

CLIMATE FROM THE 7520-YEAR UNBROKEN SCOTS PINE TREE-RING CHRONOLOGY FOR FINNISH LAPLAND



Marjo Eronen, Department of Geology, University of Helsinki, Finland
Sanna Hedman, Department of Geology, University of Helsinki, Finland
Markus Lindholm, Saima Centre for Environmental Sciences, University of Joensuu, Finland
Mauri Timonen, Finnish Forest Research Institute, Rovaniemi, Finland

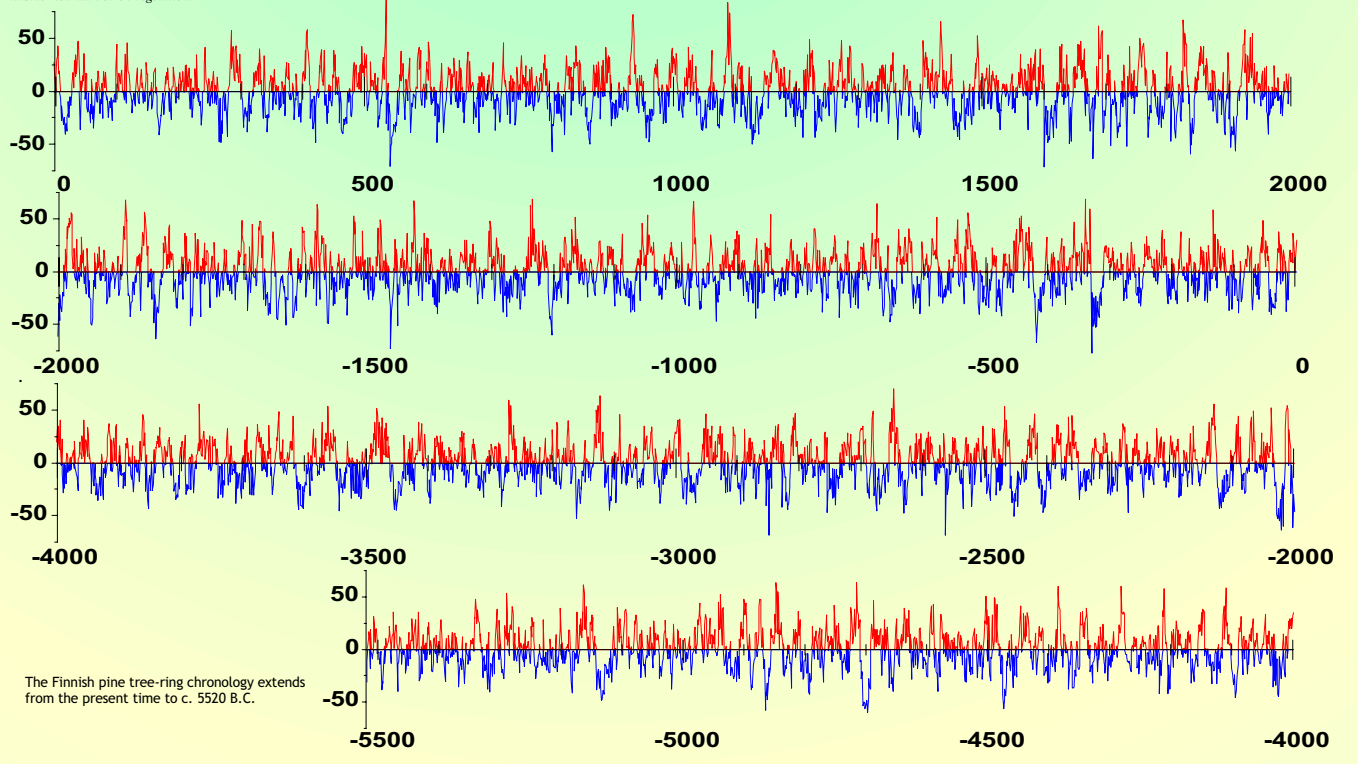
Tree rings are of great importance as high-resolution proxies of past climate. A long well-established dendrochronological record from a climatologically sensitive area can provide valuable indications of the Holocene climatic variability. Here we report a c. 7500 years long continuous Scots pine tree-ring record from the treeline area of northern Fennoscandia. This record can be used for reconstructions of the interannual variability of past summer temperatures and potentially for studies of many past climatic and environmental variables.

