



Scientists Reveal Joint Factors for Severe Drought in North China in 2014

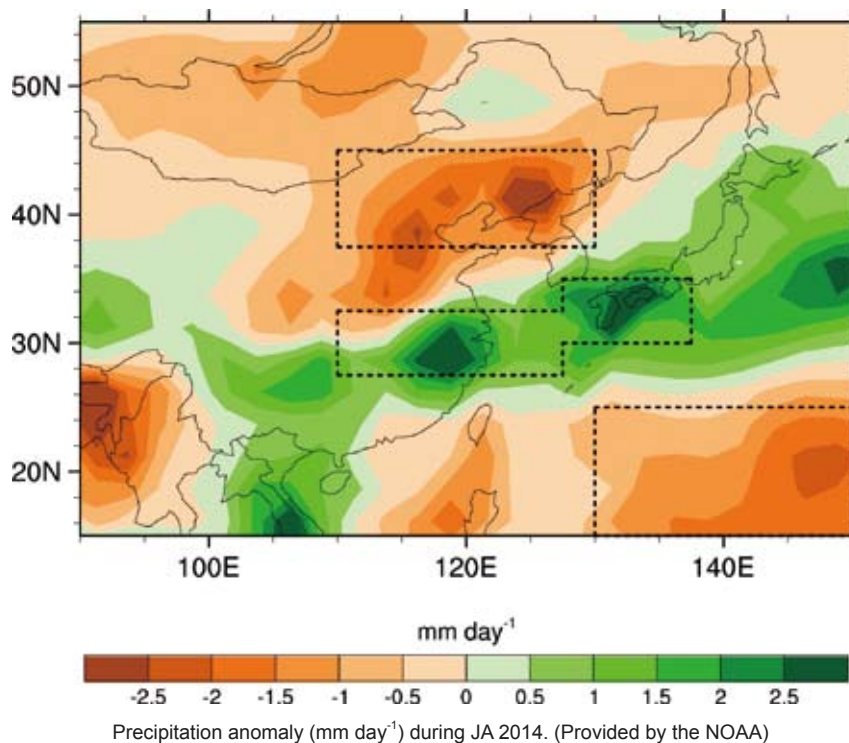
Severe drought events are serious issues in north China, particularly since the end of the 1970s when the East Asian monsoon became weakened and the monsoon rainfall decreased dramatically in the area. In the summer of 2014, North China suffered from a major drought, which turned out to be the worst for some provinces in the past 60 years.

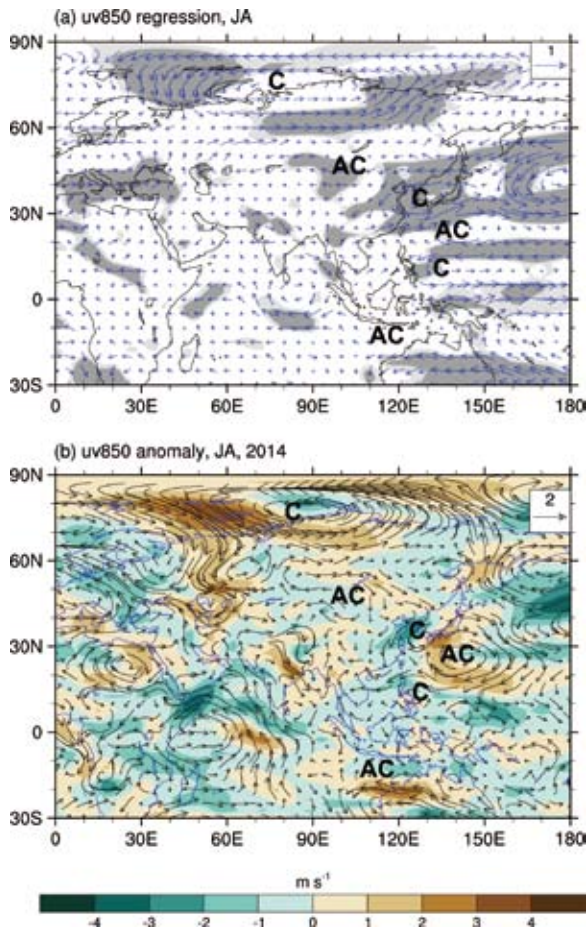
A research group led by Prof. WANG Huijun and Dr. HE Shengping from the Nansen-Zhu International Research Center, Institute of Atmospheric Physics, CAS investigated the atmospheric circulation anomalies, as well as the forcing of the sea surface temperature (SST) and Arctic Ocean sea ice responsible for the severe drought. They found that the East Asian summer precipitation in 2014 exhibited a tripole anomaly, with severe negative anomalies in north China, strong positive anomalies in South China, South Korea and

Japan, and intense negative anomalies in the western North Pacific. Along with the severe tripole precipitation anomalies, there were strong intensities of the Silk Road pattern, the Pacific-Japan pattern and the Eurasian teleconnection pattern, which were responsible for the strong precipitation anomaly in 2014 through changes to the western Pacific subtropical high (WPSH) and the East Asian trough.

Further analysis indicated that the SST in the North Pacific was nearly the warmest in the past 60 years and, together with the strong SST warming in the warm pool region, causing the strong Pacific-Japan teleconnection pattern, southward positioning of the WPSH, and weakened East Asian summer monsoon. “Additionally, the summertime sea ice cover in the Arctic Ocean triggered a strong Eurasian teleconnection pattern,” WANG said.

Meanwhile, the intense warming over the European





(a) Regression maps of summer 850-hPa wind (m s^{-1}) anomalies with regard to simultaneous PI during 1979-2014. Light (dark) shaded regions indicate the values are significant at the 90% (95%) confidence level, based on the Student's *t*-test. (b) The 850-hPa wind anomaly (vectors) of JA 2014. The color shading indicates the anomalous magnitude of wind. The letters AC and C indicate the anomalous anticyclone and cyclone, respectively.

continent and Caspian Sea favored the Silk Road pattern. The severe drought over north China, therefore, was the joint result of Pacific SST anomalies, Arctic sea ice anomalies, and warming over the European continent and Caspian Sea. “One or two of these factors alone may not have resulted in such a severe drought,” he added.

Their study suggested that the seasonal prediction of East Asia summer precipitation should consider not only the tropical Pacific SST, as is sometimes the case, but also the North Pacific SST, the Arctic sea ice extent, and the thermal state in the Caspian Sea.

The research paper was published in the September 2015 issue of *Journal of Climate*.