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Annual Precipitation since A.D. 1460 reconstructed from the juniper growth of Qilian Mountains

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Abstract

We present a century-scale annual precipitation reconstruction from previous August to current July over the past 540 years based on a tree ring-width chronology developed from juniper (Juniperus przewalskii Kom) on the Qilian Mountains. The reconstruction is verified with dependent data, and accounts for 41% of the instrument data variance during their common period (1960-2000). The full reconstruction indicates that the regional precipitation variability is relative stable except for the significant wetter epoch (1680-1760 A.D.) and an extreme drought event in the late 1920 over a large geographic area in northwestern China, which is corroborated by other paleoclimatic indicators. The wavelet analysis reveals the strong low frequency cycles (2.8, 2.1-2.6, 4.5, 5.5-6.1 yr) on the whole reconstructed period. The cycle of 16 yr is also examined, but it is discontinuous for the whole period. Overall, our reconstruction not only extends the regional precipitation history, and provides the valuable information to understand some proposed climate forcing.

Keyword: Tree-ring Width Index Precipitation Qilian Mountains