



## **Impacts of potential HONO sources on the concentrations of oxidants and secondary organic aerosols in the Beijing-Tianjin-Hebei region of China**

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We first coupled indoor emissions and biomass burning emissions into the WRF-Chem model besides the other four potential HONO sources (i.e. traffic emissions, soil emissions, and heterogeneous reactions on aerosol and ground surfaces). Eight simulations were performed in the Beijing-Tianjin-Hebei region (BTH) of China in August of 2006. The results indicated that traffic emissions and heterogeneous reactions on ground and aerosol surfaces were the key sources of HONO at night, accounting for  $\sim 41\%$ ,  $\sim 27\%$  and  $\sim 20\%$  of the nighttime simulated HONO concentrations, respectively. The two heterogeneous reactions were the main contributors during the day, accounting for  $\sim 66\%$  (ground surfaces) and  $\sim 19\%$  (aerosol surfaces) of the daytime simulated HONO concentrations. The indoor emission source could be the second largest contributor during nighttime and led to a maximum hourly enhancement of 0.59 and 0.76 ppb at the central urban sites of Beijing and Tianjin, respectively. The six potential HONO sources enhanced the monthly meridional-mean concentrations of  $O_3$ , OH and  $HO_2$  by 5–44%, 5–>150% and 5–>200%, respectively, leading to an enhancement of 1–3  $\mu\text{gm}^{-3}$  in the monthly averaged concentrations of secondary organic aerosol (SOA), and that of 10–35  $\mu\text{gm}^{-3}$  in the largest hourly concentrations of SOA within 1000 m above the ground in the BTH. The major precursors of the enhanced SOA were Xylenes, Toluene and BIGALK (lumped alkanes  $C>3$ ). The inclusion of the six potential HONO sources in the WRF-Chem model considerably improved the HONO simulations at both urban and suburban sites compared with the corresponding observations. The above results suggested that the six potential HONO sources significantly enhanced the atmospheric oxidation capacity and leading to large enhancements in the hourly SOA concentrations and aggravating haze events in this region.