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Preliminary multiproxy surface air temperature field reconstruction for China over the past millennium

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We present the first millennial-length gridded field reconstruction of annual temperature for China, and analyze the reconstruction for spatiotemporal changes and associated uncertainties, based on a network of 415 well-distributed and accurately dated climatic proxy series. The new reconstruction method is a modified form of the point-by-point regression (PPR) approach. The main difference is the incorporation of the "composite plus scale" (CPS) and "Regularized errors-in-variables" (EIV) algorithms to allow for the assimilation of various types of the proxy data. Furthermore, the search radius is restricted to a grid size; this restriction helps effectively exclude proxy data possibly correlated with temperature but belonging to a different climate region. The results indicate that: 1) the past temperature record in China is spatially heterogenic, with variable correlations between cells in time; 2) the late 20th century warming in China probably exceeds mean temperature levels at any period of the past 1000 years, but the temperature anomalies of some grids in eastern China during the Medieval climate anomaly period are warmer than during the modern warming; 3) the climatic variability in the eastern and western regions of China was not synchronous during much of the last millennium, probably due to the influence of the Tibetan Plateau. Our temperature reconstruction may serve as a reference to test simulation results over the past millennium, and help to finely analyze the spatial characteristics and the driving mechanism of the past temperature variability. However, the lower reconstruction skill scores for some grid points underline that the present set of available proxy data series is not yet sufficient to accurately reconstruct the heterogeneous climate of China in all regions, and that there is the need for more highly resolved temperature proxies, particularly in the Tibetan Plateau.