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Strengthened linkage between midlatitudes and Arctic in boreal winter

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Early studies have suggested a linkage between the surface warming over the Barents-Kara Seas and the strength of the Siberian high in boreal winter. Here, we show that the linkage is not stable, and with an apparent interdecadal change in the late-1990s. Coinciding with Arctic surface warm anomalies in recent decades (1997–2017), the Siberian high has been significantly intensified, the East Asian jet stream has expanded westward, and an apparent Rossby wave has propagated from the Arctic to East Asia, suggesting an atmospheric teleconnection between midlatitudes and Arctic. In contrast, midlatitude atmospheric circulation anomalies coinciding with Arctic surface warm anomalies were barely statistically significant during 1979–1996. The associated strong anomalous ascending/descending motions and divergent/convergent upper troposphere air masses over the Arctic-Eurasian sector seem to have favored the midlatitude-Arctic linkage during 1997–2017. We hypothesize that Arctic midtropospheric warming plays a crucial role for the linkage between midlatitudes and Arctic in boreal winter. Multimodel simulations support this, and also point to internal atmospheric variability as the cause for the interdecadal shift in the strength of the midlatitude-Arctic linkage.