A Late Cretaceous polar forest from NW Ellesmere Island: implications for climate, past and future

Adam Z. Csank
Department of Earth Sciences, Dalhousie University, Halifax, NS B5H 4J1
<acsank@is2.dal.ca>

During the Mesozoic greenhouse climate phase forests grew well within the polar circle. These unique polar forest ecosystems flourished in a warm, high-latitude environment where trees were subjected to months of unbroken winter darkness followed by continuous daylight in the summer. Analysis of these polar forests is important because they provide a long-term context for the response of modern boreal forest ecosystems to future global climate change; as one scientist succinctly put it, "the past is the key to the future".

In this paper a Late Cretaceous polar forest (palaeolatitude of ~80°N) is described from Emma Fjord, NW Ellesmere Island. The fossil forest occurs in the Campanian/Maastrichtian Hansen Point Formation of the Sverdrup basin and is associated with volcanic ash fall and pyroclastic flow sediments. Palynological analysis of these units by MacRae (unpublished B.Sc. thesis, Dalhousie University, 1989) indicates that taxodiaceous conifers dominated this region. In this paper, I describe for the first time, five specimens of silicified and calcified tree trunks from the Emma Fjord fossil forest (collected by MacRae and Muecke, Dalhousie University, 1987). Thin section analysis of anatomical features enabled the wood specimens to be assigned to three conifer families, the Cupressaceae, Taxodiaceae and Pinaceae.

Future studies of tree rings preserved in the fossil woods, and the taxonomy of associated fossil leaf remains will further augment our knowledge of the palaeoecology and palaeoclimate of this extraordinary polar forest ecosystem.