

What has caused more extreme summer heat events over northeast Asia?

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More frequent heatwaves over Northeast Asia since 1990s. Credit: Ren Liwen

Widespread hot extremes have been seen throughout the world in recent years, causing heat-related mortality and harming crops and livestock. In summer 2018, a record-breaking heat wave swept across large areas of Northeast Asia. The China Meteorological Administration issued high-

temperature warnings for 33 consecutive days. In Japan, at least 71,266 required hospitalization for heat stroke.

To make things worse, the 2018 [heat](#) wave was probably not a random or an individual case, according to a new study published in *Environmental Research Letters*.

In the study, the 2018 [heat wave](#) was used as a [rear-view mirror](#) to investigate what has caused more extreme summer heat events over Northeast Asia, and in particular, to look into the role of anomalous anticyclones over Northeast Asia.

An anticyclone is an area of high atmospheric pressure, which causes settled weather conditions, and, in summer, clear skies and high temperatures. But how much the anomalous anticyclone circulation would contribute to extreme heat events over Northeast Asia still remains unknown.

"Our study, for the first time, gave a quantitative estimation of the contribution of circulation to such a heat event over Northeast Asia, by using the flow analog method," said Liwen Ren, the lead author, a Ph.D student from the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences and University of Chinese Academy of Sciences. "We found that an anomalous anticyclone over Northeast Asia was responsible for nearly half of the magnitude in extreme heat events of 2018."

The researchers found that such anomalous anticyclones similar to that in 2018 have become worse and more common in recent decades (1991-2017) than in the past (1958-1990).

Further, this kind of dynamical (anticyclone) change in recent decades, together with thermodynamical change (e.g. mean temperature shift

towards a warmer state with increasing [greenhouse gases](#)) have made such kinds of extreme heat events more likely to happen over Northeast Asia.

"We also found that, the more extreme the heat event is, the larger the contribution of thermodynamical change will be, with a contribution of at least 80%," said Prof. Tianjun Zhou, the corresponding author. "This implies that as long as [global warming](#) continues, we will face higher risk for extreme heat events over Northeast Asia in the next decades."

More information: Liwen Ren et al, Attribution of the record-breaking heat event over Northeast Asia in summer 2018: the role of circulation, *Environmental Research Letters* (2020). [DOI: 10.1088/1748-9326/ab8032](#)

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