

# Warm-sector heavy rainfall in China: Studies and challenges

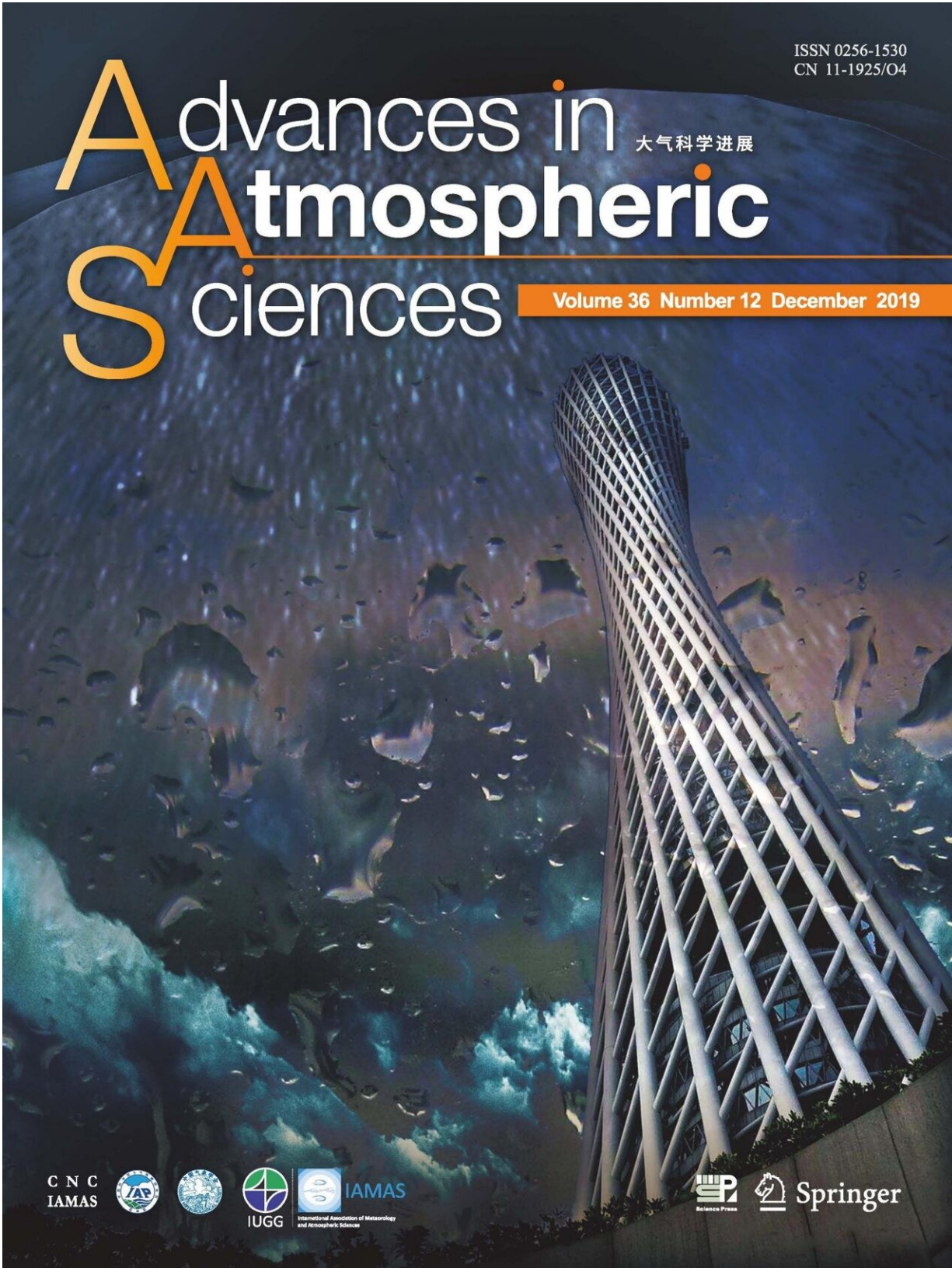
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The article is featured on the cover of Issue 12 of AAS in 2019. Shown on the cover is Guangzhou Canton Tower standing in torrential rain, representative of the considerable socioeconomic impacts imposed by WSHR. Credit: *Advances in Atmospheric Sciences*

Warm-sector heavy rainfall (WSHR) is a type of rainstorm proposed by Chinese meteorologists that had been found to only occur in South China. However, WSHR has also been found in other regions of China, according to Prof. Jianhua Sun from the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences.

"WSHR events often cause [severe flooding](#), huge economic losses, and many casualties, but the operational prediction of these events is difficult and often inaccurate," says Prof. Sun. "To encourage more scientists to study this problem, we summarize existing research and propose challenges presented by WSHR."

Prof. Sun and her team—a group of researchers from IAP, Beijing Municipal Weather Forecast Center, and China Meteorological Administration—reviewed research results on WSHR, including the categories and general features, the triggering mechanism, and structural features of the mesoscale convective system. Their study was published in *Advances in Atmospheric Sciences (AAS)* .

"After decades of research, we have a relatively deep understanding of the triggering mechanism and synoptic weather systems of WSHR in South China, but we only have a preliminary understanding of WSHR in other regions," said Prof. Sun.

WSHR events in South China are associated with four types of synoptic patterns ([wind shear](#), a low vortex, southerly wind, and backflow), while

those occurring in regions south of the Yangtze River and over the middle and lower reaches of the Yangtze River are associated with the synoptic patterns of a warm wind shear line, pre-cold front, and the edge of the western Pacific subtropical high.

The topography and land-sea contrast are [important factors](#) impacting the intensity and distribution of WSHR events in South China. However, the severe precipitation maxima in WSHR events of other regions in China are dispersed and occur over mountains, the borders of mountains and plains, and the shorelines of lakes.

WSHR events can also occur in North China, such as the extreme heavy rainfall case on July 21, 2012. Due to the lack of understanding of WSHR, forecasts of their occurrence are inaccurate and the forecast intensity is typically less than the actual precipitation record.

"Till now, forecasting WSHR has been very difficult because we do not fully understand the formation and developing mechanism," said Prof. Sun. "To improve the forecasting accuracy of heavy rainfall, the background conditions, triggering mechanism and predictability of WSHR in China are worthy of further study."

**More information:** Jianhua Sun et al, A Review of Research on Warm-Sector Heavy Rainfall in China, *Advances in Atmospheric Sciences* (2019). [DOI: 10.1007/s00376-019-9021-1](https://doi.org/10.1007/s00376-019-9021-1)

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