



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

**CSSP CHINA**



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

### **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 Sichuan, 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](http://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>

### 2018 年春未干旱

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。



### 2018 年 7 月持续强降雨

2018年6月下旬至7月中旬，中国中西部的四川省、甘肃省和陕西省部分地区遭遇持续强降雨。6月21日至7月11日期间的累积降雨量非常接近1961年以来连续三周降雨量的最高纪录。强降雨造成了洪水、山体滑坡和财产损失，受影响人数达到290万人，所造成的直接经济损失超过89亿元（约10亿英镑）。

CSSP 中国项目的研究表明，气候变化增加了短暂强降雨事件的可能性，而实际上同时也降低了长期持续性强降雨事件的可能性。这一结果表明，在中国中西部地区，短时回山洪暴发事件可能会更加普遍。



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 中国项目支持中英合作。该项目旨在提高能力，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。

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，请访问牛顿基金会网站 (www.newtonfund.ac.uk)，并通过 Twitter 关注 @NewtonFund

如需有关 CSSP 中国项目的更多信息，请访问英国气象局网站: <https://www.metoffice.gov.uk/research/collaboration/newton/csp-china/index>

关于气候变化，人们经常问的一个问题是，我们所目睹的各种地球气候变化究竟是由温室气体排放等人类影响导致，还是可归因于太阳活动或火山爆发等自然因素。气候科学支持服务伙伴关系（CSSP）中国项目利用归因技术来调查气候变化在中国近期极端天气和气候事件中所起的作用。

归因研究在潜在紧迫性和所需的措施规模方面为决策者提供了指导，帮助他们适应气候变化所带来的影响。研究表明，人类活动虽然增加了极端天气或气候事件的风险，但也为减少温室气体排放的政策提供了支持。

人们越来越需要了解过去事件的起因，以及这些事件现在乃至将来的变化可能性。建立这一证据基础将增强中国减少灾害风险的能力，并有助于保护民生，以及支持国民经济和基础设施建设。

CSSP 中国项目正在开展的工作

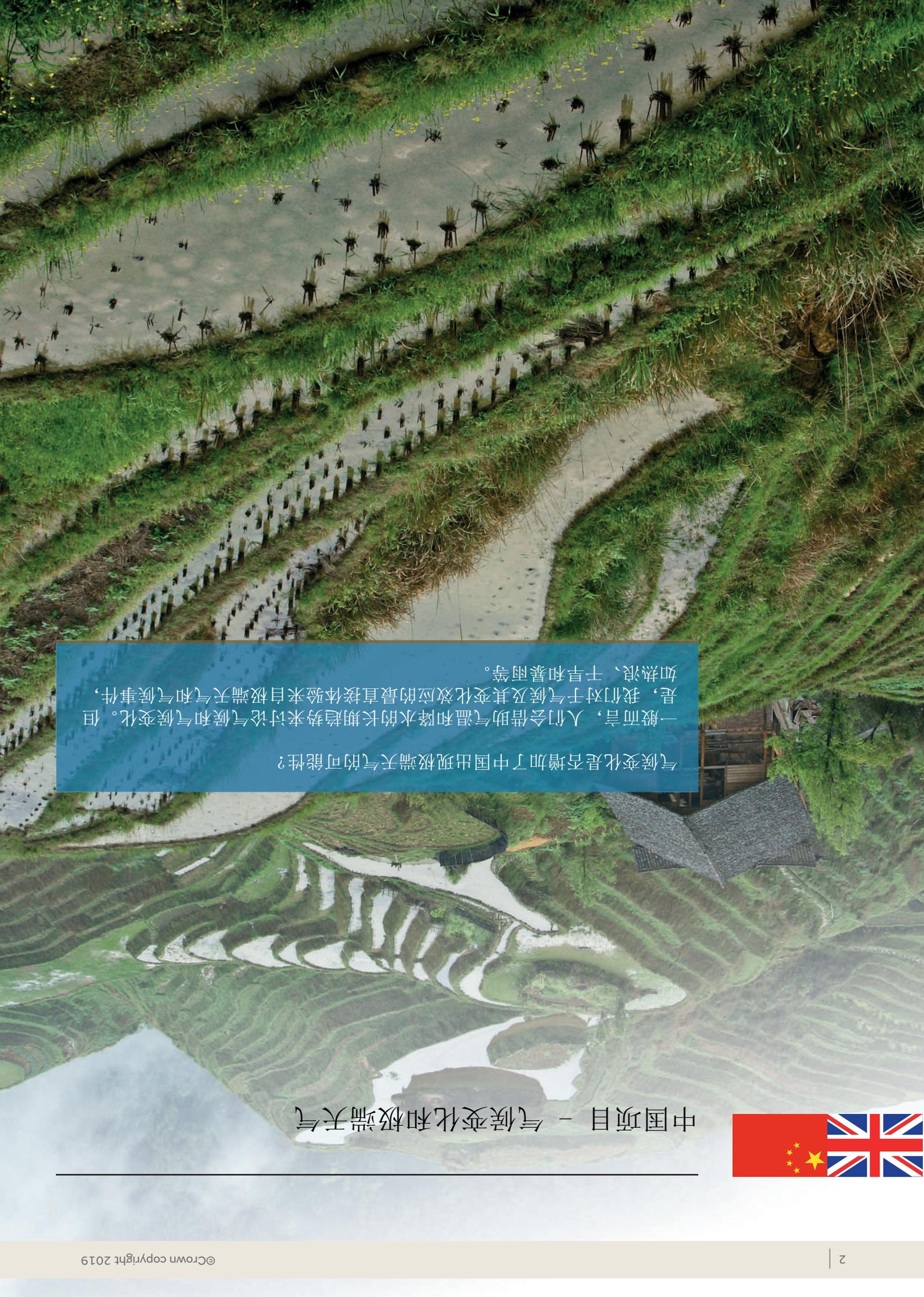
CSSP 中国项目为中英两国科学家提供了一个平台，让他们能够分析中国近期发生的极端天气和气候事件，以及评估这些极端天气和气候事件的发生概率是否因气候变化而升高。作为所开展工作的一部分，英国气象局、爱丁堡大学、牛津大学和英国国家大气科学中心举办了多场研讨会，以在初期培养建立中国职业科学家开展归因研究的能力。这些研讨会针对中国特定极端事件得出了许多成果。



2018 年夏季热浪袭击

针对 2018 年夏季那场袭击中国东北地区的漫长高温热浪，我们开展了一项专项研究。中国气象局（CMA）于 2018 年 7 月 14 日至 8 月 15 日连续 33 天发布高温预警。7 月 30 日，与高温有关的入院治疗人数打破了沈阳市的历史纪录。创纪录的高温不仅增加了人们的发病率和死亡率，还降低了农业生产率，同时增加了电力系统和供水的压力。

造成严重影响的主要因素之一是夜间的最低温度很高，这意味着人们和生态系统从白天经历的高温中恢复的机会较小。CSSP 中国项目的研究表明，由于气候变化，现今东北地区夜间热浪持续时间延长（30 天）的可能性提高约 8 倍。以前，这种事件预计每 500 年发生一次，但现在由于气候变化，它们平均每 60 年就发生一次。



## 中国项目 - 气候变化和极端天气



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，我们对于气候及其变化效应的最直接体验来自极端天气和气候事件，如热浪、干旱和暴雨等。



CSSP CHINA



气候科学支持服务伙伴关系 - 中国项目 -  
气候变化和极端天气

