Impact of Reactive Chlorine on Air Quality

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Abstract

The chlorine radical (Cl) plays a crucial role in the formation of secondary air pollutants by determining the total atmospheric oxidative capacity (AOC). However, there are still large discrepancies among studies on chlorine chemistry, mainly due to uncertainties from three aspects: (a) Anthropogenic emissions of reactive chlorine species from disinfectant usage are typically overlooked. (b) The heterogeneous reaction uptake coefficients used in air quality models resulted in certain differences. (c) The co-effect of anthropogenic and natural emissions is rarely investigated. In this study, the updated Weather Research and Forecasting (WRF)-Community Multiscale Air Quality (CMAQ) modeling system with comprehensive chlorine mechnisms was used to simulate the combined impact of chlorine emissions on the air quality of a coastal city cluster in the Yangtze River Delta (YRD) region. The results indicate that the new emissions of reactive chlorine and the updated gas-phase and heterogeneous chlorine chemistry can significantly enhance the AOC, ozne and $PM_{2.5}$. This study underlines the significance of adding full chlorine emissions and updating chlorine chemistry in air quality models, and demonstrates that chlorine chemistry may significantly impact air quality over coastal regions.

Early Career Scientist

NO, I am not an early career scientist.

IGAC Activities

CCMi: Chemistry Climate Model Initiative, AMIGO: Analysis of eMIssions usinG Observations, MAP-AQ: Monitoring, Analysis and Prediction of Air Quality

IGAC Regional Working Groups

China Working Group