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ABSTRACTS

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EVIDENCE OF ANTHROPOGENIC INFLUENCES ON THE GROWTH OF HIGH-LATITUDE TREES: IMPLICATIONS FOR TEMPERATURE RECONSTRUCTION, THE MISSING CARBON SINK AND MODEL-ESTIMATES OF FUTURE CLIMATE CHANGE

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A circum-Arctic network of high-latitude and high-elevation tree-ring chronologies, comprizing both ring-width and ring-density parameters is currently under construction. These data, represent year-by-year tree growth continuously and with absolute dating precision at over 350 sites during the last 300-400 years. At special sites where subfossil wood remains have been located, multi-millennial-length chronologies are under construction. The sensitivity of these trees to interannual variations in summer temperature provides an opportunity for the reconstruction of past thermal climates, either as detailed patterns spanning recent centuries or in terms of very long regional-mean series representing those areas with subfossil wood. Examples will be shown of the detailed regional mapping of past summer temperature patterns and long-term changes that have occurred over western Canada, northern Fennoscandia and northern Siberia. These reconstructions allow us to place the climate of the present century in much longer context and provide a basis for assessing the significance of current and future model-based estimates of high-latitude warming.

The statistical and ecological problem associated with attempts to infer long-time scale temperature change from tree-ring data will be discussed. Recent results will be shown that

strongly suggest that different (positive and negative) anthropogenic influences have affected "natural" tree-growth over recent centuries and, dramatically, in recent decades. Such influences may confound our attempts to infer accurately past climate changes on long timescales. These results are relevant to the question of the "missing carbon sink" and have important implications for carbon-cycle modelling of future CO_2 concentration and hence estimate of future climates.