# Subfossil trees as proxies for long-term climate dynamics and ecosystem changes

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Our understanding of long-term climate dynamics, environmental changes, as well as our possibilities to evaluate climate models predicting future climate scenarios are largely based on proxy records with a high temporal resolution and a wide geographical distribution. This study present results from an ongoing initiative to develop multi-millennial Scandinavian tree-ring width (TRW) chronologies from subfossil oak (*Quercus* spp.) and pine (*Pinus* spp.). About 1000 oak trunks extracted from Danish and South Swedish sites have been analyzed, and at present, the material consists of a mixture of absolutely dated, radiocarbon dated, and not yet dated TRW records showing a temporal spread over the last 8500 years. The material has been collected during dendrochronological fieldworks and archaeological excavations since the 1970s, but since there are still gaps in between the chronologies, new efforts are under way to find materials that can bridge the gaps. Regarding the pine trees, the material consists of remains from about 800 trees from south Swedish peat extraction sites (Edvardsson et al. 2012, 2014). The main part of the pine material covers the period 5200 - 1100 BCE (approximately 7200 - 3100 BP), which corresponds to the Holocene Thermal Maximum (HTM) and the transition period towards a colder and more unstable climate following HTM.

Significant long-distance cross-dating statistics between Swedish – Danish – German TRW chronologies proves that there is a valuable (palaeo)climatic signal in the TRW data (Edvardsson et al. 2012, 2014, 2016). Moreover, several oak dying-off and burial events coincide with wet shifts causing expanding peatlands, which makes the oak material a valuable complement to the Scandinavian bog-pine chronologies, whereas peatland pine colonization phases correspond to relatively warm and dry periods. The importance of these TRW chronologies should therefore not be underestimated as (1) climate records of comparable length and resolution are rare for southern Scandinavia, (2) the TRW chronologies can serve as an important dating tool for archaeological artefacts from the region, and (3) there is a widespread lack of detailed moisture proxies spanning several millennia. Our data clearly show that a continuous 8000-year bog-oak chronology and multi-millennial pine chronologies from South Scandinavia is a realistic objective and would doubtlessly fill a major geographic gap in an ecologically sensitive region located at the interface between the temperate and boreal vegetation zones. Furthermore, these data can be helpful in detecting and dating extreme climate changes that have influenced societal development during prehistoric times.

### References

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