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## Switches of Holocene temperature-precipitation correlations in northern Hemisphere extra-tropics comparing proxy and model data

**Ulrike Herzschuh**<sup>1,2,3</sup>, Thomas Boehmer<sup>1</sup>, Raphael Herbert<sup>1</sup>, Thomas Laepple<sup>1</sup>, Richard Telford<sup>4</sup>, Xianyong Cao<sup>5</sup>, Anne Dallmeyer<sup>6</sup>, and Stefan Kruse<sup>1</sup>

<sup>1</sup>Alfred Wegener Institute, Research Unit Potsdam, Potsdam, Germany (ulrike.herzschuh@awi.de)

<sup>2</sup>Institute of Environmental Sciences and Geography, University of Potsdam, Germany

<sup>3</sup>Institute of Biochemistry and Biology, University of Potsdam, Germany

<sup>4</sup>Department of Biological Sciences, University of Berger, Norway

<sup>5</sup>Institute of Tibetan Plateau Research, CAS, China

<sup>6</sup>Max Planck Institute for Meteorology, Hamburg, Germany

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Future precipitation response to warming remains uncertain because climate models poorly reproduce observed changes of temperature-precipitation correlations. However, restricting model validations to the observational period may yield to misleading conclusions due to the complexity of the involved processes. Our analyses of Holocene proxy-based temperature-precipitation correlations from 1500 northern Hemisphere extratropic pollen records portrayed significant latitudinal dependence, temporal changes from the early to late Holocene as well as differences between short and long time-scales. These observed variations were found to be mostly consistent with patterns simulated by Holocene transient climate simulations. Our results suggest that the strength of positive temperature-precipitation correlations in high-latitudes is sensitive to the background temperature while monsoonal subtropics reflect spatial shifts of circulation systems; and correlation sign switches in mid-latitudes relate to changes of westerlies strength. We conclude that regional and continental climate change on land is more complex than the expected “wetter climate in a warmer world” assumption which holds well at the global scale. On the other hand, long-term projections of precipitation may be better than previously thought as major processes seem to be already implemented correctly in general circulation models.