



## Observation Characteristics and Model Validation of Photochemical Process in Guangzhou, China

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An actinic radiation flux instrument was used for the observations at the Guangzhou Panyu Atmospheric Composition Station during October, 2012, in order to obtain eight types of material photolysis rates which were closely related to the photochemical process. The observation analysis and model validation were then carried out. The results showed that Guangzhou was significantly characterized by photochemical pollution in October, 2012. The maximum daily 8 hour average and the daily 1 hour maximum of the ozone concentration had monthly averages of 121.57 ppb and 155.00 ppb, respectively, which were greater than the national secondary standard by 62.81% and 66.08%, respectively. Also, the eight types of photolysis rates were related to the ozone concentration by different extents. Among these, the maximum daily 8 hour average and the daily 1 hour maximum of the photolysis rate  $J(\text{NO}_2)$  were closely related to the ozone generation, with monthly averages of  $7.12 \cdot 10^{-3} \text{s}^{-1}$  and  $9.97 \cdot 10^{-3} \text{s}^{-1}$ , respectively. The maximum daily 8 hour average and the daily 1 hour maximum of the photolysis rate  $J(\text{O1D})$  were closely related to the ozone depletion, displaying monthly averages of  $2.47 \cdot 10^{-5} \text{s}^{-1}$  and  $3.18 \cdot 10^{-5} \text{s}^{-1}$ , respectively. The Model CMAQ 5.0 was used for the simulation analysis in the cases of a sunny high ozone process. The results showed that, compared with the measured photolysis rate, the  $J(\text{NO}_2)$  simulation value was approximately 30% to 40% lower, while the  $J(\text{O1D})$  simulation result was 5% to 10% higher. Therefore, characteristics of the under-estimation of the photolysis rate  $J(\text{NO}_2)$  and over-estimation of the  $J(\text{O1D})$  clearly existed. That is to say, the formation rate of the  $\text{O}_3$  was under-estimated, while its depletion rate was over-estimated, which was a generally important cause which led to the model having a lower simulation of  $\text{O}_3$ .