

Why is east Asian summer monsoon circulation enhanced under global warming?

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The near-surface southerly wind is a key feature of East Asian summer monsoon (EASM) circulation, and a stronger EASM circulation leads to a northward shift of East Asian rainfall. Almost all climate models show

an enhanced EASM circulation in a warmer climate, and previous studies attributed the enhanced EASM to the enhanced zonal land-sea thermal contrast.

"However, the land-sea thermal contrast cannot explain the seasonality of the change in East Asian [circulation](#)." said Dr. Chao He from Jinan University, China, "What's more, the enhanced EASM circulation is associated with a large-scale cyclone anomaly around the Tibetan Plateau (TP), motivating us to hypothesize that TP may play a certain role."

In a recent study published in *Journal of Climate*, Chao He and Tianjun Zhou from the Institute of Atmospheric Physics (IAP), Chinese Academy of Sciences, in cooperation with Ziqian Wang from Sun Yat-sen University and Tim Li from Nanjing University of Information Science and Technology, confirmed this hypothesis. The study shows that the TP plays an essential role in enhancing the EASM circulation under global warming through enhanced latent heating over the TP.

The team compared the global warming scenarios with the present-day climate in 30 coupled models from phase 5 of the Coupled Model Intercomparison Project (CMIP5). Indeed, the latent heating over TP and its southern slope is substantially enhanced, due to the increased atmospheric water vapor content and enhanced local hydrological recycling. As confirmed by the Linear Baroclinic Model, the enhanced latent heating over TP stimulates a cyclone anomaly around TP, enhancing the southerly wind in East Asia. In addition, the latent heating over TP also explains the inter-model spread of the projected changes in EASM circulation among CMIP5 models.

This study cleared up the role of the TP on the response of EASM circulation to global warming. "As the TP plays a key role in the response of EASM to [global warming](#) in future [climate](#) projections, attention should be paid to the accurate simulation of physical processes

over TP." said Zhou.

More information: Chao He et al, Enhanced Latent Heating over the Tibetan Plateau as a Key to the Enhanced East Asian Summer Monsoon Circulation under a Warming Climate, *Journal of Climate* (2019). [DOI: 10.1175/JCLI-D-18-0427.1](https://doi.org/10.1175/JCLI-D-18-0427.1)

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