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Abrupt changes in an 8000-year precipitation reconstruction for Nevada, the Western USA

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A scanning t-test algorithm for detecting multiple time-scale abrupt changes in the level of a time-series was used to analyze an 8000 year time series of annual precipitation which was reconstructed from tree rings for the Nevada Climate Division 3 in the western USA. The tree ring samples were gathered from eight states in the southwestern USA. Twenty-two change-points were identified by the algorithm and these were used to partition the tree-ring series into twenty-three relatively Wet/Normal/Dry episodes. These twenty-three episodes were collaborated by a coherency analysis of abrupt changes between the precipitation reconstruction series and the TIC/??啄180 records from cored sediments of Pyramid Lake in Nevada, and by comparison with published results from related studies. These episodes were also compared with studies of the global climate change and with records of climate change in China during the same periods. The results suggest that the precipitation reconstruction series is quite valuable for climate-change research on multi-centennial time-scales in the western USA, and that the scanning t-test and coherency detection algorithms may have a wide use for detecting multiple time-scale abrupt changes in a long time series. As the TIC and ??啄180 record series are high resolution with unequal sampling intervals ranging between 3 and 14 years, a new algorithm was developed to deal with the unequal time intervals in the series.

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关键词: abrupt change; 8000 years; precipitation reconstruction; tree ring; Western USA doi: 10.1360/gso50301