

## Preface to the 2nd Special Issue on Climate Science for Service Partnership China

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It is a great pleasure to introduce this second special issue of *Advances in Atmospheric Sciences* with new highlights from the Climate Science for Service Partnership (CSSP, Scaife et al., 2021) between China and the UK. The CSSP harnesses expertise in the China Meteorological Administration's National Climate Centre (CMA NCC), the Institute of Atmospheric Physics (IAP) at the Chinese Academy of Sciences and the Met Office, plus key UK and Chinese universities and institutes to deliver a vibrant programme of collaborative research.

Now in its ninth year, an important legacy of the partnership is the exceptional body of peer reviewed science it has produced, with over 500 studies published in the scientific peer reviewed literature. The CSSP between China and the UK has also created a growing legacy in climate model development, with improvements in global and regional climate models and prediction systems that come from years of hard-earned mechanistic understanding, identification of model errors and improvements in model formulation. The project has also delivered new techniques and novel uses of climate data from models and observations that have led to benefits, for example, in estimating extreme events. Some of these studies have already proved to be disturbingly prescient by anticipating the intensity of what, at the time of publication, were unprecedented Chinese heatwaves and extreme UK rainfall, but have since occurred.

The CSSP between China and the UK spans a wide range of climate science and includes observational studies, predictability and climate dynamics, extremes and climate change and the development of climate models and climate services. All of these topics are represented in this special issue, with observational work on records of extreme humidity levels in the papers by Willett. (2023a, 2023b), the predictability and dynamics of the Asian summer monsoon in the papers by Zhu et al. (2023), Wang et al. (2023) and Zhang et al. (2023a), while Nie et al. (2023) investigate predictability of North Pacific cut off lows. The development of models is considered in the papers by Geen et al (2023), Sheridan et al. (2023) and Talib et al. (2023) and extreme events and the model representation of greenhouse gases are considered in the papers by Zhang et al. (2023b); Li et al. (2023) and Xie et al. (2023). Finally, the paper by Bett et al. (2023) documents further development of seasonal climate services by extending the lead time for seasonal predictions of Yangtze river basin rainfall to over 6 months in response to scientific capability and user demand.

The long-lasting collaborations that have now developed between corresponding research groups in China and the UK are perhaps the most important achievements of the CSSP. Current joint research topics in climate dynamics, climate services, model development and observations are all bearing further fruit and are urgently needed if we are to be forewarned of climate change and impending climate extremes such as the recent Chinese summer floods and droughts and the recent extreme summer temperatures and winter rainfall in the UK.

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