



## **Non-Climate Long Term Memory in Tree Ring Proxies**

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Long term memory (LTM) scaling behavior in tree-ring proxies and regional mean temperature/rainfall reconstructions has been analyzed and compared with the ones found in instrumental temperature and rainfall records. Detrended fluctuation analysis is employed to detect LTM, and its scaling exponent  $\alpha$  is used to measure LTM. The results show mean  $\alpha = 0.8$  in tree-ring width records, and mean  $\alpha = 0.7$  in tree-ring maximum density from 1yr up to 100yrs, while  $\alpha \approx 0.6$  ( $\alpha = 0.5$ ) is found in instrumental data of temperature (rainfall). By comparing the no-memory data ( $\alpha = 0.5$ ) with data with artificial LTM ( $\alpha > 0.5$ ), we demonstrate the potential influences of LTM on climate reconstructions and call special cautions in the variability analysis of proxy chronologies or reconstructions, especially in quantifying: i) trends; ii) climate anomalies; iii) extreme events.