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Interactive Comment

Interactive comment on "Impact of the isoprene photochemical cascade on tropical ozone" *by* F. Paulot et al.

Anonymous Referee #1

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This paper uses GEOS-Chem forward model and its adjoint, with a new set of isoprene oxidation mechanism, to assess the impact of isoprene oxidation on tropical ozone locally and remotely. This is very interesting work, given the combination of latest updates on isoprene oxidation and adjoint model simulations. However, I feel it very important to include PAN in this analysis because of two reasons:

1. Rapid PAN formation in fresh fire plumes. In fresh fire plumes, NO_x is rapidly converted to PAN in a few hours and then PAN becomes the dominant NO_y form (Mauzerall et al., 1998; Yokelson et al., 2009). NO_x in biomass burning plumes could be soley produced from the slow decomposition of PAN on a timescale of several days. I don't think this feature can be well represented in global models, unless NO_x is partly released as PAN (Hudman et al., 2007; Alvarado et al., 2010). This delay would largely change

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the interaction between biomass burning and biogenic emissions, as described here. Some discussion on this uncertainty is needed.

2. PAN formation from isoprene oxidation. Numerous papers have addressed the important role of PAN on tropical ozone (e.g. Poisson et al., 2000; Roelofs and Lelieveld, 2000; Aghedo et al., 2007). PAN can act exactly as ING, consuming NO_x locally and releasing NO_x remotely. It seems to me that this is another pathway competing with ING chemistry. Relative importance of these two pathways must be addressed in order to understand the impact of isoprene oxidation on tropical ozone.

Other comments:

1. Page 25620 Line 5: "${}^{a}_{A}S^{O_3}_{OH+ING_0}$" : "A (Africa)" is not mentioned here in the explanation. Also "ozone" refers to "mean tropospheric ozone"?

2. Page 25624 Line 5: "${}^{S}_{S}S^{O_3}_{E(ISOP)}$is minimum from April to May when D_{ING} contributes most to L_{NO_x}". I don't see this minimum from Fig 7.

3. Page 25625 Line 20: ". . . by Eq. (6) . . ." : Is it really Eq. (6)?

4. Page 25625 Line 20: "the segregation of NO_x by isoprene nitrates in South America by Eq. (6) results in very low boundary layer O_x ". Why can't isoprene + O_3 reaction be the reason for the low O_x ?

5. Page 25626 Line 20: . . . are positive. . ." : Do you mean "O_3 + ING_0" instead of "OH + ING_0"? "OH + ING_0" is always negative in Fig. S8.

6. In Fig. 3, please make the minus sign more apparent in the legend.

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