

Skillful Seasonal Prediction of Yangtze River valley summer rainfall

Chaofan Li¹, Adam A. Scaife², Riyu Lu¹, Alberto Arribas², Anca Brookshaw², Ruth E. Comer², Jianglong Li³,
Craig MacLachlan², Peili Wu² and Philip E. Bett²

¹ *Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China*

² *Met Office Haley Center, Exeter, UK*

³ *Beijing Climate Center, China Meteorological Administration, Beijing, China*

China suffers from frequent summer floods and droughts, but seasonal forecast skill of corresponding summer rainfall remains a key challenge. In this study, we demonstrate useful levels of prediction skill over the Yangtze River valley for summer rainfall and river flows using a new high resolution forecast system. Further analysis of the sources of predictability suggests that the predictability of Yangtze River valley summer rainfall corresponds to skillful prediction of rainfall in the deep tropics and around the Maritime Continent. The associated dynamical signals favor increased poleward water vapor transport from South China and hence Yangtze River valley summer rainfall and river flow. The predictability and useful level of skill demonstrated by this study imply huge potential for flooding and drought related disaster mitigation and economic benefits for the region based on early warning of extreme climate events. These improvements in seasonal forecasting promote the related operational services that directly benefits from the dynamical climate models, even though many challenges still remaining in seasonal forecast of Yangtze River valley summer rainfall.

Key words: seasonal forecasting, precipitation, predictability, meridional teleconnection

References

- Li, C., A. A. Scaife, R. Lu, A. Arribas, A. Brookshaw, R. E. Comer, J. Li, C. MacLachlan, and P. Wu, 2016: Skillful seasonal prediction of Yangtze river valley summer rainfall. *Environ. Res. Lett.*, **11**, 094002. doi:10.1088/1748-9326/11/9/094002.
- Li, C., W. Chen, X. Hong, and R. Lu, 2017: Why was the strengthening of rainfall in summer over the Yangtze River valley in 2016 less pronounced than that in 1998 under similar preceding El Niño events?—Role of midlatitude circulation in August. *Adv. Atmos. Sci.*, **34**, 1290-1300, doi:10.1007/s00376-017-7003-8.
- Bett, P. E., A. A. Scaife, C. Li, C. Hewitt, and Coauthors, 2018: Seasonal forecasts of the summer 2016 Yangtze River basin rainfall. *Adv. Atmos. Sci.*, doi:10.1007/s00376-018-7210-y (in press).