

Hydro-climatic variation in northwestern China and its multi-decadal to multi-centennial teleconnection with the Pacific Ocean

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Northwestern (NW) China region locates in the boundary region between the Westerlies and the Asian Monsoon. Due to its unique geographical setting, scientific studies that examine the long-term dynamics of the hydro-climate there have received particular attention in recent years. However, these studies are often constrained by the availability of instrumental precipitation records. The present study seeks to address this issue. I based on historical drought/flood records to trace the geographic extent of drought anomalies as well as the intra-regional precipitation variability in NW China in AD580–2008, covering the periods with and without instrumental precipitation records. Moving correlation and wavelet analyses were applied to find their significant determinants. Results show that El Niño Southern Oscillation (Indo-Pacific warm pool sea surface temperature) is the major multi-decadal to centennial (centennial to multi-centennial) determinant of the hydro-climatic variability in NW China. The associated mechanism is anchored with the change of Asian Summer Monsoonal precipitation, while it is driven by different factors at different time-scales. The above findings may help predict the occurrence of drought in the boundary region between the Westerlies and the Asian Monsoon in the extratropics.

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