

EGU2020-2368

<https://doi.org/10.5194/egusphere-egu2020-2368>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Investigating Spatiotemporal Variation of Heatwave and its Association with Blocking in the Northeastern Asia

Beijing Fang and Mengqian Lu

The Hong Kong University of Science and Technology, School of Engineering, Department of Civil and Environmental Engineering, Hong Kong (bfang@connect.ust.hk)

Severe heatwaves in recent decades caused tremendous financial loss and even deaths. And both the occurrence and characteristics of heatwave are changing under global warming. The spatiotemporal variation and characteristics of heatwave in Northeastern Asia are investigated on both grid and event bases in this study. We find that persistent, extensive and intense heatwave has become more frequent during the last four decades. Such trend is found significantly correlated with the increase of temperature.

As most dreadful heatwaves are reported to be accompanied by blocking, we also thoroughly analyze the association between heatwave and blocking using two leading blocking indices, examining 500hpa geopotential height (TM index) and vertically averaged potential vorticity anomaly (PV index), respectively. A discrepancy between blocking climatology of TM index and PV index is exhibited, with the former displaying two high-frequency zonal bands at the south and north regions, while the latter only showing one high frequency band in the north. However, grid-based concurrence analysis using the two blocking indices agreeably suggests that blocking favors the occurrence of heatwave, especially in the north region where blocking often occurs. We further explicitly investigate their extended temporal association with time lags, which has not been done before in the literatures. It reveals that heatwave mostly occurs after or on the onset day of blocking and ends after or at the end of blocking. It indicates that blocking is more of a favorable environmental condition to trigger heatwave than maintain it. Lastly, the impact of blocking on the characteristics of heatwave events is explored on an event basis, using the 3D object model newly proposed by this study. Blocking related heatwave events are more likely to be more persistent, extensive and intense than unrelated events.