CLIMATE SCIENCE FOR SERVICE PARTNERSHIP CHINA – CLIMATE CHANGE AND EXTREME EVENTS

CSSP CHINA
Is climate change increasing the likelihood of extreme weather in China?

Typically, people discuss climate and climate change in terms of long-term trends in temperature and rainfall. However, we most directly experience the effects of our climate through extreme weather and climate events such as heatwaves, droughts and heavy rainfall.
A question often asked about climate change is whether the changes we are seeing in the earth’s climate are due to human influence such as greenhouse gas emissions, or if they can be explained by natural causes such as changes in solar activity or volcanic eruptions. The Climate Science for Service Partnership China (CSSP China) project is using a technique called attribution to investigate the role of climate change in recent extreme weather and climate events in China.

Attribution studies provide decision-makers with guidance on the potential urgency and scale of measures needed to help them adapt to the impacts of a changing climate. Research showing that human activities increase the risk of an extreme weather or climate event also supports policies to mitigate greenhouse gas emissions.

There is an increasing need to be able to understand what has caused past events and how their likelihood is changing both now and into the future. Building this evidence base will enhance China’s capabilities in Disaster Risk Reduction and help protect livelihoods as well as supporting the national economy and infrastructure.

**What CSSP China is doing**

The CSSP China project has provided a platform for scientists in China and the UK to analyse recent extreme weather and climate events in China and investigate whether they have become more likely due to climate change. As part of this, the Met Office and the Universities of Edinburgh and Oxford, and the National Centre for Atmospheric Sciences have run workshops to train and build the capacity of early career Chinese scientists to carry out attribution studies. These workshops have produced many results focussing on specific extreme events in China.

**Intense summer heatwave 2018**

One study focusses on the summer of 2018 when a long and intense heat wave affected Northeast China. The China Meteorological Administration (CMA) issued 33 days of consecutive high temperature alerts from 14 July to 15 August 2018. On 30 July the number of heat-related hospital admissions broke the historical record in the city of Shenyang. As well as increased human morbidity and mortality the record heat reduced agricultural productivity and increased the strain on power systems and water supplies.

One of the major factors behind the severe impacts was the high minimum temperatures at night-time, which meant that people and ecosystems had less chance of recovering from heat experienced during the day. Research in CSSP China shows that experiencing such a prolonged (30-day) continuation of night-time heat waves is now about eight times more likely in Northeast China due to climate change. Previously such events would only be expected to occur about once every 500 years, but now due to climate change they could occur on average once every 60 years.
Late spring drought 2018

Late spring (April-May) is normally the end of the dry season in South China, however 2018 was an exception when an extreme drought developed. South China had their 2nd driest spring since 1951 with Guangdong and Fujian provinces receiving only 40% of their normal rainfall for the time of year. In addition, monthly average temperatures were almost 3°C above normal. The drought resulted in shrinking reservoirs and water shortages as well as shortages of rice, with yields down by over a million tonnes compared to 2017.

Research in CSSP China has shown that such a drought in late spring in South China is now about 13 times more likely due to climate change. This result poses serious challenges for water resource management and the agricultural sector in South China.

Persistent heavy rainfall July 2018

During late June to mid-July 2018 parts of Sichaun, Gansu and Shaanxi provinces, in central-west China, were affected by a persistent heavy rainfall event. The accumulated rainfall between 21 June and 11 July was very close to the record for a three-week period since 1961. This caused floods, landslides and damage to property and affected 2.9 million people with direct economic losses of over 8.9 billion Yuan (~£1 billion).

Research in CSSP China suggests that climate change has increased the likelihood of short-lived intense rainfall events while actually decreasing the likelihood of long-term, persistent heavy rainfall events. This result suggests that short-duration, flash flooding events may become more common in central-west China.

Future work on attribution in CSSP China will continue to advance the science behind these attribution statements and test models and techniques for their reliability as well as continuing to examine extreme events. The project will also be working with decision-makers to help them make use of this latest science in their decision-making.

CSSP China is building strong UK-China science partnerships

CSSP China supports collaboration between the UK and China. It aims to develop capability to inform decision makers in climate mitigation and adaptation strategy and to underpin services to support climate and weather resilient economic development and social welfare.

