Centennial tree-ring records over north Kashmir, India in the context of recent climate change

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Tree-rings are known as excellent proxies for developing millennia long climate records. Such records are useful in understanding climate variability before instrumental era and to assess the effects of the recent global climate change. Tree-ring based studies are limited over the Himalayan region, particularly from the Jammu and Kashmir, INDIA. In the present study, over 100 of tree-ring samples of *Cedrus deodara* and *Abies pindrow* from four different forest sites of north Kashmir are analyzed. The tree-ring chronology from Dangiari spans around 400 years. The tree-ring index chronologies (time span 210-325 years) from Kaleban, Kanzalwan and Mawar sites show a significant rise in ring widths after 1900 A.D. Such rise in the tree growth is limited to recent years in case of chronology from Dangiari. Meteorological data of the Srinagar station which is comparatively closer to the tree-ring sites have been used in response function analyses to understand the tree growth-climate relationship. The analyses clearly indicate a significant negative (positive) response of summer temperature (precipitation) over the tree growth. Higher temperature results in an increase in the rate of evaporation of available soil moisture received from the small amount of precipitation during summer. As this season coincides with the later part of active growth period of the trees, a loss of soil moisture due to extensive heating likely to affects the tree growth. Therefore, though the higher temperature accelerates the photosynthesis, significant soil moisture deficiency occurs at higher temperatures due to high rate of evaporation and evapotranspiration. More than average precipitation during the season is very useful in maintaining the minimum requirement of moisture and is found to be conducive for the tree growth.