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OZONE PRODUCTION IN THE NASHVILLE URBAN PLUME

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The DOE G-1 aircraft flew 17 flights in the Nashville urban area, measuring O_3 , O_3 precursors, and photochemical oxidation products, including HCHO, peroxides, and NO_y . Trace gas concentration data from these flights are used as input to steady state photochemical box model calculations. Ozone production rates, $P(O_3)$, and concentrations of short lived species such as OH, peroxy radicals, and NO_2 are calculated in terms of the measured stable compounds. The calculations also yield the sensitivity of $P(O_3)$ to changes in NO and hydrocarbons (HC). The Nashville urban plume is calculated to have NO_x and HC sensitive regions. The most important factor in determining the relative sensitivity of $P(O_3)$ to NO and HC is the fraction of radicals that are removed by reactions of the type radical + $NO_x \rightarrow$ products. A crossover from NO_x to HC sensitive conditions occurs when more than 1/2 of radicals are removed by reaction with NO_x . When more than 2/3 of radicals are removed by reactions with NO_x , then NO_x becomes counter-productive to O_3 formation.