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## Aerosol-weather-climate interactions in highly polluted regions

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With rapidly expanding economic and industrial developments and tremendous increases in energy consumption, China and India are facing serious aerosol pollution, posing great threat to human health. Aerosols also modulate the climate and ecosystems via aerosol-cloud-radiation interactions. Yet, the poor understanding of aerosol pollution in Asia and its interactions with climate impedes the design and implementation of effective pollution control measures. Combining atmospheric modeling and observations, we demonstrated that the aerosol interactions with radiation and clouds contributed in important ways to intensification of the aerosol enhancements in North China. We manifested also how assimilation of  $PM_{2.5}$  in winter haze periods can improve model predictions and that these improved predictions can reduce significantly the uncertainties in health impacts and estimates of aerosol radiative forcing. It was also demonstrated that the conditions of the ocean temperature in fall can be effectively used to predict the severity of Indian winter haze, which provides useful implications for pollution control at least a season in advance.