



A multi-proxy reconstruction of spatial and temporal variations in Asian summer temperatures over the last millennium

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Reconstructions of the spatial and temporal patterns of regional temperature variability are important for a better understanding and quantification of the influence of different external forces and internal feedbacks of the global climate system at scales that are most relevant to human society. However, in many parts of the world, data on patterns of past temperature variability are sparse, on account of a paucity of proxy records. To solve this problem, the international Past Global Changes (PAGES) project established the PAGES 2k Network in 2009. This network includes the Asia 2k group, which mobilized the scientific community in Asia to obtain numerous proxy records that were not available from public data repositories. This effort produced temperature reconstructions and analyzed the spatial and temporal variability of reconstructed temperatures in Asia during the last ~2000 years. This study reconstructed the spatial and temporal evolution of summer (June–July–August; JJA) temperature in eastern and south-central Asia using multi-proxy records and the regularized expectation maximization (RegEM) algorithm with truncated total least squares (TTLS), under a point-by-point regression (PPR) framework. The temperature field reconstructions illustrate that temperatures in central, eastern, and southern China during the 11th and 13th centuries, and in western Asia during the 12th century, were significantly higher than those in other regions, and comparable to levels in the 20th century. Except for the most recent warming, all identified warm events showed distinct regional expressions and none were uniform over the entire reconstruction area.