

Provenance of the Namurian Lismore Formation, mainland Nova Scotia

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The Namurian Lismore Formation of the Mabou Group, mainland Nova Scotia is a 2500 m thick upward coarsening fluvio-deltaic sequence deposited during terminal orogeny associated with the amalgamation of Pangea. At the time the region was located in the equatorial belt. The sequence consists of a lower fine-grained sandy to muddy redbed member and an upper member of medium-grained green organic-rich micaceous sandstone interbedded with red siltstone. Organic-rich shales from the lower part of the lower member contain Namurian B spores.

Palaeocurrent data show a shift from a southwest sediment source to a northwest sediment source passing up from the lower member to the upper member. Evidence of a change to a wetter climate upsection includes upsection increase of abundance of organic debris, of cross-bedded channel sand deposits versus upward fining cycles with flat bedded bases (suggestive of flood deposits), of frequency of carbonaceous pebble conglomerates and decrease in abundance of desiccation cracks. Thick channel sand deposits are indicative of a strong seasonal (monsoonal) influence.

Based on geochemistry, the sandstones of the Lismore Formation have been divided into two units, A and B. This division does not correspond to the lower and upper members which were divided stratigraphically. Unit A includes the lower member and 115 m of the upper member. Unit B

consists of the remainder of the upper member. In general, unit A exhibits a more restricted range of major and minor oxide compositions which fall within the field of unit B samples.

In order to identify a source area, the geochemical and isotopic composition of the Lismore Formation are compared to several suites of rocks which reside within and around the Maritimes Basin. The data show considerable overlap between unit A of the Lismore Formation and the unconformably underlying Martin Road Formation suggesting that both formations have similar provenance. Similarities also exist between unit A and the Silurian Arisaig Group (Beechill Cove Formation).

Further evaluation of possible mixed sources has led to the discovery that the sedimentary rocks of the Beechill Cove Formation and the plutonic rocks of the Cobequid Highlands could combine to produce the sedimentary rocks of the Lismore Formation. The percentage contribution attributable to the Cobequid Highlands plutonic rocks increases higher up section from approximately 15% - 25% to 50%. A minor influence of Meguma metasedimentary rocks within the Lismore Formation is apparent on isotope plots and is probably the result of transport of resistant detritus from the Meguma metasedimentary rocks or of reworked detritus from the St. Mary's Basin.