

# Holocene Palaeoclimatic Reconstruction in Northern Iceland: Approaches and Results

Endurskipan av holosenum fornveðurlag í Norðuríslandi: framferðarhættir og úrslit

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## Úrtak

Tólveðurfrøðiligar skrásetingar í Íslandi miðskeiðis í 19. öld eru brúktar til at vísa, at landið hefur verið fyrri bæði veðurlagslágmarkum og veðurlagshámorkum, sum umboða tað holosenu tíðarskeiðið. Tilfarið er brúkt til at meta um, hvussu stór tey holosenu temperaturfrávikini vóru, 3 K, og hvussu nógv avfallið broyttist, meira enn 100 %.

## Extended abstract

The period since the middle of the 19<sup>th</sup> century, when instrumental meteorological recording first started in Iceland, has shown climate conditions close to, or even at, both Holocene minimum and optimum levels. The 19<sup>th</sup> century part of the 'Little Ice Age' represents a thermal minimum, whilst the warmest decades of the 20<sup>th</sup> century are close to the estimated Holocene thermal maximum. A model describing sea-ice-climate-ELA relationships in Northern Iceland for this period has been developed, providing a calibrated proxy climate record as a basis for palaeoclimatic reconstruction for the Holocene as a whole.

Glacier advances in the periods around 4700BP (all dates are in <sup>14</sup>C years BP), around 4200BP, c.3200-3000BP, around 2000BP, around 1500BP and around 1000BP, based on radiocarbon dating and tephrochronology, mark climatic minima of the post-Preboreal Holocene, when conditions were comparable to the extremes in the second half of the 19<sup>th</sup> century. If it is assumed that annual mean temperatures experienced during the 1930s, the warmest in the observed record, are comparable to the Holocene thermal optimum, a range of c. 3K can be estimated for the Holocene as a whole. Studies of variations in the ELAs of glaciers in the Tröllaskagi area of Northern Iceland over the period of meteorological observations shown a mean ELA rise of only 50m, over 200m less than that calculated from the observed temperature change of 1.7K in mean summer temperature, and the range of c. 3K in annual temperature. It is argued that this reflects a doubling of precipitation levels.

This calibration provides a baseline for the examination of other proxy palaeoclimatic data for the Holocene as a whole, especially pollen and macrofossil evidence, the results of which are presented elsewhere.