



Decadal-scale hydroclimate shifts over the past 700 years in central and eastern Asia

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Decadal to multi-decadal hydroclimate shifts are explored with the use of tree-ring based drought reconstructions in central and eastern Asia (CEA) since 1300. Although the decadal-scale variations of the drought area indices (DAI) between central and monsoonal Asia are in-phase in most periods, the frequency shifts of the DAI from significant interannual to decadal/multi-decadal variability between the two regions are out-of-phase at nearly centennial time interval. This might be associated with a centennial-scale anti-phase relationship between the westerlies and the monsoon. Decadal-scale DAI shifts are most frequently occurred in central High Asia and northeastern Asia, possibly due to the close relationships between hydroclimate variations in these regions and the Pacific Decadal Oscillation (PDO). The most significant relationships between PDO and hydroclimate changes of CEA are observed in central Asia since 1300, particularly significant for the recent century with a warming trend. This relationship disappears only during periods with the minimum solar forcing (~1460s–1550s and ~1790s–1830s). The robust relationships between PDO and hydroclimate changes may be bridged by the heating of the Tibetan Plateau, which can be weakened when solar forcing is reduced.