Reconstructed drought variability across Mongolia based on tree-ring records

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Abstract: This paper presents a spatially and temporally improved reconstruction of mean summer (June–August) temperature derived from tree-ring width data of Dahurian larch (Larix gmelinii Rupr.) from the northern Great Xing"an Mountains, Northeast China. Three new chronologies were added to the original 2011 reconstruction, and the reconstruction extended back to AD 1715. The reconstruction was generated using a simple linear regression method, verified by independent meteorological data, and accounts for 47.0% of the actual temperature variance during the common period (1957–2008). The reconstruction captures decadal and century-scale regional temperature variability, such as cold decades (1940s, 1930s, 1790s, 1950s and 1850s), warm decades (2000s, 1870s, 1750s, 1980s and 1840s), a cold half-century (ca. 1750–1799), and a warm half-century (ca. 1900–1949). It also reveals slightly higher frequency of cold years (20.4%) than warm years (18.0%), and a recent warming trend. Compared to the original 2011 reconstruction, this reconstruction has lower inter-annual temperature variability, high explained variance and high representativeness of regional climate. The reconstruction also correlates with the East Asian Monsoon and the Pacific Ocean signals, and indicates the feasibility of using tree rings from high latitude Northeast China to reconstruct summer temperature in permafrost forest environments.