



## **Relationship between winter AO/NAO and temperature in China: intraseasonal and interdecadal variations**

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In this study, we focus on the intraseasonal and interdecadal variations in the relationship between winter AO/NAO (Arctic Oscillation / North Atlantic Oscillation) and surface air temperature (SAT) in China. On one hand, our results show that there is an intraseasonal contrast in impacts of AO/NAO on SAT in the central-southern China between early and mid-late winter. The linkage between AO and central-southern China SAT strongly depends on the AO-associated changes in Middle-East Jet Stream (MEJS) and the AO-MEJS relationship is significantly different between early and mid-late winter. On the other hand, our results also clearly show that inter-decadal changes have occurred in the relationship between the winter NAO and southern China surface air temperature anomalies in the past decades. A weak in-phase relationship occurred before the early 1970s, but a significant out-of-phase relationship dominated during 1979-1998, though it has been clearly weaker from the late 1990s onwards. Observational evidence shows that such interdecadal variations are mainly related to variations in the spatial pattern and amplitude of the NAO. The eastward shift and amplitude intensification of the NAO favored a north-south Asian dipole structure of circulation anomalies, which tended to produce cold SAT anomalies in central-southern China in the positive NAO phase and warm in the negative NAO phase.