Environment

Tree Rings Tell Moisture Variability on Tibetan Plateau

Tibetan Plateau (TP) is known as "Asia's Water Tower", but it remains an interesting question whether the water supply to the north of the plateau is the same with that to the south. Dr. ZHANG Qibin and coworkers from the State Key Laboratory of Vegetation and Environmental Change, CAS Institute of Botany recently tried to answer it from their studies of tree rings. They found evidences for different moisture conditions on the north and south of the plateau during the past five and a half centuries, and particularly, a "wet south and dry north" scenario occurred during 1463-1502 and 1693-1734 CE periods. Their findings have been published in *Nature Communications* under the title of "Moisture dipole over the Tibetan Plateau during the past five and a half centuries".

Historical hydroclimate records on the TP are important for understanding the driving factors behind water resources changes. Data of the past few decades can be obtained from observational stations, while pre-instrumental records relies on climate proxies such as tree rings. However, it is not easy to get such tree-ring records on the TP due to a couple of reasons. On one hand, old growth forests are unevenly distributed in remote mountain areas of the plateau, making it difficult to collect tree-ring samples that are both old in age and dense in spatial coverage within a short period of time. On the other hand, the growth of tree rings is affected by micro-climate due to mountainous topography, making it hard to extract regional hydroclimate signals from tree rings.

Dr. Zhang's group has been conducting TP tree-ring research for more than ten years. They have collected a large number of samples over vast areas of the TP and established a tree-ring databank using the dendrochonological technique of crossdating. From the databank, they were able to select 23 tree-ring chronologies that are of the same genus in *Juniperus* and all sensitive to May-June moisture condition (represented by PDSI index). They found that 9 chronologies north of the 33 degree north latitude and 14 chronologies south of the latitude have the same cluster characteristics, respectively. Chronologies combined for the north and for the south contain strong May-June PDSI regional signals. Accordingly, north and south tree-ring chronologies were used to reconstruct May-June PDSI history for the past five and a half centuries. Comparisons of the north and south moisture history reveal two significant and prolonged "wet south and dry north" intervals.

These results are useful for further studying how the TP water resources are influenced by the interactions of the Westerlies and the South Asian Monsoon. The data will also help understanding spatiotemperal patterns in forest ecological processes on the TP.

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