2.138 The Impacts of Heterogeneous Reaction of N2O5 on Sea Salts on Concentration of Ozone and total nitrate.

Early Career Scientist

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Abstract:

High concentrations of nitrogen-contained gases and sea salts were concentrated over eastern coastal area of China. Heterogeneous reaction between them would lead to important impacts on ozone and nitrogen contained species, which will further influence atmospheric oxidation capacity and nitrogen deposition. We incorporated the heterogeneous reaction of N_2O_5 and sea salts into the Community Multiscale Air Quality model (CMAQv5.0) to analyze its impacts on O_3 and nitrogen across eastern China in summer (May 6 to 10, 2017) and winter (Jan 1 to 7, 2016). The results showed that the heterogeneous reaction of N_2O_5 on sea salt enhanced nitryl chloride ($ClNO_2$) levels by more than 3 orders of magnitude during both the winter and summer. In winter, $ClNO_2$ concentration can reach up to ~ 0.7 ppb over of Yangtze River area, Pearl River area and Yellow sea. $ClNO_2$ concentration in summer was 0.2 ppb lower than that in winter, and the highest daily mean concentration (0.5 ppb) appeared near Bohai Sea. Enhancements of ozone due to photolysis of $ClNO_2$ was in the range of 3 ~ 11ppb (8%-30%) in winter, which is approximately 2 ~ 4 times higher than that in summer (1.2-3 ppb). The increased O_3 showed a good corresponding relationship with the heterogeneous production of $ClNO_2$. In addition, model results suggested that this heterogeneous

chemistry reduced total nitrate (TNO_3 = HNO_3+NO_3^-) by ~ 10%-18% in winter and 7%-11% in summer.

KEYWORDS
Heterogeneous reaction; N_2O_5; Ozone; Sea salt; total nitrate

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