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Summer Eurasian Heat Wave and its linkage to SST anomalies over North Atlantic and Barents-Kara Seas

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In our study, we aim to examine what factors lead to the summer heat waves over Eurasia and their variability. The analysis reveals that the summer heat waves over Eurasia show two kinds of spatial patterns: midlatitude and high latitude types. The mid-latitude heat wave mainly occurred over west Russia in the west of 55°E and in the south of 60°N, whereas the high-latitude type mainly occurred over west Russia in the east of 55°E and in the north of 55°N. We further analyzed the relationship of the two kinds of heat waves with atmospheric circulation patterns in the Atlantic-Eurasian sector and sea surface temperature (SST) anomalies over the North Atlantic and Arctic. The results show that the cold or warm SST anomalies over Barents-Kara Seas (BKS) can significantly influence the latitude and longitude of Russian heat waves, while the heat waves are also related to the latitude of positive SST anomalies over North Atlantic.

A mid-latitude wave train propagating into Eurasia and mid-latitude Russian heat waves, which are related to the positive phase of the North Atlantic Oscillation (NAO), are seen when there are strong SST warming in the North Atlantic mid-high latitudes south of 60°N and SST cooling over BKS. In contrast, a high-latitude Russian heat wave can occur over west Russia when there are positive SST anomalies over Baffin Bay, Davis Strait and Labrador Sea north of 60°N and BKS, while this high-latitude wave train is related to the decay of Greenland blocking or the negative NAO phase via high-latitude wave train propagation.