EGU2020-3196
https://doi.org/10.5194/egusphere-egu2020-3196
EGU General Assembly 2020

Holocene moisture variations in the Tianshan Mountains and their geographic coherency in the mid-latitude Eurasia: A synthesis of proxy records

Yunpeng Yang
Henan University, China (yangyunpeng15@mails.ucas.ac.cn)

Understanding the Holocene moisture variations in the Arid Central Asia (ACA) is of a large-scale climatic significance simply because the vast ACA is influenced by several different climate systems. However, the temporal and spatial patterns and the modulating mechanisms of the Holocene aridity (or moisture) variations in the ACA remain in the center of controversies for the past two decades. Firstly, we in this research depicted the spatial and temporal patterns of the Holocene aridity variations in the Tianshan Mountains based on thirteen already-published aridity sequences and two recently obtained aridity sequences. Our depiction shows that the regionally-averaged standardized aridity-index (RA-SAI) curve for the Eastern Tianshan Mountains exhibits a wetting trend. In contrast, the RA-SAI curve for the Western Tianshan Mountains exhibits a drying trend. Secondly, we further examined these two RA-SAI sequences (one for the Eastern Tianshan and another for the Western Tianshan) within a much larger geographic context for exploring the mechanisms modulating the Holocene patterns. Our examination shows that the summer precipitation-dominated northern middle-latitude Eurasia (i.e., MLEA-N) has experienced a wetting trend and the winter precipitation-dominated southern middle-latitude Eurasia (i.e., MLEA-S) has experienced a drying trend. The wetting trend in MLEA-N is proposed to have resulted from increasingly more positively-phased AMO activities that have increasingly enhanced cyclonic pressure anomalies over the Atlantic regions, directly or indirectly bringing more and more summer precipitation to MLEA-N stretching from West Europe to the Eastern Tianshan. And, the drying trend in MLEA-S is proposed to have resulted from increasingly more negatively-phased NAO activities. That is, the negatively-phased NAO activities weakened the strength of Western Disturbances, therefore resulting in decreased winter precipitations in MLEA-S stretching from the Eastern Mediterranean to the Western Tianshan.