

Winter monsoon variability and its impact on aerosol concentrations in East Asia

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Monsoons play a key role in synoptic weather patterns, which affect the frequency and longevity of pollution events. In East Asia, particulate matter (PM) pollution is particularly severe in winter. In this study, we investigate the relationship between winter aerosol concentrations and the East Asian Winter Monsoon (EAWM) variability using a global 3-D chemical transport model (GEOS-Chem) and ground PM observations. A strong relationship between aerosol concentrations and the intensity of the EAWM is found, but shows a different sign for northern and southern East Asia. Compared to the climatological mean aerosol concentrations in winter, changes driven by the EAWM variability are up to 25% in East Asia in the model. The EAWM variability is found to play a major role in interannual variations in aerosol concentrations; consequently, changes in the EAWM will be important for understanding future changes in wintertime PM air quality in East Asia.

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