

An axiom in paleo research is that deeper histories reveal greater dynamics within the study system. Two investigations in broadleaf-dominated regions of the eastern US support this general rule of thumb. While temperate, broadleaf forests in humid regions are generally thought to be more stable at large spatial scales than those in semi-arid or boreal regions, we find that both the moisture availability and 'natural' disturbance are more dynamic between late 1500s and 1800s than what has been observed since the latter half of the 1900s. A new reconstruction of the Palmer Drought Severity Index in the northeastern US indicates that the 16th century megadrought appears to have been more persistent than in regions to the south. In combination with reconstructions derived from the North American Drought Atlas, we also find a broad pattern of increasing wetness from ca 1840 to the 1980s. Similarly, tree-ring and independent recruitment data indicate coherent, regional to subcontinental forest dynamics. These two data sets reveal several important aspects in the dynamics of temperate, broadleaf forests. First, it supports data sets covering the Holocene that indicate climate as an important shaper of these forests. Second, it bridges the mesoscale gap between observational studies and sediment core to give a better understanding the continuous nature of disturbance at various temporal and spatial scales. Third, it gives insight into how these forests might rapidly change under future climate change scenarios. Finally, it indicates that episodic climatic events have long-lasting impacts on forests dominated by gap dynamics.

Theme: O08. Drought and mortality

Presentation Type: Oral

TREE RING-DATED FLUCTUATION HISTORY OF MIDUI GLACIER SINCE THE LITTLE ICE AGE IN THE SOUTHEASTERN TIBETAN PLATEAU

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Fluctuation history of Midui glacier in the southeastern Tibet since the Little Ice Age (LIA) was reconstructed by the dating of lateral and terminal moraines using tree rings. Four conversions of glacier advance/stabilization to retreat were identified at around 1767, 1875, 1924 and 1964. The glacier reached its LIA maximum position at 1767. The fluctuations are consistent with those of other glaciers from the Tibetan Plateau, the Rockies and the Alps, suggesting high spatial coherency of glacier fluctuations in the Northern Hemisphere. Comparison with the summer temperature reconstruction in the southeastern Tibetan Plateau indicated that the Midui glacier fluctuation may be related to temperature variation on the centennial timescale. On the decadal scale, the fluctuation could correspond to cold/warm variation with an 8-year lag on average.

Theme: General Session

Presentation Type: Oral

IS LATEGLACIAL/EARLY HOLOCENE CLIMATE VARIABILITY REFLECTED IN ANNUALLY RESOLVED TREE-RING STABLE ISOTOPE CHRONOLOGIES FROM CENTRAL EUROPE?

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To date ice cores and varved lake sediments possibly provide the best available proxy records for the Lateglacial/Early Holocene period. This includes the so-called Younger Dryas interval (ca. 12,900 - 11,500 BP), representing an abrupt return to glacial-like conditions interrupting the transition to the warmer climate conditions of the Holocene. Lateglacial and Early Holocene tree-ring chronologies are rare, however, they are

of utmost importance for the calibration of the 14C calibration curve. They may also contain valuable information about past environmental conditions at annual time resolution. As the existing Lateglacial tree-ring material is characterized by rather short segment lengths (mean tree age 140 yrs) in tree-ring width may not be the best parameter for assessing climate anomalies. Carbon and oxygen isotope composition of tree-ring cellulose has proven potential for climate reconstruction. Besides correction of short juvenile trends isotope data can be used with only minor adjustments to their means and sample depths of 4-5 trees are normally enough for a significant expressed population signal. We are investigating a floating 860-year (13200 - 12340 cal BP) dendrochronological record of Lateglacial and Early Holocene chronologies of scots pine (*Pinus sylvestris* L.) from subfossil tree remnants of Central Europe. Namely, from Barbiers River (Moyenne Durance, Southern French Alps) and three Swiss (Dattnau, Landikon and Ganziloh) sites. We will present and discuss our tree ring stable isotope records ($\delta^{13}C$ und $\delta^{18}O$) in comparison to lake sediment and ice core data records.

Theme: O06. Stable isotopes in dendrochronology

Presentation Type: Oral

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DROUGHT VARIABILITY AT THE NORTHERN FRINGE OF THE ASIAN SUMMER MONSOON REGION OVER THE PAST MILLENNIA

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The northern fringe of the Asian summer monsoon region (NASM) in China refers to the most northwestern extent of the Asian summer monsoon. It is important to understand the characteristics and related mechanisms of drought variability at longer and shorter time-scales, because water shortage in the region is of great concern today and in the future. Here, we used newly developed and existing tree-ring, historical documentary and instrumental data available in the region to identify spatial and temporal patterns, and possible mechanisms of drought variability, over the past two millennia. We found that drought variations were consistent in the western (the Qilian Mountains and Hexi Corridor) and eastern parts of the NASM (the Great Bend of the Yellow River region) on decadal to centennial timescales. We suggest that the warm temperature anomalies in the tropical Pacific might have been mainly responsible for the recent 1975-1999 drought. A possible reason for the drought of 1625-1644 is the combined effects of the weakened Asian summer monsoon and an associated southward shift of the Pacific Intertropical Convergence Zone. This resulted from the combined effects of the Tibetan Plateau cooling together with the cooling of most of the Northern Hemisphere, rather than changes solely in the sea surface temperature of the tropical Pacific. Our results provide a benchmark for comparing and validating general circulation model paleosimulations of the variability of the Asian summer monsoon at decadal to centennial time-scales.

Theme: O04. Large-scale climate reconstructions and models

Presentation Type: Poster

RADIAL GROWTH OF QILIAN JUNIPER ON THE NORTHEAST TIBETAN PLATEAU AND POTENTIAL CLIMATE ASSOCIATIONS

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There is controversy regarding the limiting climatic factor for tree radial growth at the alpine treeline on the northeastern Tibetan Plateau. In this study, we collected 594 increment cores from 331 trees, grouped within four altitude belts spanning the range 3550 to 4020 m.a.s.l. on a single hillside. We have developed four equivalent ring-width chronologies and shown that there are no significant differences in their growth-climate responses during 1956 to 2011 or in their longer-term growth patterns during the period AD 1110-2011. The