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Interactive comment on “An extreme CO pollution event over Indonesia measured by the MOPITT instrument” by F. Nichitiu et al.

Anonymous Referee #1

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This is my review of "An extreme CO pollution event over Indonesia measured by the MOPITT instrument", by F. Nichitiu, et al. This is an interesting paper which uses MOPITT, MODIS, and TRMM measurements to show evidence of a possible feedback mechanism between fire activity and lightning over Indonesia in September-November during the 2006 El Nino event. It is apparent that something unique occurred in 2006 over Indonesia compared to 2002 and 2004. I do not find any fundamental reason why this paper should not be accepted with mostly minor changes. It is an interesting concept paper and potentially important, even given the limited number of available measurements to support their feedback hypothesis.

A shortcoming with this paper is paucity of data. Figure 8a shows measured lightning flashes per storm (FPS) versus hot-spots (HS) for large fire events (11 coincident data

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points). The figure indicates what seems to be a clear positive correlative relationship, perhaps even non-linear as they note regarding a possible saturation effect, yet removing the single Oct06 data point to the upper right would not lend support for this latter hypothesis. The important point of Figure 8a is a positive correlative relationship between intense burning events and lightning with a possible feedback process involved as the authors suggest in the Figure 6 schematic.

Intentional anthropogenic burning (agricultural waste/general land clearing - not lightning induced) may have increased markedly in Indonesia over the last 20 years including the 2006 El Nino event. It is possible that a substantial amount of the anomalous CO measured in 2006 just by coincidence was not at all lightning related, but instead caused by intentional land clearing fires. Are there any available records of intentional fires/hectares burned in Indonesia for these years to support or refute this?

The authors have room with ACP to discuss more details of Logan et al. [2008] regarding TES measurements of CO, H₂O, O₃, and possible lightning effects in 2006. Logan et al. [2008] examined tropospheric O₃ and suggested significant contribution from lightning-induced NO_x in late November and December 2006 when biomass burning (as CO detected by TES) decreased significantly.

The final Conclusions section mentions the Price and Rind 1994 modeling papers where large increases (a doubling) in CO₂ could produce an escalation of dry lightning and induced fires in the tropics. In relative context what is the estimated measured time record of global CO₂ and would increases in measured temperature and CO₂ (~30% CO₂ increase since the early 1800's?) be enough to induce a detectable lightning effect? The author's inclusion of the Price and Rind papers is somewhat speculative in view of the limited measurements in this study and time record.

Small points:

Page 10: Should be Logan et al. [2008].

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Figure 8 caption: 100W to 120W for Indonesia I think should be 100E to 120E.

ACPD

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 9, 1211, 2009.

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