



## Impacts of daytime nitrous acid source on O<sub>3</sub> budget and concentrations of O<sub>3</sub> and major aerosol components in the coastal regions of China

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37 field experiment data from 13 different field campaigns across the globe are used to express the unknown daytime HONO source (Punknown) as a function of NO<sub>2</sub> mixing ratios and J(NO<sub>2</sub>): . Then the Punknown is added into the WRF-Chem model. Elevated daytime-mean Punknown values are found in the coastal regions of China, reaching 2.5 ppb h<sup>-1</sup> in the Beijing-Tianjin-Heibei region, 2.0 ppb h<sup>-1</sup> in the Yangtze River delta region, and 1.2 ppb h<sup>-1</sup> in the Pearl River delta region. When the Punknown, HONO emissions and nighttime hydrolysis conversion of NO<sub>2</sub> on aerosols are considered, daytime HONO is produced primarily via Punknown and the reaction of OH and NO, whereas, nighttime HONO is produced primarily via the nighttime hydrolysis conversion of NO<sub>2</sub> on aerosols.

Impacts of Punknown on O<sub>3</sub> and major inorganic aerosols are evaluated in this study. Simulation results show that O<sub>3</sub> budget and monthly/hourly mean concentrations of O<sub>3</sub> [U+3001]NO<sub>3</sub>-[U+3001]NH<sub>4</sub><sup>+</sup> and SO<sub>4</sub><sup>2-</sup> in the coastal regions of China are significantly increased when the Punknown is considered. Monthly daytime-mean of O<sub>3</sub> production rates and loss rates are respectively increased by 0.80~2.95 ppb h<sup>-1</sup> (30~115%) and 0.03~0.21 ppb h<sup>-1</sup> (8~32%); monthly averaged daily maximum 8-h O<sub>3</sub> concentrations is increased by 1.90~7.24 ppb (2~10%); daily maximum 1-h surface O<sub>3</sub> concentrations is increased by 9.00~35.00 ppb in major cities; monthly mean concentrations of NO<sub>3</sub>-[U+3001]NH<sub>4</sub><sup>+</sup> and SO<sub>4</sub><sup>2-</sup> are increased by 0.01~5.64 μg m<sup>-3</sup> (1~23%) [U+3001] 0.14~1.28 μg m<sup>-3</sup> (2~20%) and 0.72~2.54 μg m<sup>-3</sup> (9~22%), respectively, in the coastal regions of China.