

Source Attribution to Surface Ozone in Asia during ASIA-AQ: NO_x Tagging in MUSICA_{v0}

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Abstract

Tropospheric ozone (O₃), a secondary air pollutant, is generated through numerous photochemical reactions, with significant implications for human health, ecosystems, and climate change. The globally escalating attention towards tropospheric ozone in Asia is driven by the substantial increase in precursor emissions. Utilizing a novel configuration of the global Community Atmosphere Model with chemistry and variable resolution, known as MUSICA_{v0} (MUlti-Scale Infrastructure for Chemistry and Aerosols, version 0), numerical simulations will be conducted to elucidate the origins of surface ozone. The recent Airborne and Satellite Investigation of Asian Air Quality (ASIA-AQ) field campaign during February – March 2024 provided comprehensive atmospheric composition data over the Republic of Korea, Philippines, Taiwan, and Thailand. A special MUSICA_{v0} grid was developed for ASIA-AQ that has finer resolution (down to 12-km) over all regions of interest in Asia. This global model with variable resolution grid is unique for source quantification as it allows simulation at local-to-regional scales, resolving urban-scale emissions and associated chemical processing, while simultaneously simulating hemispheric-scale pollution transport. In this study, NO_x emissions from various sectors and source regions are tagged to quantify their contributions to surface ozone. These findings will be compared to source attribution from FLEXPART back trajectories, and the model results will be evaluated with available observations from satellite, surface monitors and aircraft.

Early Career Scientist

YES, I am an early career scientist.

IGAC Activities

ACAM: Atmospheric Chemistry and the Asian Monsoon, CCMi: Chemistry Climate Model Initiative

IGAC Regional Working Groups

Americas Working Group