

EGU21-351

<https://doi.org/10.5194/egusphere-egu21-351>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Impact of Boreal Autumn Antarctic Oscillation on Winter Wet and Cold Weather in East Asia

Zhengxuan Yuan, Jun Qin, Shuanglin Li, Sijing Huang, Yassin Mbululo, and Akhtar Rehman
China University of Geosciences (Wuhan), School of Environmental Studies, Atmospheric Science, China
(393431165@qq.com)

The Antarctic Oscillation (AAO) is the dominant mode of the southern extratropical atmospheric mass variability which has potential influences on the Northern Hemisphere (NH). This study reveals a significantly negative correlation between the September-October (SO) AAO index and the occurrence rate of following January-February (JF) wet and cold weather in the Middle and Lower Reaches of Yangtze River Basin (MLRY) in China. The latter is quantified by a Precipitation-Temperature (PT) Index. JF PT is modulated by both northerly air flow in the lower troposphere and southerly air flow in the lower-middle troposphere. The SO AAO stimulates Southern Ocean Dipole (SOD) pattern-like SST anomalies, which induces a North Atlantic Oscillation (NAO)-like atmospheric response in the following JF through ocean-air interaction. As for the northerly flow, the JF NAO-like pattern triggers an eastward propagating wave train, influencing the intensity of East Asian Winter Monsoon (EAWM) and subsequently the northerly cold flow to MLRY. As for southerly flow, the variation of JF SOD regulates the local meridional cell, in turn modulating the Middle East Jet Stream (MEJS) along with the NAO-like pattern, influencing the intensity of precipitation and the wet and warm flow over Southern China and the adjacent regions. In addition to the tropospheric processes, the stratospheric Quasi Biennial Oscillation (QBO) serves as the 'bridge' for linking SOD to NH climate, inducing the JF PT response to SOD SST. To summarize, SO AAO affects the JF PT in MLRY by modulating both cold-dry northerly air flow and warm-wet southerly air flow through ocean-atmosphere interactions and stratospheric pathway.