

Interactive comment on “Application of thermal dissociation-laser induced fluorescence (TD-LIF) to measurement of HNO_3 , Σ alkylnitrates, Σ peroxy nitrates, and NO_2 fluxes using eddy covariance” by D. K. Farmer et al.

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We thank Drs. Neftel, Amman and Spirig for their insightful comments, and for continuing the discussion we raise in the paper regarding our summer flux observations at Blodgett Forest. The data presented were intended merely to provide enticing examples of the potential of this instrument to make new contributions. A complete discussion of our proposed mechanism for HNO_3 production in the canopy required a separate manuscript. The basic idea is that the upward HNO_3 fluxes are not driven by NO_x emissions into a constant field of OH, but rather that OH is higher within the canopy than above, driving HNO_3 production and thus an HNO_3 gradient causing an

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upward flux. We do not attribute the HNO_3 fluxes to conversion of soil NO to HNO_3 . As we mention in this paper, and will discuss in forthcoming papers, we suggest that soil emissions of NO react with O_3 to produce NO_2 , and thus influence the emission of that species. Neftel and colleagues are correct in their calculation that the available time is too short for the emitted NO_2 to produce the HNO_3 gradient responsible for the entire flux. Thus we argue that there is no reason to expect the ratio of NO_2 to HNO_3 fluxes to be any particular value as the mechanisms controlling these fluxes are different. Namely, the NO_2 flux is likely driven by soil NO emissions reacting with O_3 , while the HNO_3 flux is driven primarily by an OH gradient and the competing processes of deposition.

Regarding the more technical comments, we will clarify the wording of our lagtime calculation in a revised manuscript, as our calculation method matches Referee 1's suggestion. We agree with Dr. Neftel that spectral analysis may be used to think about fluxes, and have been considering how to use the observed ogives to provide information on the processes involved. We are preparing a manuscript on this topic, and welcome Dr. Neftel's ideas and discussion on this matter.

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