



The role of biophysical indicators in the reconstruction of long-term late-spring – summer temperatures for the region of Western Hungary and Eastern Austria

Andrea Kiss (1), Rob Wilson (2), Franz Holawe (3), Elisabeth Strömmér (3), and István Bariska (4)

(1) University of Szeged, Physical Geography and Geoinformatics, Szeged, Hungary (kissandi@earth.geo.u-szeged.hu), (2) University of St. Andrews, School of Geography and Geosciences, St. Andrews, U.K. , (3) Institute for Geography and Regional Research, University of Vienna, Austria, (4) Vas County Archives – Kőszeg Municipal Archives, Kőszeg, Hungary

We present an almost 500-year May-July temperature reconstruction based on 24 biophysical series. 19 are vine-related series from Kőszeg, Szombathely and Sopron in Western Hungary (11 series, from 1580s onwards), Vienna, Klosterneuburg, Perchtoldsdorf (7 series; at present from 1520s onwards) in Eastern Austria and Bratislava in Western Slovakia (1 series, from 1770s onwards).

At present, the first, largest group is the vine related indicators, where dates of blossoming (1 series), beginning of grape ripening (3 series), dates of full ripening (2 series), beginning of grapevine harvest (8 series), starting dates of pressing out the juice (1 series: at present 1520s onwards), starting dates of tax-collection (after the pressed juice: 1 series) and wine quality indices (3 series: from 1580s onwards) are also included.

The second main group of 4 indicators applied in the analysis are grain-harvest related indicators from Western Hungary, such as dates for estimation of harvesting-shares which are strongly dependant on the beginning of grain harvesting (at present 2 series: from 1640s onwards) and dates of grain tax collection (2 series: from 1560s onwards). A third group, still in development, is mainly related to more natural vegetation, and is strongly dependent on the full ripening of oak acorns: the starting dates of woodland pasture (at present 1 series: from 1770s onwards). The above-mentioned historical series correlate well, over the 18th-19th century period, with Vienna May–July measured temperature (Böhm, et. al. 2009).

The complicated nature of these historical data is described (e.g. with respect to the normality of the data distribution), and we present methods to transform and composite the data into a homogenous, homoscedastic time-series that can be used for proxy based calibration. Finally, a preliminary May-July temperature reconstruction is derived using modified dendrochronological methods. (see Leijonhufvud et al. 2009) The Kőszeg, Szombathely, Sopron and Bratislava series and all presented analyses were developed within the framework of the EU project 'Millenium'. The Austrian series are partly based on published series (Pribram 1938, Lauscher 1985, Strömmér 2003) although in some cases modified and extended for this study, as well as newly developed data.

The present work is a continuation of the 'Analysis of late spring-summer temperatures for Western Hungary based on vine, grain tithes and harvest records', presented at the annual congress of EGU in 2009 (Kiss and Wilson 2009).

References

Böhm, R., Jones, P.D., Hiebl, J., Frank, D., Brunetti, M., Maugeri and M. 2009: The early instrumental warm-bias: a solution for long central European temperature series 1760–2007. *Climatic Change*, doi: 10.1007/s10584-009-9649-4.

Kiss, A. and Wilson, R. 2009: Analysis of late spring-summer temperatures for Western Hungary based on vine, grain tithes and harvest records. *Geophysical Research Abstracts* Vol 11, EGU2009-10945-1.

Lauscher, F. 1985: Beiträge zur Wetterchronik seit dem Mittelalter. In: *Sitzungsberichte, Abtheilung II*,

Mathematische, Physikalische und Technische Wissenschaften, Band 194, Heft 1-3. pp. 93-131.

Leijonhufvud, L., Wilson, R., Möberg, A., Söderberg, J., Retsö, D. and Söderlind, U. 2009: Five centuries of Stockholm winter/spring temperatures reconstructed from documentary evidence and instrumental observations. *Climatic Change*, doi: 10.1007/s10584-009-9650-y.

Pribram, A. F. 1938: Materialien zur Geschichte der Preise und Löhne in Österreich. Band. I. Carl Ueberreuters Verlag, Wien. pp. 364-370.

Strömmер, E. 2003: Klima-Geschichte. Methoden der Rekonstruktion und historische Perspektive. Ostösterreich 1700 bis 1830. *Forschungen und Beiträge zur Wiener Stadtgeschichte* 39. Franz Deuticke, Wien. pp. 59-71.