

A combined influence of three oceans on record-breaking rainfall over China in June 2020

April 8 2021



Credit: CC0 Public Domain

The rainfall over the Yangtze River Valley (YRV) in June 2020 broke the existing record from 1979. As of June 28, the People's Daily Online

reported that there were more than 12 million people affected by flood disasters related to this torrential rain, with deaths or disappearances of 78 persons and a direct economic loss of more than 25 billion CNY. Recently, scientists from South China Sea Institute of Oceanology (SCSIO), Chinese Academy of Sciences revealed the cause of the record-breaking rainfall over the YRV.

According to their study published in *Science China Earth Sciences* on March 19, 2021, all three of the Pacific, Indian and Atlantic oceans contributed to the record-breaking rainfall over the YRV in June 2020, which is unique and different from previous studies.

"There are negative 200-hPa relative vorticity anomalies over North China (NC) and negative 850-hPa relative vorticity anomalies in the South China Sea (SCS) in June 2020. The rainfall anomalies in the YRV are mainly controlled by the NC vorticity. However, the SCS vorticity provides favorable moisture conditions for the rainfall anomalies in the YRV," explained Dr. Jiayu Zheng from SCSIO, leading author of the study. Atmospheric processes associated with these two vorticity anomalies were responsible for the record-breaking rainfall over the YRV.

Dr. Chunzai Wang, corresponding author of this study, added:

"Atmospheric circulation anomalies are strongly influenced by sea surface temperatures (SSTs). The purpose of our study is to detect which [ocean](#)'s SSTs are responsible for the atmospheric circulation and rainfall anomalies in June 2020 over the YRV."

In their study, they revealed that the positive SST anomalies in May over the western North Atlantic induce positive geopotential height anomalies in June over the mid-latitude North Atlantic, which affect the rainfall anomalies in the YRV by changing the NC vorticity via Atlantic-induced atmospheric wave train activity across Europe. The Indian Ocean and

tropical North Atlantic, as capacitors of Pacific El Niño events, affect the SCS vorticity associated the anomalous anticyclone over the SCS and also facilitate the YRV rainfall by providing favorable moisture conditions. Thus, all three oceans made contributions to the rainfall over the YRV in June 2020, but the Atlantic played a dominant role.

Dr. Wang concluded: "Previous studies focused on relationships of the Pacific or Indian Oceans with the rainfall in China. In our study, we found that the three oceans have a combined influence on the [rainfall](#) in China." These results indicate that it is of importance to investigate extreme weather and climate events from the perspective of all three oceans. Further research is needed to advance our understanding of three-ocean interactions and extreme weather and climate events.

More information: Jiayu Zheng et al, Influences of three oceans on record-breaking rainfall over the Yangtze River Valley in June 2020, *Science China Earth Sciences* (2021). [DOI: 10.1007/s11430-020-9758-9](https://doi.org/10.1007/s11430-020-9758-9)

Provided by Science China Press

Citation: A combined influence of three oceans on record-breaking rainfall over China in June 2020 (2021, April 8) retrieved 23 June 2024 from <https://phys.org/news/2021-04-combined-oceans-record-breaking-rainfall-china.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.