4.125 Spatiotemporal distribution of anthropogenic aerosols in China around 2030.

Presenting Author:

Shu Li, School of Atmospheric Sciences, CMA-NJU Joint Laboratory for Climate Prediction Studies, Jiangsu Collaborative Innovation Center for Climate Change, Nanjing University, Nanjing, China, lishu@nju.edu.cn

Abstract:

In the context of global warming, the future spatiotemporal distribution of aerosols in China is a common concern of the government and the scientific community. In this study, the regional climate model RegCM4 is used to simulate the spatiotemporal distribution of anthropogenic aerosols including sulfate, black carbon and organic carbon in China around 2030 under the RCP4.5 and RCP8.5 scenarios and estimate the contributions of climate change, emission change and extra-regional transport change to the change of anthropogenic aerosol concentration in the study area. The results show that around 2030, the annual averages for sulfate, black carbon and organic carbon surface concentrations in the central and eastern parts of China will be 8.5, 1.7 and 3.7μg m-3, respectively, under the RCP4.5 scenario, whereas 10.0, 2.2 and 4.4 μg m-3, respectively, under the RCP8.5 scenario. The surface concentration of sulfate is higher in summer and spring, while lower in winter and autumn. The surface concentrations of black carbon and organic carbon are higher in winter and lower in other seasons. The results of sensitivity experiments demonstrate that the future change in local emissions has the greatest impact on the anthropogenic aerosol concentrations throughout China, followed by the impact of future climate change, while the effect of extra-regional transport change is very small. For the column burdens of sulfate and black carbon, the future change in local emissions is the dominant influence factor. But for the column burdens of organic carbon, the effect of extra-regional transport change is close to that of the future change in local emissions. The results of this paper suggest that the future change in local emissions and future climate change may lead to further aggravated particulate pollution in China, thereby hindering the governmental effort to improve air quality.