New understanding of 'warm Arctic-cold Eurasia' on a subseasonal scale

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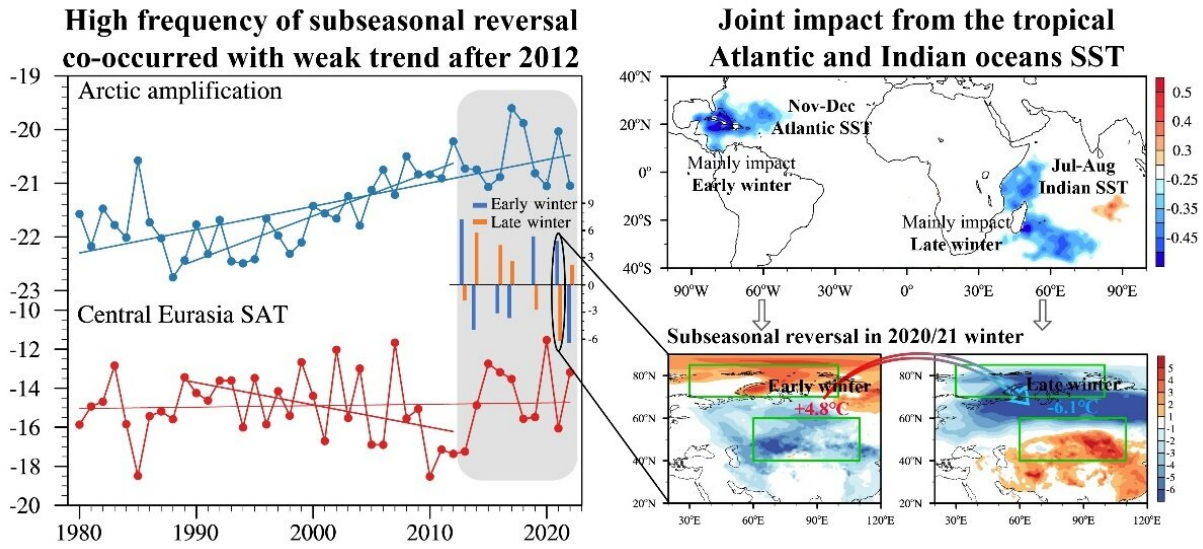

The close linkage between "Arctic warming-Eurasia cooling" trend and the frequency of subseasonal reversal, and the joint impact from the SST in tropical Atlantic and Indian Ocean on the subseasonal reversal of “warm Arctic-cold Eurasia”. Credit: *Science Bulletin* (2023). DOI: 10.1016/j.scib.2023.02.009

"Warm Arctic-cold Eurasia" is one of the most significant pattern in winter climate change in the mid-high latitudes of the Northern Hemisphere, which is a frontier scientific problem in current international climate research.

The study of Blackport and Screen (2020) published in *Nature Climate Change* indicated that the "Arctic warming-Eurasia cooling" trend was significantly weakened after 2012 compared with 1989-2011 and the linkage between Arctic and Eurasian temperature anomalies was not closely connected.

In the regard, Academician Huijun Wang (corresponding author), Professor Zhicong Yin (first author) and co-authors from Nanjing University of Information Science and Technology proposed a new scientific understanding, which published in the journal *Science Bulletin*.

The conclusion of Blackport and Screen that the "Arctic warming-Eurasia cooling" trend was weakened is obviously limited by the length of the observation data. After the update of winter data for 2020 and 2021, the trend change of "Arctic warming-Eurasia cooling" showed great uncertainty.

Blackport and Screen implied a not close linkage between the Arctic and the Eurasian temperature anomalies from the perspective of seasonal average, which ignored the high relationship between the two on a subseasonal scale. In fact, in the past two winters, the early winter of 2020/21 showed a strong "warm Arctic-cold Eurasia" pattern (WACE), and the late winter quickly reversed to a "cold Arctic-warm Eurasia pattern (CAWE). In 2021/22, the CAWE anomaly in early winter reversed to the WACE pattern in later winter.

Thus, the close linkage in WACE is obscured by winter mean.

This study innovatively focused on the new subseasonal variability characteristics of WACE pattern and revealed that the frequency of the subseasonal phase reversal was closely related to the "Arctic warming-Eurasia cooling" trend. The key process of WACE subseasonal variation was caused by preceding tropical SST anomalies, which improved the

scientific explanation of the formation mechanism of WACE pattern.

The new understanding of the WACE pattern on the subseasonal scale has made important progress in understanding the potential impact of Arctic climate change and the trend change of "Arctic warming-Eurasia cooling," and also provides an effective prediction signal for extreme climate such as extreme cold/warm transition and spring sandstorm in the mid-low latitudes.

More information: Zhicong Yin et al, Subseasonal variability and the "Arctic warming-Eurasia cooling" trend, *Science Bulletin* (2023). DOI: 10.1016/j.scib.2023.02.009

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