Geophysical Research Abstracts
Vol. 16, EGU2014-12772, 2014
EGU General Assembly 2014


# A Pliocene chronostratigraphy for the Canadian western and high Arctic

John Gosse (1), Lea Braschi (1), Natalia Rybczynski (2), Thomas Lakeman (1), Susan Zimmerman (3), Robert Finkel (3), Rene Barendregt (4), and John Matthews (5)

(1) Dalhousie University, Earth Sciences, Canada (john.gosse@gmail.com), (2) Canadian Museum of Nature, Ottawa, Canada, (3) CAMS, Lawrence Livermore National Laboratory, Livermore, USA, (4) Univ. of Lethbridge, Lethbridge, Canada, (5) Retired, Geological Survey of Canada

The Beaufort Formation comprises an extensive (1200 km long, more than 1 km thick) clastic wedge that formed during the Pliocene along the western Canadian Arctic Archipelago (CAA). In the western Arctic, the Ballast Brook (BB) site on Banks Is. exposes more than 20 km of section through the sandy and pebble sandy braided stream deposits with detrital organic beds. Farther north, Beaufort Fm fluvial and estuarine facies have been examined on Meighen Is. In the high Arctic, high terrace gravels (450 m high surface) at the Fyles Leaf Bed (FLB) and Beaver Pond (BP) sites on Ellesmere Is. are not considered part of the Beaufort Fm but have similar paleoenvironmental records. Fossil plant and faunal material from these sediments is often very well preserved and provides evidence of a boreal-type forest and peatlands. The BP fossil site preserves the remains of fossil vertebrates including fish, frog, horse, beaver, deerlet, and black bear, consistent with a boreal type forest habitat. The FLB 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). Paleoenvironmental reconstruction of the Ellesmere sites has yielded a Mean Annual Temperature of between 14 to 22 degrees Celsius warmer than today. Minimum cosmogenic nuclide burial ages of 3.4 and 3.8 Ma obtained for the BP and FLB sites, respectively, are consistent with vertebrate and floral biostratigraphic evidence. The paleoenvironmental records from the Beaufort Fm in the western CAA sites have revealed a similar ecosystem with noteworthy differences in MAT and perhaps seasonality. New burial ages from Meighen Is. indicate a maximum age of 6.1 Ma, consistent with yet much older than previous age estimates, but supportive of paleomagnetic and biostratigraphy at the same location. The age differences may account for some of the interpreted variations in paleoenvironments, in addition to spatial differences in climate. The Beaufort Fm. appears to have filled at least the western portions of the ca. 100 km-wide channels that currently separate the islands of the CAA. Intervals of Pliocene continental-shelf progradation are recorded in the lower Iperk Fm, which is situated offshore and includes complex sigmoid-oblique clinoforms indicative of high-energy, coarse-clastic, deltaic sedimentation. A key objective of our research is to derive new age estimates and improved correlations among the Beaufort and Iperk Formations and high terrace gravels in order to test hypotheses to explain the nature of the dramatic landscape changes responsible for their deposition and the infilling of the CAA channels. If the channels of the modern CAA function as a heat source during winter months and a heat sink during summer months, infilling of the CAA channels and development of a broad coastal plain in the Pliocene may have shut down this radiative process, resulting in increased seasonality and continentality.