East Asian hot spring linked to the Atlantic sea surface temperature anomaly

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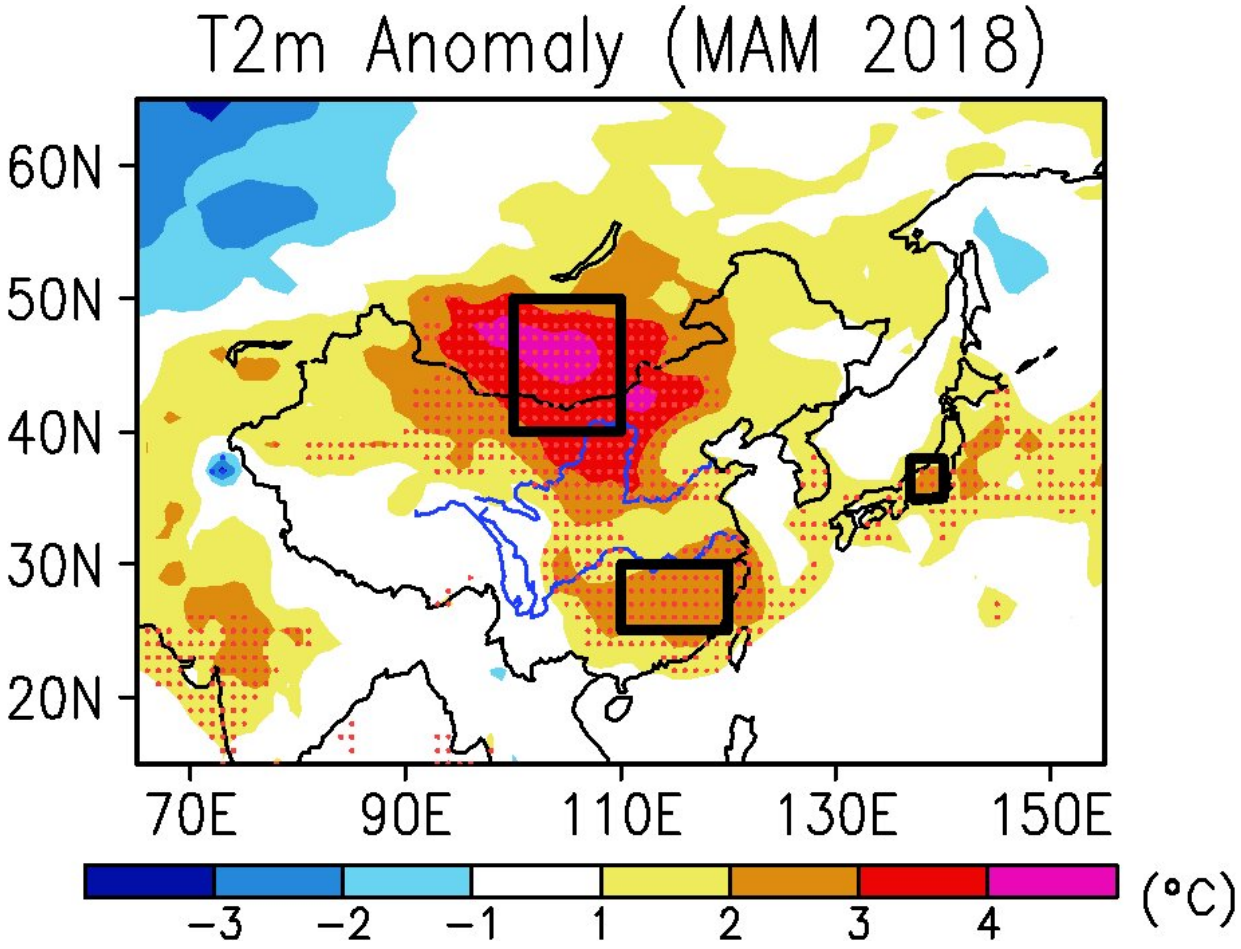

Deviations of 2m air temperatures in spring 2018 from the climatology. Credit: Kaiqiang Deng

The changes in spring surface air temperature can exert significant impacts on human health and lead to considerable socioeconomic consequences. Therefore, it is of great interest to understand and predict the variations of spring temperatures. However, the dynamics and predictability of East Asian temperatures during boreal spring are more challenging compared to those in the other seasons. Part of the difficulty is due to the existence of the so-called spring predictability barrier—a phenomenon whereby the predictive skill based on ENSO decreases rapidly during boreal spring.

"East Asia experienced an unusually warm spring in 2018, when exceptionally high surface air temperatures were recorded in large areas of Asia, such as northern China, southern China, and Japan," says Dr. Kaiqiang Deng, a climate researcher who works with Prof. Song Yang in the School of Atmospheric Sciences, Sun Yat-sen University, and the first author of a paper recently published in *Atmospheric and Oceanic Science Letters*.

"The intensity of ENSO usually peaks during boreal autumn and winter, and tends to decay remarkably during boreal spring, leading to a reduced predictability of climate and weather in East Asia during this period. However, the ENSO signal during 2017/18 was weak, and so it is interesting to explore whether other antecedent signals (in addition to ENSO) existed that could have been applied to predict the warm East Asia in spring 2018," explains Dr. Deng.

Dr. Deng and his collaborators investigated the spatiotemporal patterns of the record-breaking temperatures in East Asia in spring 2018 based on ERA-Interim reanalysis data. Their research linked East Asian extreme heat in boreal spring to North Atlantic SST anomalies.

The results indicated that the tripole mode of North Atlantic SST anomalies can trigger anomalous Rossby wave trains over the North

Atlantic and Eurasia through modulating the North Atlantic baroclinic instability, which then propagate eastwards and induce anomalously high pressure and anticyclonic circulation over East Asia, leading to descending motion, reduced precipitation, and increased surface solar radiation, which were favorable for the record-breaking warmth in East Asia during spring 2018.

"The seasonal memory of the North Atlantic tripole SST mode from the previous winter to the following spring may provide useful implications for the seasonal prediction of East Asian weather and climate," says Dr. Deng. "In the future, we would like to construct a statistical prediction model to improve the sub-seasonal to seasonal predictions for East Asian spring climate."

More information: Kaiqiang Deng et al, Unprecedented East Asian warming in spring 2018 linked to the North Atlantic tripole SST mode, *Atmospheric and Oceanic Science Letters* (2019). DOI: 10.1080/16742834.2019.1605807

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