CSSP China is building strong, sustainable partnerships between the China Meteorological Administration (CMA), the Institute of Atmospheric Physics (IAP) and the Met Office, the UK’s national meteorological service, and other key Chinese and UK scientific institutes.

The Weather and Climate Science for Service Partnership Programme – of which CSSP China is a part - is funded by the UK Government’s Newton Fund, and is also known as the UK-China Research and Innovation Partnership Fund in China.

For further information visit the Newton Fund website (www.newtonfund.ac.uk) and follow via Twitter: @NewtonFund
For more information on CSSP China visit the Met Office website https://www.metoffice.gov.uk/research/collaboration/newton/cssp-china/index
春末(4月 - 5月)通常是中国南方旱季的结束时间,但2018年是个例外,出现了极端干旱的现象。华南地区迎来了自1951年以来第二个最干燥的春天,广东和福建的降水量仅为全年正常降雨量的40%。此外,月平均气温几乎比正常水平高出3°C。干旱导致水库萎缩、水资源短缺及水稻减产,与2017年相比,产量下降了100多万吨。

CSSP中国项目的研究表明,由于气候变化,目前华南地区晚春发生这样一场干旱的可能性提高了约13倍。这一结果给华南地区的水资源管理和农业部门带来了严峻挑战。

今后,CSSP中国项目的归因研究工作将继续推进这些归因声明背后的科学理论、测试模型和技术的可靠性,并继续研究极端事件。该项目还将与决策者合作,帮助他们在决策中利用这一最新科学技术。

CSSP中国项目正在打造坚实的中英科学合作伙伴关系。CSSP中国项目旨在提高能力,为决策者提供气候缓解和适应战略的相关信息,并为支持气候和天气适应性经济发展及社会福利的服务提供基础。

CSSP中国项目正在中国气象局(CMA)、中国科学院大气物理研究所(IAP)、英国气象局、英国国家气象部门等中英重点科研机构之间建立坚实且可持续的伙伴关系。

CSSP中国项目也在推动在上述中英科学合作伙伴关系中发展。

天气气候科学支持服务伙伴关系计划(CSSP 中国项目是其中之一)由英国政府牛顿基金资助,在中国也被称为“中英联合科学创新基金”。

如需更多信息,请访问牛顿基金网站(www.newtonfund.ac.uk),并通过Twitter关注@NewtonFund。如需有关CSSP中国的更多信息,请访问英国气象局网站:https://www.metoffice.gov.uk/research/collaboration/newton/cssp-china/index
About climate change, a frequently asked question is whether the various earth climate changes we have witnessed are caused by human factors such as greenhouse gas emissions, or are attributable to natural factors such as solar activity or volcanic eruptions. The Climate Science for Service Partnership (CSSP) China Project uses attribution technology to investigate the role of climate change in recent extreme weather and climate events in China.

Attribution studies provide guidance for decision-makers in the potential urgency and scale of the required measures, helping them adapt to the impacts of climate change. Research shows that while human activities increase the risk of extreme weather events, they also provide support for policies to reduce greenhouse gas emissions.

In recent years, people need to understand the causes of past events and the likelihood of future changes. Establishing this evidence base will enhance China's ability to reduce disaster risks, and help protect livelihoods, support national economies, and infrastructure construction.

CSSP China Project is working to provide a platform for Chinese and British scientists to analyze recent extreme weather and climate events in China, and assess the probability of these extreme events occurring due to climate change. As part of its work, the UK Met Office, University of Edinburgh, University of Oxford, and the UK National Atmospheric Science Centre held several workshops to develop the capacity of Chinese scientists to conduct attribution research. These workshops produced many results for specific extreme events in China.

A major factor was the high night-time minimum temperature, which meant that people and ecosystems had fewer opportunities to recover from the heat of the day. CSSP China Project research found that the likelihood of night-time heatwave events lasting 30 days has increased by about 8 times due to climate change. Previously, such events were expected to occur every 500 years, but now they occur on average every 60 years.
气候变化是否增加了中国出现极端天气的可能性？

一般而言，人们会借助气温和降水的长期趋势来讨论气候和气候变化。但是，我们对于气候变化及其变化效应的直接体验来自极端天气和气候事件，如热浪、干旱和暴雨等。
Climate Science Support Partnership – China

- Climate change and extreme weather

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