

Natural and anthropogenic contributions to long-term variations of SO₂, NO₂, CO and aerosol over East China

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East China has been experiencing significant air pollution during the past decades. Long-term variations of air pollutants over East China are affected by increasing energy consumption, government pollution regulation, new technologies, economic conditions, human activities and a number of natural factors such as global warming, long-term variations in precipitation, monsoon strength etc. Quantifying the impacts of natural oscillations and anthropogenic activities on the long-term variations of air pollutants is critical for guiding emission control measures. In this study, satellite-retrieved and MOZART-4-simulated SO₂, NO₂, CO and total column aerosol mass concentration (AMC) data are used to investigate the impacts of natural factors and human activities on long-term variations of these air pollutants over East China. The Kolmogorov–Zurbenko (KZ) filter is used to extract long-term trends from both observed and simulated air pollutant data. Results show that SO₂ concentrations decreased from 2007 to 2014, with natural and anthropogenic factors contributing 37.4% and 62.6% to this decrease, respectively. NO₂ concentrations increased significantly during 2000–2014; anthropogenic activities contribute 79.5% to this variation, while natural factors only account for 20.5%. CO concentrations decreased slowly from 2003 to 2009, with contributions of natural and anthropogenic factors of 19% and 81%, respectively. Since 2006, AMC decreased slightly, with natural factors accounting for 43% of the total variation, while human activities account for 57%.

Keywords: satellite observation, MOZART-4 model, contribution