



## **Comparison of the climate effects of surface uplifts from the northern Tibetan Plateau, the Tianshan, and the Mongolian Plateau on the East Asian climate**

Ran Zhang (1) and Dabang Jiang (1,2)

(1) Climate Change Research Center, Chinese Academy of Sciences, Beijing, China (zhangran@mail.iap.ac.cn), (2) NZC, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

Surface uplifting from the northern East Asian mountains has had an important effect on the evolution of the East Asian climate since the late Miocene; however, the uplifting climate effects from each of these mountains remain unclear. This paper compares the climate effects of surface uplifts from the northern Tibetan Plateau (TP), the Tianshan, and the Mongolian Plateau (MP) on the East Asian climate. Our model results indicate that each of these mountains has different climate effects along an uplifting sequence from south to north. Compared to the combined surface uplifts from the northern TP and the Tianshan, the last surface uplift from the MP made a greater contribution to the decreased annual precipitation over inland Asia north of  $\sim 45^{\circ}\text{N}$  and strengthened summer middle tropospheric westerly wind on its north side; furthermore, it made a comparable contribution to the intensified winter low-level (850 hPa) northwesterlies in northern East Asia and intensified winter middle tropospheric westerly wind over the region from East Asia to the northwestern Pacific. However, different uplift scenarios influenced these uplifting climate effects. For example, if the MP rose without the northern TP and the Tianshan, the uplifting climate effects of the MP described above largely weakened. In comparison, the further combined surface uplifts of the northern TP and the Tianshan had a more marked regional climate effect, particularly for the winter monsoon wind, and summer and winter middle tropospheric westerly wind.