



Environmental factors affecting sensitivity of Oak (*Quercus* spp.) ring width chronologies to hydroclimate

Petr Dobrovolný (1,2), Michal Rybníček (2,3), Ulf Büntgen (2,4,5), Miroslav Trnka (2,6), Rudolf Brázdil (1,2), Zdeněk Stachoň (1), Ondřej Prokop (3), Tomáš Kolář (2,3)

(1) Masaryk University, Department of Geography, Brno, Czech Republic, (2) Global Change Research Institute, Czech Academy of Sciences, Brno, Czech Republic, (3) Department of Wood Science, Mendel University in Brno, Czech Republic, (4) Swiss Federal Research Institute for Forest, Snow and Landscape WSL, Birmensdorf, Switzerland, (5) Oeschger Centre for Climate Change Research, Bern, Switzerland, (6) Department of Agrosystems and Bioclimatology, Mendel University in Brno, Czech Republic

Long oak ring width chronologies are invaluable sources of information for dating purposes. However, their use for climate reconstruction may be complicated by the fact that they sometimes convey climate signals that appear ambiguous. This contribution employs the more recent part of the oak ring width chronology from the territory of the Czech Republic for testing its “internal homogeneity”. Oak ring width measurements compiled from 44 sampling sites were analyzed for the 1655–2013 period. Measurements taken at all sites were sorted into ten sub-chronologies on the basis of a number of environmental factors, such as soil moisture (dry/wet), elevation (low/high), age (young/old), species (*Quercus robur* or *Q. petraea*), and geographical position (east/west). Various statistical tests were applied to establish whether there exist significant differences between pairs of chronologies over the common period of 1920–2013. Additionally, the sensitivities of individual sub-chronologies to precipitation regime and to various drought indices were compared. Our results indicate five pairs of very similar sub-chronologies. Moreover, the growth-response to MJJ precipitation totals and/or to drought indices is very much the same in these sub-chronologies. We discuss the issue of tree-age structure and try to evaluate the significance of problems arising out of the combination of the two main oak species in the chronology. This analysis demonstrates that, even in the absence of certainty about environmental factors in the earlier parts of oak TRW chronologies, the internal homogeneity of the chronology compiled from climatologically homogeneous region remains essentially unaffected. This means that such a lack does not preclude use of oak ring width chronologies in dendroclimatology.