

Variability of floods, droughts and windstorms over the past 500 years in Central Europe based on documentary and instrumental data

Rudolf Brazdil (1,2)

(1) Masaryk University, Institute of Geography, Brno, Czech Republic (brazdil@sci.muni.cz), (2) Global Change Research Institute CAS, Brno, Czech Republic

Hydrological and meteorological extremes (HMEs) in Central Europe during the past 500 years can be reconstructed based on instrumental and documentary data. Documentary data about weather and related phenomena represent the basic source of information for historical climatology and hydrology, dealing with reconstruction of past climate and HMEs, their perception and impacts on human society. The paper presents the basic distribution of documentary data on (i) direct descriptions of HMEs and their proxies on the one hand and on (ii) individual and institutional data sources on the other. Several groups of documentary evidence such as narrative written records (annals, chronicles, memoirs), visual daily weather records, official and personal correspondence, special prints, financial and economic records (with particular attention to taxation data), newspapers, pictorial documentation, chronograms, epigraphic data, early instrumental observations, early scientific papers and communications are demonstrated with respect to extraction of information about HMEs, which concerns usually of their occurrence, severity, seasonality, meteorological causes, perception and human impacts. The paper further presents the analysis of 500-year variability of floods, droughts and windstorms on the base of series, created by combination of documentary and instrumental data. Results, advantages and drawbacks of such approach are documented on the examples from the Czech Lands. The analysis of floods concentrates on the River Vltava (Prague) and the River Elbe (Děčín) which show the highest frequency of floods occurring in the 19th century (mainly of winter synoptic type) and in the second half of the 16th century (summer synoptic type). Reported are also the most disastrous floods (August 1501, March and August 1598, February 1655, June 1675, February 1784, March 1845, February 1862, September 1890, August 2002) and the European context of floods in the severe winter 1783/84. Drought fluctuations in the Czech Lands are represented by the chronology of drought frequency on the one hand and by the reconstructed series of drought indices (SPI, SPEI, Z-Index and PDSI) on the other. Wind extremes are documented on the example of Czech windstorm chronology derived from documentary data (including tornadoes) with an example of “windstorm of the 18th century” (20–21 December 1740). Finally, scientific potential and perspectives of historical-climatological (historical-hydrological) research of HMEs are presented.