



Changes in Central European Soil Moisture Availability and Circulation Patterns over 1875-2005

M. Trnka (1, 2), J. Kyselý (2), M. Možný (3); J. Hostýnek (3), L. Bartošová (1)

(1) Institute for Agrosystems and Bioclimatology, Mendel University of Agriculture and Forestry Brno, Czech Republic, mirek_trnka@yahoo.com

(2) Institute of Atmospheric Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic

(3) Czech Hydrometeorological Institute, Prague, Czech Republic

The main aim of the study was to analyze drought events in the Czech Republic during period 1875-2005 using previously unavailable data. The daily mean temperature and precipitation sums were homogenized by the Czech Hydrometeorological Institute for 8 sites where measurements have started between 1875 and 1912 and continued up to 2005. The episodes of drought occurrence within these time series were assessed by standard methodology employing monthly Palmer Z-index (ZIND) and Palmer drought severity index (PDSI). This approach was combined with calculation of PDSI and ZIND in weekly time step that has been recently developed. The study focused also on the analysis relating the drought patterns with the frequency of the basic synoptic situations using the Hess-Brezowsky catalogue of DWD.

We have found statistically significant trend of the PDSI values in at least one month at 7 out of the 8 secular series. The results also seem to suggest that drought events have been growing in their number and/or intensity throughout the last 130 years at majority of the sites despite notable fluctuations. The period 1985-2005 (particularly the early 1990's and 2003-2005) proved to be exceptionally dry compared to 1875-1930 or even 1961-1990 time frames. There has been steady increase of the drought intensity and proportion of months/weeks in the drought episode with the time also in case of ZIND. In the same time the soil moisture anomalies (expressed in terms of ZIND (weekly) and PDSI (time scale up to 12 months) in the last 30 years of

record exhibit significantly different distribution characteristics compared to the period 1876-1905 or 1901-1930. It is obvious that these trends in drought indices are driven by increased ambient temperatures as there has been no significant change in the precipitation patterns. The detail analysis showed that the existing drying trend especially in early vegetation period (April-June) is associated with increasing frequency of central-European highs and southern and eastern circulation types that are in general conducive to drought during this season. The study also gives a comprehensive list of circulation types and their groups that are conducive to drought in each season and their interdecadal variability.

Acknowledgement : *This study was conducted with support of the 6th FP EU research project CECILIA (no GOCE 037005) and by the Research plan No. MSM6215648905 “Biological and technological aspects of sustainability of controlled ecosystems and their adaptability to climate change“, which is financed by the Ministry of Education, Youth and Sports of the Czech Republic .The weekly drought indicators were parameterized with the help of KONTAKT project no. ME 844.*