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Tree-ring width based temperature and precipitation reconstruction in southeastern China

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Southeastern China is a subtropical region where the climate is dominated by the Asian monsoon climate system, with high temperature and precipitation in summer, and low temperature and precipitation in winter. Tree-ring research has been developed very fast in the past decade in the region. Some studies show that coniferous tree growth in the region is limited by temperatures in prior winter and during the growing season (i.e. prior November to current April, April to July, etc.), however to different limiting levels. Higher temperature in the dormant season means less damage to leaves and roots, and less consumption of previously stored carbohydrates and starches that can be used for tree growth in the coming year. The mechanism of positive relationships with the growing season is the same as that in high-latitude and high-elevation regions. The temperature reconstructions match each other very well at decadal to multi-decadal scales during the past 150 years at a large spatial scale, that is, of 700 km away, even though there are some discrepancies in the early part of the comparisons. Possible reasons for the discrepancies may include local temperature differences, small sample depth in the early part of the reconstructions, and/or juvenile effects. Generally, there is a weak precipitation signal in tree-ring width chronlogies. However, some studies have shown potentials in precipitation reconstruction in recent years, such as using tree-ring width chrnologies by taking samples at some special sites, using adjusted late-wood width chronlogies, and using stable isotopes. Thus, we might have a comprehensive understanding of the Asian monsson climate system over the past several centuries through temperature and precipitation reconstruction together using tree-ring series.