

## ***Interactive comment on “Spatial variability in tropospheric peroxyacetyl nitrate in the tropics from infrared satellite observations in 2005 and 2006” by Vivienne H. Payne et al.***

**Anonymous Referee #1**

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The manuscript presents a distribution of PAN in November/December 2005 and 2006 from TES measurements. Observations of PAN are available from a few satellites, e.g., ACE-FTS, MIPAS and AURA-TES. These measurements are valuable in understanding role of PAN chemistry. This paper presents a springtime maximum in PAN over North Central Africa in December 2005 compared to 2006. It states that strong convection in 2006 might have contributed to the observed low concentrations of PAN. A Small enhancement of PAN and high in CO over Indonesia in December 2006 has been attributed to extreme biomass burning associated with El Nino. It hypothesized that  $\Delta\text{PAN}/\Delta\text{CO}$  enhancement could be associated with a strong influence of lightning. This paper provides interesting results and is thus suitable for ACP. I suggest

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incorporating the following points:

- (1) I suggest performing additional simulations from GEOS-Chem model, with and without lightning parameterization. Also, a set of simulations with biomass burning emissions on and off. It will help to justify hypothesis of the strong influence of lightning and Biomass burning.
- (2) El Nino events are associated with less convection (droughts) and lightning. An elaborated discussion and a supporting figure should be incorporated.
- (3) Details of convection scheme switched on and off in GEOs-Chem model to understand its role over North Central African region should be given in section 3.
- (4) Discussion related to measurements and data scrutiny, given in section 4 (observations of PAN in the Tropics) should be moved to section 2 (TES PAN Retrievals).
- (5) There are a number of sentences which are too long and should be broken in pieces.

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