of element mobility during bentonitization will help to determine the applicability of geochemical correlation between individual units. These ashes may represent late-stage magmatic activity within the Sverdrup Basin or they may be the products of extra-basinal volcanism.