VIEWpoint 新观点

Investigating heatwaves in China under climate change – unchartered waters

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Explainer

An explainer on research from the Climate Science for Service Partnership (CSSP) China for decision-makers in China // No. 01

Summary

As part of CSSP China a series of workshops have taken place to allow researchers to apply attribution techniques used in the UK to extreme events in China. Attribution is the process of determining the extent that anthropogenic climate change had a role in an extreme event. One workshop revealed that using sea surface temperatures closer to those naturally occurring at the time of a heatwave was then better able to reproduce the event in climate modelling and this result has fed back into how attribution is approached in the UK.

Why?

In CSSP China attribution workshops the delegates study extreme events of their choosing, so when record breaking temperatures occurred in July 2017, reaching 40.9°C in Shanghai, this was selected for research and publication (Chen et. al 2019). The heatwave caused severe impacts on public health and agriculture.

The workshop and paper investigated if anthropogenic warming has increased the likelihood of these kinds of heatwaves over central eastern China. Such a heatwave, over five days, was found to be ten times more likely under anthropogenic climate change.

How?

Attribution research is carried out by simulating the climate under a range of situations to establish if and how often the extreme event can be reproduced with and without climate change.

The range of situations is provided by modelling the climate hundreds of times, each of the ensemble having slightly different selections to represent uncertainties in meteorological systems.

At the workshop the ensemble was not able to produce such high temperatures as experienced in central eastern China – leaving the researchers to look more closely at the model inputs.

It was found through further work that by including global sea surface temperatures closer to those observed in 2017 resulted in a significantly more faithful simulation of the climate and subsequent prediction of frequency and risk of similar heatwaves.

The magnitude of the risk depends on sea surface temperatures used (Sparrow et. al, 2018).

What now?

Attribution of recent extreme events is an active area of climate research. Findings such as the importance of including a plausible range of sea surface temperatures to capture high temperatures over land, is part of the process of discovery and improvement of predictions.

The CSSP China workshop and further research over the following year resulted in changes to the inputs to the Met Office operational attribution system to take account of the influence of observed sea surface temperatures patterns.

References

Chen et. al 2019 DOI:10.1175/BAMS-D-18-0087.1

Sparrow et. al 2018 DOI:10.1088/1748-9326/aae356

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