



Decadal to multi-decadal variability of sea surface temperatures in the North Atlantic over the last 2000 yrs.

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The North Atlantic Oscillation (NAO) is commonly used to describe the major climatic modes of the Northern Hemisphere and reflects the atmospheric pressure field, wind tracks and, consequently, precipitation over the North Atlantic and connected regions. Decadal to multi-decadal sea surface temperatures (SSTs) variability has been described in a few of historical records, but longer time series are needed to better understand the nature of NAO variability and for testing numerical models. In order to extend existing records and document the long-term variability of NAO, a high resolution proxy record was generated in the marine core MD99-2275 (66°33'N; 17°42'W; 440 m water depth) retrieved from the north Icelandic shelf. Here we present a unique SST time series derived from alkenone paleo-thermometry over the last 2000 yrs, with a mean temporal resolution of 4 years. Internal reproducibility of SSTs is estimated to 0.2°C. The age model is constrained by 8 well dated tephra layers and several ¹⁴C dates. The overall record exhibits a decreasing trend from c.a. 9°C down to 7°C. The 980-1340 AD time interval characterized by warmer SSTs (averaging 9°C) is attributed to the Medieval Warm Period (MWP). The onset (+1.5°C) and termination (-2°C) of the MWP appear to occur in no more than a decade. The detailed structure of MWP reveals two periods of colder SSTs at c.a. AD 1100-1150 and at AD 1230-1260

that are also seen in the GISP2 oxygen record. A similar thermal structure extending from c.a. AD 300 to 700 probably depicts the Roman Warm Period. Our record also shows significant SST coolings coincident with major solar radiation minima. Wavelet analysis was performed on this proxy data set to explore the dynamics of NAO and achieve a coherent picture of its impact on the North Atlantic surface circulation.