



A proxy record of winter temperatures since 1836 from ice freeze-up/breakup in lake Näsijärvi, Finland

Manfred Mudelsee (1,2)

(1) Climate Risk Analysis, Hannover, Germany (mudelsee@mudelsee.com), (2) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

One obstacle on the way to a comprehensive spatial reconstruction of regional temperature changes over the past centuries is the sparseness of long winter temperature records. This presentation shows reconstruction of a proxy record of April and November-to-December temperatures in south-central Finland for the interval from 1836 to 1872 from breakup and freeze-up dates and ice-cover duration of a lake. Emphasis is on detecting the suitable winter months and quantifying the calibrations with measured temperatures (1873 to 2002). The calibration slope for the breakup date ($0.158\text{ }^{\circ}\text{C/day}$) is larger than for freeze-up date ($0.119\text{ }^{\circ}\text{C/day}$) or duration ($0.090\text{ }^{\circ}\text{C/day}$). A comparison with results from other proxy records shows that the slope may depend also on the geographical site. Trend analyses of the full temperature records (1836 to 2002) indicate the existence of minor change-points at around 1867 (April temperature) and 1874 (November-to-December temperature), with warming rates thereafter of $1.67\text{ }^{\circ}\text{C per century}$ (April) and $1.16\text{ }^{\circ}\text{C per century}$ (November to December). Spectral analyses reveal peaks in the band between 2 and 5 year period, which may point to influences of the North Atlantic Oscillation, and less power in the decadal band (up to 42 year period).