Geophysical Research Abstracts
Vol. 12, EGU2010-2148, 2010
EGU General Assembly 2010

March-June temperature reconstruction in the Czech Lands based on cereal harvest dates in the 1501-2008 period

Rudolf Brázdil (1), Martin Možný (2), Petr Dobrovolný (1), and Mirek Trnka (3)

(1) Masaryk University, Institute of Geography, Brno, Czech Republic (brazdil@sci.muni.cz, +420-549491487), (2) Czech Hydrometeorological Institute, Observatory Doksany, Czech Republic, (3) Mendel University of Agriculture and Forestry, Institute of Agriculture Systems and Bioclimatology, Brno, Czech Republic

Cereal crop harvests reflect the weather patterns of the period immediately preceding them, and thus the dates at which they begin may be used as a source of proxy data on regional climate. Using systematic phenological observations in the Czech Lands (now known as the Czech Republic) after 1848, together with exploration of further surviving documentary evidence (chronicles, diaries, financial accounts etc.), it has proved possible to create series of winter wheat harvest dates for the period 1501–2008. Employing linear regression, the harvesting dates of the main cereal species (wheat, rye, barley, oats) were first converted to winter wheat harvest days and then normalised to the same altitude above sea level. The next step consisted of using series of winter wheat harvest dates to reconstruct mean March–June temperatures in the Czech Lands, applying standard palaeoclimatological methods. Series reconstructed by linear regression explain 70% of temperature variability. A profound cold period corresponding with late winter wheat harvests was noted between 1659 and 1705. In contrast, warm periods (i.e. early winter wheat harvests) were found for the periods of 1517–1542, 1788–1834 and 1946–2008. The period after 1951 is the warmest of all throughout the entire 1501–2008 period. Comparisons with other European temperature reconstructions derived from documentary sources (including grape harvest dates), tree-ring and instrumental data reveal generally close agreement, with significant correlations. Lower correlations around A.D. 1650 and 1750 may be partly related to deterioration of socio-economic conditions in the Czech Lands resulting from prolonged wars. The results obtained demonstrate that it is possible to use widely-available cereal harvest data for climate analysis and also that such data constitute an independent proxy data series for the region of Central Europe crucial to further studies of the potential impact of climatic variability and climate change on agriculture. (The paper was supported by Grant Agency of the Czech Republic, project No. 521/08/1682.)