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PEROXY RADICAL CONCENTRATION AND OZONE PRODUCTION RATE IN THE 1995 SOUTHERN OXIDANTS STUDY

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The 1995 Southern Oxidants Study (SOS) combines aircraft observations of ozone precursors with model calculations in order to understand the processes which lead to elevated ozone levels around Nashville, TN, and over a multi-state area in the eastern US. Photochemical ozone production requires nitrogen oxides (emitted primarily by anthropogenic sources), volatile organic compounds (with both anthropogenic and natural sources), humidity and sunlight, all of which are present in abundance during the summer in the eastern US. The rate limiting steps in this ozone production mechanism are reactions of nitric oxide (NO) with peroxy radicals. The present work presents calculations of peroxy radical concentrations and ozone production rate using the extensive data set collected on the WP-3 Orion aircraft. Measured concentrations of nitrogen oxides and free radical precursors, such as ozone and formaldehyde, are used to construct a free radical budget. This budget allows the calculation of peroxy radical concentrations and, in combination with the measured NO, provides an estimate of the instantaneous ozone production rate. Radical levels and ozone production in rural areas and urban plumes are contrasted. This data is used to describe the correlations of peroxy radical concentration and ozone production rate with the amount of nitrogen oxides for different organic compound levels.