

Hydro-climatic variation in northwestern China and its teleconnection with the Pacific Ocean over the last millennium

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Scientific studies that examine the long-term dynamics of drought over the northwestern (NW) China region have received special 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 major 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 are important for predicting the future impacts of, and developing proper counter-measures against, drought. Given that drought has been a limiting factor for the economy and society in NW China, this study is not only of academic interest but also of practical value.

Keywords: Asian Summer Monsoon, ENSO, Pacific Ocean, Hydro-climate, Northwestern China