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## Setting the tree-ring record straight

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Tree-ring chronologies are the main source for annually resolved and absolutely dated temperature reconstructions of the last millennia and thus for studying the intriguing problem of climate impacts. Here we focus on central Europe and compare the tree-ring based temperature reconstruction with reconstructions from harvest dates, long meteorological measurements, and historical model data. We find that all data are long term persistent, but in the tree-ring based reconstruction the strength of the persistence quantified by the Hurst exponent is remarkably larger ( $h = 1.02$ ) than in the other data ( $h = 0.52 - 0.69$ ), indicating an unrealistic exaggeration of the historical temperature variations. We show how to correct the tree-ring based reconstruction by a mathematical transformation that adjusts the persistence and leads to reduced amplitudes of the warm and cold periods. The new transformed record agrees well with both the observational data and the harvest dates-based reconstructions and allows more realistic studies of climate impacts. It confirms that the present warming is unprecedented.