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ABSTRACTS

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The Editors

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The effects of uncertainty on compaction, pressure, temperature and maturity modelling of the Sable Subbasin

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The approximation of physical parameters, such as porosity, thermal conductivity, heat flow and sediment grain size is a critical element in modelling a basin's hydrocarbon potential. This paper presents an analysis of the effect of variability in these poorly constrained physical parameters on compaction, pressure, temperature and maturity models of the Sable Subbasin.

Each parameter is varied by increments and the effects of the variation on the model is calculated. Model predictions are then compared with several measured values from Glenelg J-48: drill stem pressures, corrected bore-hole temperatures and vitrinite reflectance measurements.

Modelled burial history and predictions of pressure variation with depth are sensitive to changes in the porosity-depth profile. Porosity calculations from sonic transit time generate a porosity-depth profile that produces consistent predictions of fluid pressure. Measurements of bore hole temperatures constrain sediment thermal conductivity values. Pressure measurements constrain grain size assumptions. Organic maturity, calculated from vitrinite reflectance data using VITRIMAT, together with bore hole temperature results, control present-day heat flow values. Variations in heat flow through time strongly affect the modelled organic maturity of the source sediments.

Compaction, pressure, temperature and maturity models constrain porosity, grain size, thermal conductivity and present-day heat flow approximations. Organic maturity models of source depths in the Sable Subbasin are sensitive to changes in heat flow through time. Most passive margin rifting models predict heat flow variation, especially shortly after the rifting event. Future modelling of hydrocarbon generation in the Sable Subbasin must incorporate the results of these margin-scale rifting models with more detailed basin-scale thermal models.

Vertical stratigraphic sequence of the Bluesky Formation in west-central Alberta and implications for a depositional model

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Marine and brackish water sandstones and shales of the Bluesky Formation (Early Cretaceous) overlie continental, fluvial deposits of the Gething Formation and are overlain by deep marine shales of the Wilrich Formation. Three transgressive surfaces and at least two prograding shoreface sequences are present within the study area.

The base of the Bluesky Formation is an irregular transgressive surface that has reworked sediment to the first coal but is strongly influenced by the Gething paleotopography. This transgressive event resulted in deposition in a tidally-influenced, marginal marine environment, followed by deposition of a lower shoreface sequence.

The second transgressive surface on the top of this lower shoreface sequence is marked in core by a pebble lag, overlain by heterolithic sandstone and shale. It is possible either that this transgressive event reworked only the top of the lower shoreface sequence or that a drop in sea-level occurred before the transgressive event, thereby resulting in erosion of the upper shoreface and foreshore sequence with subsequent deposition of a pebble lag as this surface was transgressed.

The third transgressive surface marks the top of the Bluesky Formation and occurs at the top of the second prograding shoreface sequence. It is characterized by a glauconite-rich layer overlain by deep marine shales. This last regional transgressive surface was associated with a major rise in sea-level and is a useful datum for stratigraphic cross sections.

The Willowbank mudflat: sediment grain-size analysis and *Corophium* population distributions

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Research in Europe and the Minas Basin has well established that the burrowing amphipod ("mud shrimp") *Corophium volutator* is found on estuarine mudflats with particular types of sediment substrate. That is, the sediment grain-size limits both the distribution and abundance of this species. However, recent research also suggests that the amphipod itself significantly modifies the nature of the top seven or so centimetres that it burrows into. Little is known about the nature of the bioturbation process or the extent that this process determines the nature of surface sediments in estuaries, although it may be responsible for "fining downward" sequences observed in mudflats of the Minas Basin. The effect may be large, considering that these organisms may reach abundances in the order of 60,000 per square metre.

This study, on the Willowbank mudflat of the Cornwallis River estuary, will examine the nature of the bioturbation process and determine the extent to which surface sediments of mudflats may be modified by this amphipod.

Early Carboniferous hydrothermal events of the western Cobequid Highlands of Nova Scotia

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Qualitative petrological analysis and quantitative microprobe and whole rock geochemical data are used to document hydrothermal activity in intrusive bodies immediately north of the Cobequid Fault system. The plutons concerned are the Cape Chignecto, Hanna Farm, West Moose River and North River plutons. Airborne radiometric maps (scale 1:500,000) of the study area indicate elemental anomalies related to hydrothermal events. In particular, airborne radiometric maps indicate a strong potassic anomaly along the Cobequid Fault and associated igneous bodies.

Major hydrothermal activity is characterized by albitization and biotitization. Minor activity is marked by the presence of carbonate, chlorite, and rutile-hematite bearing fractures and veins. Possible REE mineralization is present within the Cape Chignecto granites. REE mineralization is marked by the presence of fluorite and REE-rich isotropic minerals hosted by vugs.

Albitization and biotitization of granites are early high-temperature events, based upon criteria of formation and cross-cutting relationships. Except for the North River pluton, albitization of K-feldspar and perthite is confined to mylonitic samples, petrologically marked by albite overgrowths. Geochemically albitized mylonitic granites have enriched Na_2O content coupled with depletions of K_2O and Rb. Biotitization of granites is generally constrained to clots and stringers confined to early stage fractures formed in a brittle environment.

Biotitization also occurs in gabbroic bodies of the Cape Chignecto, Hanna Farm and West Moose River plutons. Biotitization of the gabbroic intrusions involves primarily the replacement of hornblende by secondary biotite and changes in primary biotite textures. Biotitization textures within the gabbroic phases can be strongly correlated with potassic alteration documented in the Santa Rita prophyry copper deposit, New Mexico.

Chloritization, carbonatization, and hematite-rutilization are considered late-stage events, possibly related to mafic dyke emplacement in an extensional environment.

Cape George Complex, Antigonish Highlands, Nova Scotia: tectonic significance of Late Paleozoic deformation in a dextral strike-slip regime.

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In Maritime Canada, the Late Paleozoic is generally characterized by mildly deformed continental to platformal sedimentary rocks. The complex structural history of the Cape George area, Antigonish Highlands, Nova Scotia, represents anomalously intense local deformation of Late Paleozoic strata. This kinematic study provides important constraints on Late Paleozoic tectonic activity during the waning stages of the Appalachian orogeny in Nova Scotia.

The Cape George Complex is dominated by southward-directed reverse faults bounded by a NE-trending strike-slip system. Shear-related fabrics are observed in shear zones trending E-W which contain foliations characterized by flattened and stretched pebbles in Devonian and Carboniferous polymictic conglomerates. Kinematic data, including S-C fabrics, stretching lineations, fault drag features, extensional fabrics and slickensides, are consistent with a dextral strike-slip environment in which localized reverse faulting was associated with shortening across the major faults. The Cape George Complex is interpreted as a positive flower structure resulting from dextral transpression along the NE-trending Hollow-Marsh Cove fault system.

Coeval deformation along the Hollow Fault in the New Glasgow area produced the Stellarton Graben which has been attributed to side-stepping transfer of dextral strike-slip movement along the Hollow-Cobequid fault system. This indicates that the style of Late Paleozoic deformation adjacent to the Hollow Fault was heterogeneous along its length. This is consistent with a regional dextral strike-slip system with compressional structures, such as the Cape George Complex, at restraining bends, and extensional features, such as the Stellarton Graben, at releasing bends adjacent to the fault. Late Paleozoic global reconstructions indicate that dextral strike-slip activity may have been genetically related to the convergence of Gondwanaland and Laurasia to form Pangea.