

## Contribution of global warming and atmospheric circulation to the hottest spring in Eastern China in 2018

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The spring of 2018 was the hottest on record since 1951 over eastern China based on station observations, with 2.5 °C higher than the 1961-1990 mean and more than 980 stations reaching the record spring mean temperature. The number of warm spring days in eastern China also ranked the highest in the observational record. This event exerted serious impacts on agriculture, plant phenology, electricity transmission systems and human health in the region. Contributions of human-induced climate change and an anomalous anticyclone to this event is investigated using the newly homogenized observations and updated Met Office Hadley Centre system for attribution of extreme events, as well as the Canadian Earth System Model simulations. Results indicate that both anthropogenic influences and anomalous anticyclone play significant roles in increasing the probability of the 2018 hottest spring. Quantitative estimates of the probability ratio show that anthropogenic forcing may have increased the chance of this event by 10-fold, while the anomalous circulation approximately increased by 2-fold. The persistent anomalous anticyclone located in the north side of China blocks the air with lower temperature from high latitudes into the eastern China. Without anthropogenic forcing or without the anomalous anticyclone in northern China, the occurrence probability of the extreme warm spring will be significantly reduced.

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