

Climate variability and long-term expansion of peat lands in Arctic Norway during the late Pliocene (ODP Site 642, Norwegian Sea)

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We present the first high resolution reconstruction of vegetation and climate change in northern Norway between 3.6-3.14 Ma based on pollen assemblages in the marine sediments of ODP Hole 642B, Norwegian Sea (67°N). During the late Pliocene vegetation alternated between cool temperate forests during warmer-than-present intervals and boreal forest similar to today during cooler intervals. The northern boundary of the deciduous to mixed forest zone was displaced at least 4-8° further north and warmest month temperatures were 6-14.5°C higher than present during warm phases. Diverse cool temperate deciduous to mixed forests grew under warm climatic conditions in the lowlands of the Scandinavian mountains during the earliest late Pliocene (c. 3.6-3.47 Ma). A distinct cooling event at c. 3.47 Ma led to the predominance of boreal forest and the development of open, low alpine environments. The cooling culminated around 3.3 Ma, coinciding with Marine Oxygen Isotope Stage (MIS) M2. After c. 3.29 Ma a high variability of climate is indicated by the repeated expansion of forests and peat lands during warmer and cooler periods, respectively. Climate progressively cooled after 3.18 Ma, resembling climatic conditions during MIS M2. A long-term cooling is expressed by an expansion of Sphagnum peat lands that potentially contributed to the decline in atmospheric CO₂-concentration at the end of the Piacenzian warm period. Correlations with other Northern Hemisphere records suggest hemisphere-wide effects of climate changes. Late Pliocene vegetation changes will be compared to alkenone-based sea surface temperature reconstructions and dinoflagellate cyst assemblage changes for ODP Hole 642B.