



## **Asynchronicity of the Holocene Moisture Variations across the Mongolian Plateau and the adjacent Siberia and China**

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Based on the review of high-standard Holocene climatic reconstructions from the Mongolian Plateau and the adjacent Siberia and China, temporal and spatial patterns of the Holocene moisture evolution are synthesized. The regionally-averaged moisture index (i.e. RAMI) for the winter monsoon-dominated southern Siberia exhibits a general declining trends since 10.6–9.6 cal. kyr BP, being consistent with the trends of the annual precipitation and the warm-season temperature in the Russian Plain. The consistency might be attributable to the Holocene declining trend of the warm-season temperature in North Atlantic region. The RAMI for the westerlies-affected northern Xinjiang had a persistent increasing trend since ~8 cal. kyr BP. The wetting trend of northern Xinjiang might be attributable to the increasing trend of winter insolation and to the associated increasing trend of cold-season temperature in northwestern Europe. The chronological correspondences between dry phases and warm intervals in the arid areas of the entire Mongolian Plateau lend a support to our earlier proposal that the mid-Holocene dry phase in the arid Mongolian Plateau was most likely the result of mid-Holocene high warm-season temperature. The RAMI for China is the delayed reflections of the East Asian summer monsoon strength to the solar radiation. That is, the peak insolation (14-6 cal. kyr BP) was responded by the Oceanic Thermal Optimum (12-5 cal. kyr BP) with some time lags and the Oceanic Thermal Optimum was then responded by the Holocene Moisture Optimum in southern China (10-5 cal. kyr BP) and then in northern China (9-6 cal. kyr BP). The RAMI for the Tibetan Plateau shows that the moisture has been persistently declining since ~11 cal. kyr BP and that the period between ~11.5 and 7.5 cal. kyr BP was the Holocene Moisture Optimum. The parallel trends between the moisture level in the Tibetan Plateau and the Indian summer monsoon strength retrieved from the Arabian Sea suggest that the Tibetan Plateau has been under a dominant influence of the Indian summer monsoon throughout the Holocene.