Study links record-breaking rainfall events in separate regions

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In September 2021, record-breaking rainfall occurred in both Northwest India and North China. This was unexpected in the climatological sense, because the rainy season is generally in July and August over Northwest

India and North China, and subsequently, in September, precipitation reduces remarkably.

A study published in *Advances of Atmospheric Sciences* found that the rainfall and large-scale circulations in September 2021 resembled those of the peak rainy season (July and August), possibly due to warmer conditions over continental Eurasia.

The Asian upper-tropospheric westerly jet extremely was greatly displaced on the poleward direction over West Asia, and correspondingly, an anomalous cyclone appeared over India. This anomalous cyclone transported abundant water vapor into Northwest India, leading to the heavy rainfall there.

The term "teleconnection" is used to describe the climatic links between geographically separated regions in atmospheric sciences. One such teleconnection over the Eurasian continent, known as the Silk Road pattern, was highly anomalous in September 2021, possibly induced by the Indian rainfall anomalies. This anomalous pattern favored the extreme rainfall in North China through the water vapor transported by the lower-tropospheric southeasterly anomalies.

"Climate extremes during the transitions from one season to the next should be emphasized, in addition to the extremes during the peak warm or cold season," said Lu Riyu, co-lead author of the study and a professor at the Institute of Atmospheric Physics of the Chinese Academy of Sciences.

"Climate extremes in one region can be related to, or lead to, those in other regions, through atmospheric teleconnection patterns," said Lu. "The more frequent and stronger climate extremes under global warming expected, the more atmospheric teleconnections will be triggered, which in turn could induce climate extremes in far-away regions worldwide."

More information: Ying Na et al, The Concurrent Record-breaking Rainfall over Northwest India and North China in September 2021, *Advances in Atmospheric Sciences* (2023). DOI: 10.1007/s00376-022-2187-y

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