

Distinctive timing of US historical surface ozone change determined by climate and anthropogenic emissions

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Future changes in surface ozone in a warming climate is an important question for the United States. Analyses of historical ozone change in response to climate change, although useful for validating theories regarding future ozone changes, are complicated by concurrent changes in anthropogenic emissions. Here we find that the individual contributions of climate and precursor emissions to US historical ozone changes over 1990–2014 can be distinguished by contrasting the changes in daytime versus nighttime ozone, based on an analysis of observed and simulated annual mean ozone time series. In particular, climate variability has determined ozone interannual variability, particularly for the daytime ozone, while reductions of anthropogenic NO_x emissions have primarily driven an increase in the nighttime ozone. Our results have important implications for future ozone change studies and ozone mitigation.