



Two types of Arctic Oscillations and their different climatic impacts in Winter

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This study examined the connection between the tropospheric AO events and the stratospheric polar vortex using the daily reanalysis data of NCEP-DOE AMIP-II. AO events could be categorized into the stratospheric (S) type and tropospheric (T) type, in terms of the anomaly pattern of the stratospheric polar vortex. Significant differences between the S-type and T-type AO events could also be found in the troposphere: (1) the relatively strong anomalous circulation tends to cover the region from Europe/ North Atlantic sector in the S-type AO event, which shows the NAO-like pattern, whereas the significant anomalies prefer to anchor over the North Pacific in the T-type AO event; (2) in S-type AO events, the Siberian high is extended to eastern Asia.

In the S-type AO events, the significant anomalous circulation over the Europe/North Atlantic in the troposphere are mainly caused jointly by the stratosphere anomalies aloft and by the transient forcing in the troposphere. The Rossby wave propagation from the upstream Eurasian continent contributed to the eastward extension of the Siberian high.

Due to the anomalous Siberian high, the anomalous surface air temperature dominates over Southern China. The formation of the stratospheric anomalous polar vortex usually appears prior to the surface temperature anomalies over East Asia about two weeks.

Key words: AO, stratospheric polar vortex, Rossby wave, transient forcing