

Lightning NO_x emissions and their impact on air quality in a global air quality forecast model

Nitrogen oxides produced by lightning (LNOX) represent a major uncertainty in the nitrogen budget of the atmosphere, and while LNOX represents only about 10% of NO_x emissions in the atmosphere, it disproportionately affects the upper troposphere. Most air quality models have ignored LNOX emissions since anthropogenic emissions of ozone precursors dominate surface concentrations, but as anthropogenic sources decrease with increased regulation, natural sources such as lightning become increasingly important. In addition, as forecast periods are increased, remote sources of ozone need to be considered. This study will compare some of the newer lightning parameterizations as implemented in global version of the air quality forecast model of Environment and Climate Change Canada. We will look at the impact of LNOX on upper level ozone in the model and on the surface over a one-year period and during lightning intensive periods for certain region. The impact of cruising altitude aircraft will also be addressed.