

Interactive comment on “Observations of NO_x, ΣPNs, ΣANs, and HNO₃ at a rural site in the California Sierra Nevada Mountains: summertime diurnal cycles” by D. A. Day et al.

Anonymous Referee #2

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This paper presents an analysis of measurements of a variety of nitrogen compounds, including NO_x, alkyl nitrates (ANs) and peroxy nitrates (PNs) at the Blodgett forest site, focusing on measurements of the diurnal variations of these compounds to evaluate the current understanding of the chemical and dynamical processes controlling their production and fate. There is still some uncertainty associated with the chemistry of these compounds and the partitioning of the total NO_y budget, and as a result this paper provides some new information through qualitative and quantitative analysis of the diurnal cycles of these compounds measured during the summer. In addition, the authors attempt to estimate the total peroxy radical concentration at this site through calculations of the deviation from the photostationary state relation. These latter re-

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sults suggest that the concentration of peroxy radicals may be larger than previously measured under similar conditions. The paper is generally well written, and the results are worthy of publication in ACP.

My main concern is with the calculation of the total peroxy radical concentration using deviations from the photostationary state. As discussed in Cantrell et al. [1997], this method for estimating peroxy radical concentrations is highly uncertain even with reasonably accurate input values. The authors use their measured values of NO_x and O_3 in the calculation, but do not describe how they estimated the value of j_{12} . It is also not clear whether the uncertainty in their estimation of j_{12} is taken into account in the uncertainty in the $\text{HO}_2 + \text{RO}_2$ calculated concentrations shown in Figure 6. These issues should be clarified in the revised manuscript. A better approach is to use a steady-state analysis to estimate the total peroxy radical concentrations which the authors appear to have done for mid-afternoon conditions based on the discussion on page 3464. However, these calculations are only discussed briefly. The manuscript would benefit from an expanded discussion of the steady-state calculation analysis, perhaps including a simple radical budget analysis which could give additional insights into what appears to be high HO_x concentrations in this environment.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 3435, 2009.

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