Trends of surface ozone in China in recent years and the roles of anthropogenic emissions and meteorology

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Observations of surface ozone available from ˜1,000 sites across China for the past years (2013–2019) show severe summertime pollution and regionally variable trends. We assess the effects of changes in anthropogenic emissions and/or meteorological parameters on the ozone trends. Simulations with the Goddard Earth Observing System Chemical Transport Model (GEOS-Chem) indicate that an important factor for ozone trends in the eastern China is the ˜40% decrease of fine particulate matter ($PM_{2.5}$) over the past years, slowing down the aerosol sink of hydroperoxy (HO_2) radicals and thus stimulating ozone production. Both statistical and modeling approaches indicate that changes in meteorological conditions contributed largely to the increases in ozone in China. We quantify the meteorology driven increases in ozone by model sensitivity studies to separate roles of changes in natural emissions, chemical reactions and transport.

Keywords: Ozone pollution in China, Recent trends, Chemistry mechanism, Changes in meteorology