

Potential impacts of climate variability on transpacific transport of springtime Asian aerosols

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The potential impacts of large-scale circulation associated with western Pacific (WP) and Pacific-North American (PNA) patterns on transpacific transport of springtime Asian aerosols are examined using aerosol optical depth (AOD) from the Moderate-resolution Imaging Spectroradiometer (MODIS) and reanalysis data. Composite analyses reveal that the increased westerly winds are evidently observed to the north and south of the North Pacific, respectively, during WP positive (WP+) and PNA positive (PNA+) phases. Along the favorable pathways during WP+, the large amount of aerosols are more efficiently transported over the north of 40°N, producing the increased transport probability by about 36% compared to the opposite phase (WP-). Similarly, the distinct route over the south of 40°N during PNA+ associated with more frequent high aerosol loading days as compare to PNA-. Concurrent with these reinforcements during WP+ and PNA+, the long-range transports of aerosols emitted from northeastern and southeastern Asia can be effectively controlled by respective patterns.

Keywords: Asian aerosol, transpacific transport, MODIS AOD, western Pacific pattern, Pacific-North American pattern