

# **Ozone and Climate Responses to Regional Emission Changes in East Asia**

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Effects of emission changes of long-lived and short-lived gases in East Asia on the stratospheric and tropospheric ozone and climate are still under wide debt. Using a chemistry-climate model (CCM), the effects of prescribed emission increases of NO<sub>x</sub>, CH<sub>4</sub> and N<sub>2</sub>O in East Asia on the ozone layer, regional and global climate are investigated and compared with the effects of the emission changes of the same amount in North America. The analysis reveals that responses of the ozone layer and climate to emission increases in different regions of the earth are different. An increase of CH<sub>4</sub> emission by 50% over North America has a greater influence on the stratospheric ozone than the effect of CH<sub>4</sub> emission increase of the same amount over East Asia. The tropospheric O<sub>3</sub> increases caused by CH<sub>4</sub> emission increase over East Asia can be noted throughout the troposphere. However, CH<sub>4</sub> emission increases over North America cause tropospheric ozone changes only in the lower troposphere. A 50% increase in NO<sub>x</sub> emission over East Asia can cause a 2% increase in the tropospheric ozone. When N<sub>2</sub>O emission is increased by 50% globally, there is no significant changes in the tropospheric ozone, but significant decreases in the stratospheric ozone and temperature can be noted. The increases in CH<sub>4</sub>, NO<sub>x</sub>, N<sub>2</sub>O emissions at the northern mid-latitudes tend to strengthen westerly winds in the northern mid-latitude stratosphere.

Key words: East Asia, Emission changes, Ozone, Climate, Stratosphere