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Documentary and instrumental-based drought indices for the Czech Lands back to AD 1501

Rudolf Brázdil (1,2), Petr Dobrovolný (1,2), Miroslav Trnka (2,3), Ulf Büntgen (2,4,5), Ladislava Řezníčková (1,2), Oldřich Kotyza (6), Hubert Valášek (1,7), Petr Štěpánek (2,8)

(1) Masaryk University, Brno, Czech Republic (ladkar@sci.muni.cz), (2) Global Change Research Institute CAS, Brno, Czech Republic, (3) Mendel University, 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) Regional Museum, Litoměřice, Czech Republic, (7) Moravian Land Archives, Brno, Czech Republic, (8) Czech Hydrometeorological Institute, Brno, Czech Republic

This study addresses the reconstruction of four slightly different drought indices in the Czech Lands (recent Czech Republic) back to 1501 AD. Reconstructed monthly temperatures for central Europe that are representative for the Czech territory, together with reconstructed seasonal precipitation totals from the same area, are used to calculate monthly, seasonal and annual drought indices (SPI, SPEI, Z-index, and PDSI). The resulting time-series reflect interannual-to multi-decadal drought variability. The driest episodes cluster around the beginning and end of the 18th century, while 1540 emerges as a particularly dry extreme year. The temperature-driven dryness of the past three decades is well captured by SPEI, Z-index and PDSI, whereas precipitation totals show no significant trend during this period (as reflected in SPI). Data and methodological uncertainty associated with Czech drought indices, as well as their position in a greater European context, are critically outlined. Further discussion is devoted to comparison with fir tree-rings from southern Moravia and a spatial subset of the "Old World Drought Atlas" (OWDA), which reveals significant correlation coefficients, of around 0.40 and 0.50, respectively. This study introduces a new documentary-based approach for the robust extension of standardized drought indices back into pre-instrumental times, which we also believe has great potential in other parts of the world where high-resolution paleoclimatic insight remains as yet limited.