Scots pine (*Pinus sylvestris*, L.) immigrated to northern Finnish Lapland by 9.5–9 ka calBP and spread in favourable climatic conditions to a larger area than that occupied by pine forests today. The time of the maximum extent was between 7 and 4.5 ka calBP. A large number of subfossil pine trunks and stumps have been preserved in small lakes in Lapland in the present treeline area and also beyond it. An earlier work in Lapland resulted in several dozens of radiocarbon dates for subfossil pine wood. The dated sample dates could be used to tie the initial floating chronologies to the radiocarbon timescale.

Cores from living trees and beams of old wooden buildings were also used. The intensive phase of the data collection and chronology building lasted about 10 years until the master curve was completed in 1999. The present pine tree-ring chronology extends from the present time to c. 5520 B.C.

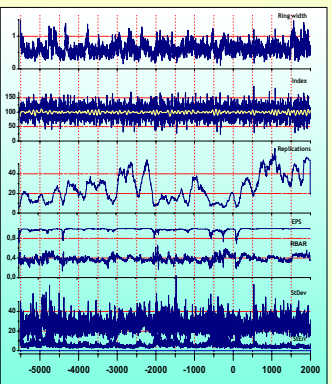
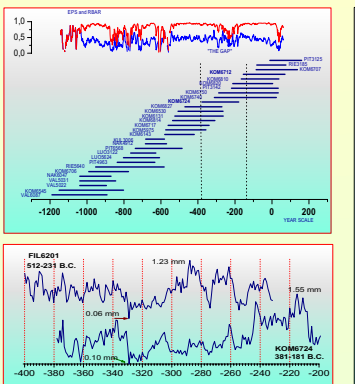
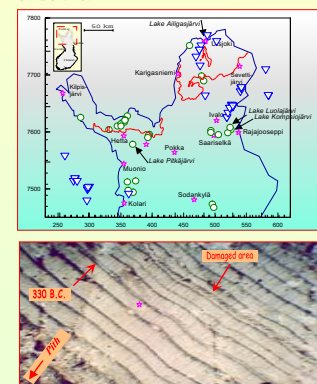


Winches and a rigid tripod were used for pulling up the logs.



The Finnish pine tree-ring chronology extends from the present time to c. 5520 B.C.

The most unfavourable period in the Finnish 7520-year pine master chronology was about 350–150 B.C. Low correlation of samples made it difficult to bridge the gap between the absolute and the floating part of the series.



Correlation of a Finnish timberline pine tree-ring index and the combined global land and marine surface temperature record from 1856 to 2002 (Jones et al.)

There was a sudden drop in the pine growth in 330 B.C. A very thin ring was formed in that year and the recovery from the blow took about 20 years.

These two samples, FI4201 and K046724, made it finally possible to close the gap. Periodically there are good correlations in tree-ring width curves due to a strong June–July temperature climatic signal. It is interesting, however, that the signal occasionally seems to disappear.

Some parameters of the Finnish 7520-year chronology. The average ring-width is about 0.6 mm. The number of replications ranges from 6 to 60 samples per year. The low values (<0.85) in the EPS parameter indicate an insufficient number of replications. The average correlation between samples is about 0.4 and the standard deviation about 30 %.

The forcing power of the NAO (North Atlantic Oscillations) is usually strong in Finland, e.g. mid-winter temperatures (DJFM) follow year-exactly the variations of the NAO indices. But the coinciding rhythms are not always true: the late 1920s–early 1930s and the 1960s were here exceptions.

