EGU22-6827, updated on 01 Oct 2022
https://doi.org/10.5194/egusphere-egu22-6827
EGU General Assembly 2022

Feedback attribution to dry heatwaves over East Asia

Ye-Won Seo[1,2], Kyung-Ja Ha[1,2,3], and Tae-Won Park[4]
[1]Center for Climate Physics, Institute for Basic Science, Busan, Republic of Korea
[2]Department of Atmospheric Sciences, Pusan National University, Busan, Republic of Korea
[3]BK21 School of Earth and Environmental Systems, Pusan National University, Busan, Republic of Korea
[4]Department of Earth Science Education, Chonnam National University, Gwangju, Republic of Korea

Summer heatwave events have exhibited increasing trends, with sudden increases occurring since the early 2000s over northeastern China and along the northern boundary of Mongolia. However, the mechanism behind heatwaves remains unexplored. To quantitatively examine the feedback attribution of concurrent events related to surface temperature anomalies, the coupled atmosphere–surface climate feedback-response analysis method based on the total energy balance within the atmosphere–surface column was applied. The results demonstrate that the contributions of the latent heat flux and surface dynamic processes served as positive feedback for surface warming by reducing the heat release from the surface to the atmosphere because of deficient soil moisture based on dry conditions. Cloud feedback also led to warm temperature anomalies through increasing solar insolation caused by decreasing cloud amounts associated with anomalous high-pressure systems. In contrast, the sensible heat flux played a role in reducing the warm temperature anomalies by the emission of heat from the surface. Atmospheric dynamic feedback led to cold anomalies. The influence of ozone, surface albedo, and water vapor processes is very weak. This study provides a better understanding of combined extreme climate events in the context of radiative and dynamic feedback processes.