Response to Reviewer 2

We thank the reviewer for the helpful comments.

Reviewer 2

Chemical formulas (HNO3, RONO2, etc.) are used before they are defined but then defined upon a second use. Either don't define them (assume everyone reading the paper already knows) or define them upon first use.

We have gone through the manuscript to be consistent in our definitions of chemical formulas. We assume the reader is familiar with simple chemical formulas (e.g. O_3, HNO_3), but include definitions of classes of compounds that have multiple abbreviations (e.g. ΣANs/ $\Sigma RONO_2$)

Should reaction R3 be shown as reversible as the decomposition can be described using a thermal equilibrium.

We have changed reaction R3 to be reversible

Page 4, line 17. Perhaps it would be better to not use primary (as it can connote direct emission), maybe use predominant?

We have changed this sentence to avoid the word primary:

"This is especially true for the multifunctional, biogenically-derived nitrates that are the predominant component of ΣANs in forested areas (e.g. Beaver et al., 2012)."

Figure 1 – Please distinguish more strongly between NO3- (nitrate ion) and NO3dot (nitrate radical) as the dash looks like a dot.

We have made the dash in Figure 1 significantly larger to make this clearer.

*Equation 2 – Is the fraction flipped? Should it not be deposition velocity*concentration/BLH?*

We thank the reviewer for noticing this error. We have corrected this equation to read as:

$$L(HNO3) = \frac{V_{dep}}{BLH} \cdot [HNO3]$$

Page 8, first paragraph. . . are there any other potential ignored or unidentified HNO3 sources that should at least be mentioned?

While there are other possible sources of nitric acid, these sources would affect only the

budget of nitric acid and not alkyl nitrates. We have added a statement about these other possible sources to the end of Section 4.1:

"If other processes are responsible for the missing nitric acid source, these would not affect the budget of ΣANs. Only the conversion of ΣANs to nitric acid will lead to a missing source of nitric acid and a missing sink of ΣANs."

Figure 7 – Is photolysis not included because it is assumed to occur so rapidly that it is "included" in the OH reaction

This is correct. We have revised the text to clarify this point:

"Since isoprene hydroxy-nitrates and most other first-generation nitrates must be further oxidized before undergoing photolysis, we do not include photolysis as a separate loss process in Fig. 7. Nitrates produced in the oxidation of compounds such as MVK and MACR can undergo photolysis without reacting with OH first, but these are a minor fraction of the total ΣAN production rate (Fig. 5)."