CLIMATE SCIENCE FOR SERVICE PARTNERSHIP CHINA

UNPRECEDENTED EVENTS

ASSESSING CHINA'S RISK TO CLIMATE-RELATED EXTREMES IN THE PRESENT DAY AND NEAR FUTURE

CSSP China has pioneered a new method that enables estimations of China's current risk to climate-related extremes. This work can help government and society anticipate extreme events and build climate resilience in the near and long-term.

Extremes in weather and climate, which can lead to events such as heatwaves and flooding, can have serious impacts on society, including the loss of lives and livelihoods. However, there are relatively few observations of such extremes, as they are, by definition, rare, making it difficult to estimate the risk and plan ahead for such events.

How can information on current climate risk help support decision makers?

Identifying climate-related risks in the present day and near future can help government and society anticipate extreme events, helping to build climate resilience in the near and long-term. For example, an understanding of the likelihood and intensity of heatwaves in the near future can help management of public health. Similarly, identifying risks from extreme rainfall can help protect business and infrastructure from flooding.

What CSSP China is doing

CSSP China has developed a new technique for assessing the current climate risk to extreme events, called UNSEEN (UNprecedented Simulation of Extremes with ENsemble). It uses ensembles of seasonal climate predictions to generate a much larger set of recent weather and climate events than is available from historical observations. The method identifies the potential for unprecedented weather and climate events under current climate conditions and estimates the risk of such extremes occurring in the real world. Before using the new technique, there is rigorous assessment of its suitability for the region and extreme in question. One benefit of this new technique is that it can be applied to temperature (to assess possible heatwaves and extreme cold events) as well as rainfall (to identify extreme rainfall or dry events leading to potential flooding or droughts).

The method has been applied to assess the risk of extreme summer temperatures over the Yangtze river basin (figure 1).

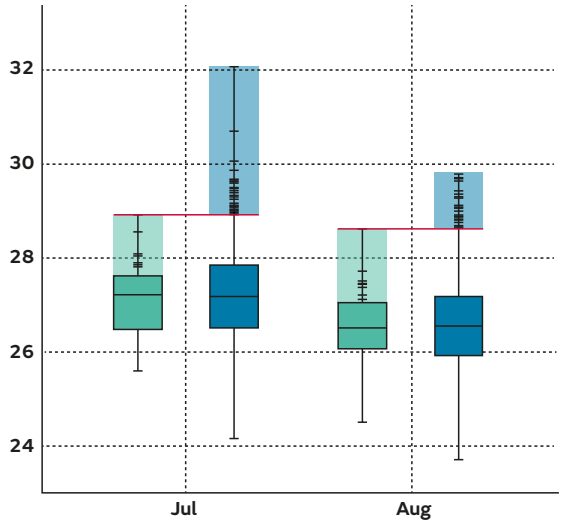

Figure 1: *Figure 1: Monthly temperatures over the Yangtze river basin from the observations (green) and climate model simulations (blue) in recent decades in summertime. Figure focuses on hot extremes. Ticks in the pale green area show the high end of the temperatures observed to-date. Blue area above the red line shows simulated events that exceed highesttemperatures observed to-date, and possible under current climate conditions.*

Figure 1 shows that much warmer summers than have been observed in recent decades are possible in the Yangtze river basin..

Using this method, we calculate that, in any given year, there is currently a 6% risk of an unprecedented hot month in July or August, and a 1% risk of a month 0.8°C hotter than previously observed.

This information could help inform adaptation planning in cities to enhance resilience to current and future extreme weather and climate events. It could also be useful for farmers in these regions to help better manage risk and prevent losses to crops and livestock.

Water stress and food security

Building on this, by applying the method to examine the risk of severe water stress in China's maize-growing regions, helps understand the risk of maize yield shocks in the current climate. CSSP China found that the chance of severe water stress leading to maize yield loss is higher than previously thought in China and other major maize growing regions around the world. It reveals that the current climate in China is capable of producing adverse conditions for maize (a combination of low rainfall and high temperatures), more extreme than any adverse conditions in China over the last 30 years. Therefore, current adaptation plans and policies in China may underestimate the true risk of shocks to maize yields. Such losses to Chinese maize could affect access to food, food prices and trade, leading to a greater reliance on reserve stocks.

What's next?

Applying this method to a wider range of weather and climate indicators such as extreme wind speeds will enable estimates of the probability of extreme high wind speeds. This will be useful for planning purposes in the Chinese wind energy and building infrastructure sectors. The applications to food security will also extend to estimate risks to other important crops such as soybean and rice.

UK-China Research Innovation Partnership Fund information

The Weather and Climate Science for Service Partnership Programme – of which CSSP China is a part - comprises projects to develop partnerships harnessing UK scientific expertise to build the basis for strengthening the resilience of vulnerable communities to weather and climate variability, supported by the UK government's Newton Fund.

For more information visit: **www.newtonfund.ac.uk** and follow via Twitter: @NewtonFund

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