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Identification of millennial Scale Climate Variability over the Holocene by Wavelet Analysis

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In this paper, we investigate two paleoclimate data sets: the Greenland ice core records and sediment records from Lake Baikal (Siberia). We use climate proxy data to identify long-term climate variations because meteorological measurements are available for the last 200 years only. Uneven time sampling and severe uncertainties in age and magnitudes result in 'common' time series analysis techniques failing. We therefore use the Foster's wavelet Z transform, as it has been shown to be an appropriate tool for identifying cyclicity in data sets with the above properties. We apply this wavelet technique to both the Greenland glaciochemical and Lake Baikal magnetic susceptibility time series. We find in both the existence of a 1500 yr climate cycle throughout the Holocene, i.e., the recent warm period that began approximately 15,000 years ago.