



Long-term NAO reconstruction using lake sediments from W Greenland

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Climate in the Arctic region and northwestern Europe is strongly affected by the North Atlantic Oscillation, the dominant mode of atmospheric variability at mid-latitudes in the North Atlantic region. The North Atlantic Oscillation index is an indicator for atmospheric circulation patterns across the North Atlantic Ocean: when the index is positive, weather conditions in Europe and the eastern US are mild and wet, whereas Greenland and northern Canada are cold and dry. A negative index is associated with the reverse pattern. Reconstructions of the North Atlantic Oscillation have been limited to the past 900 years. Here we analyse a high-resolution lake sediment record of redox variability from southwestern Greenland over the past 5,200 years to reconstruct lake thermal stratification, and link the results to an existing reconstruction of the North Atlantic Oscillation index from tree rings and speleothems. Using the relationship between the two records, we find that around 4,500 and 650 years ago - at the end of the Holocene Thermal Maximum and the beginning of the Little Ice Age, respectively - the North Atlantic Oscillation changed from generally positive to variable, intermittently negative conditions. We suggest that changes in the dominant state of the North Atlantic Oscillation tend to coincide with significant climate transitions, but note that the onset of the Medieval Climate anomaly around AD 950 did not coincide with any changes in the NAO.