

A COMPARATIVE STUDY OF OZONE PRODUCTION IN  
5 U.S. METROPOLITAN AREASLawrence I. Kleinman<sup>1</sup>, Peter H. Daum<sup>1</sup>, Yin-Nan Lee<sup>1</sup>, Linda J. Nunnermacker<sup>1</sup>,  
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December 2004

For presentation at the  
2004 AGU Fall Meeting,  
San Francisco, CA  
Dec. 13-17, 2004**ABSTRACT**

We present observations of  $O_3$  and  $O_3$  precursors measured at mid boundary layer altitude during field campaigns in Nashville, TN (1995), New York City, NY (1996), Phoenix, AZ (1998), Philadelphia, PA (1999), and Houston, TX (2000). Ozone production rates,  $P(O_3)$  and their sensitivity to  $NO_x$  and VOCs, are calculated using observed concentrations as inputs to a steady state box model. City to city comparisons are made to illustrate common features of urban photochemistry and features that are unique to specific cities. Ozone production rates vary from nearly zero to  $155 \text{ ppb h}^{-1}$ . Differences in  $P(O_3)$  depend on precursor concentrations; namely, radical sources,  $NO_x$  and VOCs. Under conditions where  $P(O_3)$  is greater than  $25 \text{ ppb h}^{-1}$ , there is a potential to produce enough same-day  $O_3$  to transform a typical regional background into a severe  $O_3$  episode. Six such cases were observed, in Nashville, Philadelphia, and Houston, with elevated  $O_3$  concentrations in the afternoon (130-211 ppb) following a morning in which  $P(O_3)$  was  $25 - 140 \text{ ppb h}^{-1}$ . High  $P(O_3)$  occurs when  $NO_x$  concentrations are 5 to 25 ppb and OH-VOC reactivity is above  $5 \text{ s}^{-1}$ . These conditions are infrequent and aside from a common dependence on calm winds reasons vary from city to city.