

## **Warm & wet or warm & dry? - A tree-ring based drought reconstruction from the European lowlands with emphasis on the medieval climate anomaly**

Tobias Scharnweber (1), Ingo Heinrich (2), Ernst van der Maaten (1), Karl-Uwe Heußner (3), and Martin Wilmking (1)

(1) Ernst Moritz Arndt University Greifswald, Germany (wilmking@uni-greifswald.de), (2) GFZ German Research Centre for Geosciences, Sect. 5.2 Climate Dynamics and Landscape Evolution, Potsdam, Germany, (3) German Archaeological Institute (DAI), Berlin, Germany

Recent advances in reconstructing natural drought variability in Europe, such as the ‘Old world drought atlas’ (Cook et al., 2015), have sharpened our picture of historical hydroclimatic variability. However, our knowledge lacks high spatial resolution, especially for the northern non-arid regions. For example, it is still under debate if the so called medieval climate anomaly (MCA; ~950-1300 AD), a period of warm temperatures comparable to the contemporary warm phase, was likewise accompanied by increased drought occurrence, or, on the contrary, was rather wet (e.g. Kress et al., 2014).

Here, we present a new millennial long drought reconstruction based on a unique dataset of tree rings from historical and modern beech wood from the northeastern European lowlands. Beech has a stable and strong regional summer drought signal over the calibration period of instrumental data ( $r > 0.7$  with drought index PDSI over 1900-2010) which, in contrast to other species such as oak, is consistent irrespective of the site/soil conditions the trees grew in. It can be assumed that during medieval times beech wood was available locally and not traded long distances. This strongly reduces the possibility that the new reconstruction mixes different signals of the possibly high spatial variability of precipitation. The extremely high replication of our chronology for the period 1000-1300 AD (peak in town foundations in NE-Germany) with more than 600 series enables a direct comparison with the well replicated recent period 1800-2010. In contrast to the results of Kress et al. (2014) for the Swiss Alps, but in accordance with the ‘Old world drought atlas’, our first results point at a rather dry and warm MCA in NE-Germany. In addition they support the observation that the hydroclimate of the twentieth century was highly variable compared with the last millennium.

### References

- Cook ER, Seager R, Kushnir Y, et al. (2015) Old World megadroughts and pluvials during the Common Era. *Science advances* 1(10), e1500561.
- Kress A, Hangartner S, Bugmann H, et al. (2014) Swiss tree rings reveal warm and wet summers during medieval times. *Geophysical Research Letters* 41(5), 1732–1737.