
Paleoceanographic evidence of climate change in the Canadian Arctic: the past 10 000 years

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The reduction, and ultimately the disappearance, of sea ice enhances the warming response of high latitude oceans through a positive feedback loop related to reduction of the heat reflected from ice. Computer models predict that continued global climate warming may lead to a temperature rise of 7.5°C and ice-free Arctic water by 2100 AD, but these models are deficient in accuracy of sea ice predictability. Paleoceanographic studies of Holocene sediments from the Canadian Arctic use fossil plankton that are tuned to modern sea surface temperatures, salinity and ice cover to reconstruct prehistorical changes for known times of climate conditions that were either warmer or colder than now. The results of these paleoceanographic studies are used to test the validity of the climate models. Data will be presented from research in the western and eastern Canadian Arctic using sediment archives, dinoflagellate cysts, pollen and diatoms to reconstruct changes in arctic temperature and sea ice over the past 1 000 to 10 000 years. The most recent research using quantitative estimates derived from dinoflagellate cysts reveals east-west swings in summer surface water temperature and sea ice records between Beaufort Sea and northern Baffin Bay that may allow refinement of earlier paleoclimate models for the whole Arctic region.