Development and collapse of the Pliocene western Canadian Arctic coastal plain*

Lea C. Braschi[1], Thomas Lakeman[1], Natalia Rybczynski[2], Guang Yang[1], and John C. Gosse[1] - *1. Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H 4R2, Canada <lea.braschi@dal.ca.> ¶ 2. Palaeobiology, Canadian Museum of Nature, Ottawa, Ontario K2P 2R1, Canada*

The Beaufort Formation is part of a dissected clastic wedge on the western margin of the Canadian Arctic Archipelago and constitutes a rich record of paleoenvironmental, paleoecological, and paleoclimatic change. It has been shown that the Canadian Arctic Archipelago mean annual temperature was between 15 to 22 °C warmer than today, at a time when ocean-atmosphere- biosphere feedbacks amplified the mid-Pliocene (+2 °C) global warming.

In the western Arctic, the Ballast Brook valley on northwest Banks Island exposes more than 20 km length of section through sandy and pebble sandy braided stream deposits and detrital organic beds. Farther north, fluvial and estuarine facies have been examined on Meighen Island. In the High Arctic, the High Terrace Gravels at the Fyles Leaf Bed and Beaver Pond sites on Ellesmere Island are not formally considered part of the Beaufort Formation but have similar quality paleoenvironmental records. The Fyles Leaf Bed site has recently yielded the first fossil evidence for a High Arctic camel, identified with the help of collagen fingerprinting from a fragmentary limb bone (tibia). Until now, because the records were poorly dated, it was impossible to distinguish if temporal (e.g., climatic) or spatial (e.g., latitudinal, sea ice distribution) variations were the cause for differences in estimated mean temperatures and seasonality from various deposits. Minimum-limiting cosmogenic nuclide burial ages of 3.4 and 3.8 Ma recently obtained for the Beaver Pond and upper part of the Fyles Leaf Bed sites, respectively, are consistent with vertebrate and floral biostratigraphic evidence. A maximum burial age of 6.1 Ma for the Beaufort Formation on Meighen Island, although older than previous age estimates of ~3 Ma, supports paleomagnetic stratigraphy and biostratigraphy at the same location. This apparent age difference between the deposits on Ellesmere and Meighen Islands may account for some of the paleoenvironmental variation.

The Beaufort Formation appears to have once filled at least the western portions of the 100 km-wide channels that currently separate the islands of the Canadian Arctic Archipelago. Intervals of Pliocene continental-shelf progradation are recorded in the lower Iperk Formation. A key objective of our research is to derive new age estimates and improved correlations between the High Terrace Gravels, Beaufort, and Iperk Formations to test hypotheses about the causes for the dramatic deposition and incision of the clastic wedge, and to estimate rates of incision and sediment flux to the Beaufort Sea Shelf at particular times during the Pliocene.

Winner of the AGS Graham Williams Award for best graduate student poster

Atlantic Geology, 2014, Volume 50, Number 1
Atlantic Geoscience Society Abstracts: 40th Annual Colloquium & Annual General Meeting 2014
doi: 10.4138/atlgeol.2014003