Geophysical Research Abstracts
Vol. 20, EGU2018-12228, 2018
EGU General Assembly 2018

The Eocene Thermal Maximum 2 (ETM-2) in the Canadian High Artic: Evidence from a terrestrial section at Stenkul Fiord, Ellesmere Island, Nunavut

Andreas Lückge (1), Reinhardt Lutz (1), Werner von Gosen (2), Markus Sudermann (3), David R. Greenwood (3), Christopher K. West (4), Mark Schmitz (5), and Jennifer M. Galloway (6)

(1) BGR, Marine Geology, Hannover, Germany (andreas.lueckge@bgr.de), (2) Geozentrum Nordbayern, Krustendynamik, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany, (3) Brandon University, Brandon, Manitoba, Canada , (4) University of Saskatchewan, Saskatoon, Saskatchewan, Canada, (5) Boise State University, Boise, USA, (6) Geological Survey of Canada (GSC), Calgary, Alberta, Canada

A succession of largely fluvial clastic sediments with intercalated coals seams of the upper Paleocene/lower Eocene Margaret Formation is exposed at Stenkul Fiord on southern Ellesmere Island. Field studies and interpretative mapping of a high-resolution satellite image of the area southeast of Stenkul Fiord show that the clastic deposits consist of at least four sedimentary units (Units 1 to 4) separated by unconformities. Volcanic ash layers of several centimeter thickness, identified within coal layers and preserved as crandallite group minerals (Ca-bearing goyazite), suggest intense volcanic ash-fall activity. Based on new U-Pb zircon ages (ID-TIMS) of three samples from one ash layer, the volcanic ash-fall took place at 53.7 Ma within the range of the Eocene Thermal Maximum 2 (ETM-2) hyperthermal. Discrete negative excursions of carbon isotope records of both bulk coal and amber droplets collected from individual coal seams indicate the extent of the ETM-2 hyperthermal in the Stenkul Fiord section. The coal seams are situated towards the top of the negative carbon isotope curve excursions. Work is underway on new samples from every coal seam to overcome limitations of the previous sampling resolution and to determine that the dated volcanic ash layer is unquestionably within the range of the negative isotope excursion. The identification of the ETM-2 hyperthermal will provide a stratigraphic tie-point in the terrestrial Margaret Formation sediments and will permit assignment of the lowermost sedimentary Unit 1 to the late Paleocene-earliest Eocene and Unit 2 to the early Eocene, whereas Unit 3 and 4 might be early to middle Eocene in age. Thus, the timing of syn-sedimentary movements of the Eurekan deformation, also causal for the observed unconformities in the section, can be studied in detail complemented by the identification of the positions of other hyperthermals like the preceding PETM or the subsequent ETM-3 in the section. The integration of structural studies, U-Pb zircon ages, palynology, and carbon isotope records is expected to provide a new stratigraphic framework for further examination of the unique early Eocene flora and fauna preserved in this high-latitude outcrop.