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Premonsoon Temperature Variations in Western Himalaya during the last Millennium: Inferred from Tree

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The Himalaya, the highest mountain system on Earth, has an active and interactive climate system. The heat budget over this region is the major driving force for the South Asian monsoon system that is in
turn linked with the El Nino-Southern Oscillation. Such linkages in global scale features call for long high-resolution climate data from the Himalayan region for climate change studies.

Although the Himalayan region abounds with a variety of high-resolution proxy climate records (eg., tree-rings, moraines and lake deposits, ice cores), long-term proxy climate records so far developed for the region are few and limited to few centuries only. We used multi-century old tree samples from various climate stressed sites in western Himalaya to develop a ring width chronology extending back to 1257 years (Ad 747-2003). To obtain low frequency variations, ring width series of Himalayan cedar (*Cedrus deodara*) exceeding 500-years in length from 20 distantly located climate stressed sites in western Himalaya were pooled together. The individual tree-ring series were processed to preserve low frequency variations in the final tree-ring chronology. This chronology showed strong negative correlation with mean premonsoon (March-May) temperature. The existence of strong relationship between tree-ring chronology and mean premonsoon temperature was exploited to develop temperature reconstruction extending back to AD 952 where sample replication reached to three. Both cool and warm episodes were noted during the Medieval Warm and Little Ice Age Period. This indicates that the climate was not consistently warm or cool during the Medieval Warm and Little Ice Age Periods. The decadal patterns in the reconstruction are consistent with other temperature reconstructions from the Asian mountain regions.

Key words: Tree rings, climate change, western Himalaya, India