

EGU23-5468, updated on 25 Apr 2024

<https://doi.org/10.5194/egusphere-egu23-5468>

EGU General Assembly 2023

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Effect of anomalous high-pressure in Eastern Europe on the prediction of 2018 East Asian heatwave

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In 2018, a severe and long-lasting heatwave in East Asia resulted in significant socio-economic damage. To possibly reduce losses, it is necessary to understand the mechanisms of heatwaves and increase their predictability. In this study, we identify the patterns of geopotential height responsible for the 2018 East Asian heatwave from ERA5 observation and compare them with simulations using Global Seasonal Forecasting System version 6 (GloSea6). The K-means clustering analysis reveals an anomalous high-pressure pattern in Eastern Europe, which is mainly associated with the 2018 East Asian heatwave. GloSea6 experiments were then conducted with various initial conditions. Notably, GloSea6 runs reproducing the observed high-pressure anomaly in Eastern Europe shows a good prediction of the 2018 East Asian heatwave. Sensitivity experiments further highlight the lack of soil moisture in Eastern Europe seems to be a key factor for the anomalous high-pressure pattern there, resulting in the 2018 East Asian heatwave. Our results imply that model- and observation-consistent representations of soil moisture in Eastern Europe are required to reduce the uncertainty in predicting the East Asian heatwaves.

This work was funded by the Korea Meteorological Administration Research and Development Program under Grant KMI2020-01212. This work was supported by the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIT) (No. 2022R1A2C1008858).