111

MODELING THE ATMOSPHERIC REACTIVE GASEOUS MERCURY IN THE URBAN AIR

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Chemical speciation and concentrations of reactive gaseous mercury (RGM) in the urban atmospheric boundary layer (ABL) have been modeled using a photochemical box model. Measurements for total gaseous mercury (TGM) and trace gases were carried out in Seoul (37.6 N, 127 E), Korea, during a one-year period of March 2001 – February 2002. Weak anti-correlation between TGM and ozone was observed in the spring. In addition, there were distinct TGM concentration differences between day and night, especially during winter. Model simulations suggested that the most dominant sink of elemental mercury (Hg(0)) was the reaction with O3 that was the major source of mercury oxide (HgO). The reaction of Hg(0) with OH and dry deposition were not the negligible removal processes of elemental mercury. The dominant RGM species in the urban ABL are likely to be HgO and Hg(HO)2. Seasonal average concentrations of HgO and Hg(HO)2 ranged from 0.5E4 to 1.1E4 and 0.2E4 to 3.5E4 molecules/cm3, respectively. Model estimated concentrations were the highest in summer. Most of RGM species showed diurnal pattern (i.e., daytime increase and nighttime decrease). For the RGM production, HgCl2 and HgBr contributions in the urban environment might be minor. Keywords: Total gaseous mercury; Reactive gaseous mercury; Seoul; Photochemical box model; Halogen