

Topographic effect of Sub-scale Mountains around the main Tibetan Plateau on Asian climate

Yingying Sha and Zhengguo Shi

Institute of Earth Environment, Chinese Academy of Sciences, China (shayingying@ieecas.cn)

As one of the most important tectonic events in Cenozoic, the uplift of the Tibetan Plateau (TP) is considered to have profound influences on the evolution of Asian climate. However, the potential influence from the sub-scale mountains around the main TP is largely neglected. In actual, these sub-scale mountains may affect some climate systems, which facilitates from their sensitive locations. Taking the Mongolian Plateau (MP) and Yunnan-Guizhou Plateau (YGP, SW China) as examples, they are located at the core paths of mid-latitude winter westerly and Indian summer southwesterly monsoon, respectively, and seem to significantly block the eastward propagation of these systems from modern climatological data. In this study, general circulation model experiments with and without mountains are employed to evaluate the topographic effect of MP and YGP on the Asian climate. The results show that, the MP, despite its smaller size, exerts a great influence on the strengthened winter climate over East Asia, including the East Asian trough, the subtropical westerly jet and the winter monsoon. The YGP, however, plays an opposite role in the Indian monsoon change, compared to the main TP. It weakens the Indian summer monsoon circulation and associated precipitation. Thus, the response of Asian climate to the mountain uplift depends closely on the actual distributions of topography rather than a simplified bulk of main TP.