

Monthly and seasonal temperature reconstructions for Central Europe derived from documentary evidence and instrumental records since AD 1500

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Abstract

Monthly temperature reconstructions for Central Europe since AD 1500 are developed from documentary index series from Germany, Switzerland and the Czech Republic covering 1500–1854 and instrumental temperature records for 1760–2007. Documentary evidence from the Low Countries, the Carpathian Basin and Poland are used for cross-checking. The instrumental station records are corrected for all known inhomogeneities, including insufficient radiation protection of early thermometers and the urban heat island effect. The documentary data series correlate with instrumental temperatures, most strongly in winter (86% explained variance in January) and least in autumn (56% in September). For annual mean temperatures, 81% of the variance is explained. Verification statistics indicate high reconstruction skill for most months and seasons. The last 20 years (since 1988) stand out as the warmest 20-year period, accounting for the calibration uncertainty and decreases in proxy data quality before the calibration period. The new reconstruction displays a previously unobserved long-term decrease in DJF, MAM and JJA temperature variability over last five centuries. Compiled monthly, seasonal and annual series have a potential to improve the robustness of gridded reconstructions. Further improvement would be achieved if documentary data from other European countries are further developed.

Keywords. Temperature reconstruction, documentary climate evidence, temperature indices, homogenized instrumental series, Central Europe.