Geophysical Research Abstracts
Vol. 15, EGU2013-6188, 2013
EGU General Assembly 2013

Postglacial paleoclimates of the Foxe Basin and surrounding regions (Nunavut, Canada): a multiproxy lake sediment archive study

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Climate change reports show that global warming effects, which are amplified at high latitudes, drive unprecedented environmental changes (ACIA 2005; AMAP-SWIPA 2011). However, not all arctic regions yield the same rate of change (Smol et al. 2005). Several paleoclimate studies completed in areas surrounding the southern Foxe Basin, in Nunavik and Labrador suggest that these regions experienced relatively subtle climatic and environmental changes over the recent past (Pienitz et al. 2004) as compared to the drastic changes reported from the Canadian High Arctic. These contrasting scenarios underscore the need to increase our knowledge of past and present environmental conditions across the Arctic in order to refine our capacity to model past, present and future environmental impacts. Unfortunately, instrumental data available for developing regional and global climate models do not adequately capture the natural environmental variability that has affected these regions over the past.

In an effort to explore the potential responses of northern freshwater ecosystems and their watersheds to climatic change and to place instrumental records into a longer-term perspective, we use a multi-proxy paleolimnological approach to study the sedimentary records preserved in several lakes distributed across regions bordering the Foxe Basin (65°-70°N; 71°-85°W) in Nunavut. This presentation will showcase the preliminary results obtained through studies of lake sediment records from the Foxe Peninsula, Southampton Island, Melville Peninsula, Steensby Inlet and the Nettilling Lake area (Nunavut, Canada). Combined with sedimentological analyses (X-ray profiles, XRF, CHN, grain size, magnetic susceptibility), changes in the composition of both fossil chironomid and diatom assemblages provide an improved understanding of the temporal and spatial variability and of the timing of past climatic events since the last deglaciation. Our central objective is to generate a network of decadal-millennial scale records of quantitative variations in water quality parameters (e.g., temperature, dissolved organic carbon, alkalinity) to explore fundamental questions concerning postglacial ecosystem succession and water quality trends in northern landscapes. Regional comparisons with ice core data from the Penny Ice Cap and the Greenland Ice Sheet, as well as with paleoceanographic data from surrounding marine environments should also allow us refine regional paleoclimate models.