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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Lightning-produced NO_x during the Northern Australian monsoon; results from the ACTIVE campaign" *by* L. Labrador et al.

Anonymous Referee #2

Received and published: 9 June 2009

The paper presents results from aircraft measurements of NOx during the ACTIVE campaign. It is well written and clearly structured. Results are presented for one flight, where relatively high mixing ratios of NOx have been measured, despite the low number of local flashes, and the possible origin of this NOx is discussed. This discussion is quite speculative.

I am aware of the difficulties of assessing LtNOx, which is definitely a hard task; nevertheless, I have two major questions/concerns with respect to the current study:

1. The ACTIVE campaign lasted over several months. Measurements of CO (Fig. 1), as well as flash counts (Table 3), are presented for the whole campaign; but for NOx, only one measurement day is presented in this study. What is the reason for this restriction? Table 3 reports on high flash counts for Nov. 2005 and Feb. 2006, but the

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respective NOx levels are not discussed. Are they comparably high? Also a figure like Fig. 1 could be presented for NOx.

2. The origin of the high mixing ratios of NOx is discussed and cannot be explained by local LNOx production. However, the discussion is rather speculative and does not fully exploit additional information that is publically available:

a) ATSR measurements show fires in Eastern Australia for January 2006 up to 15°S and 144°E, i.e. quite close to the backward trajectories!

see http://dup.esrin.esa.int/ionia/wfa/products/200601ALGO1.gif and the respective data file.

A potential interference of NOx from biomass burning, lifted up by convection, has to be discussed.

b) The hypothesyzed accumulation of LNOx along the backward trajectories sounds plausible, but could easily be verified (and partly quantified) by using additional lightning information. In particular, WWLLN data could be used to estimate the number of flashes along the trajectory, and might be related to the observed NOx mixing ratios. I am aware that WWLLN data is with costs, but I assume that at least one of the institutes involved in this study has access. It would spare some speculations!

I recommend publication in ACP after dealing with those issues.

Detailed comments:

p. 10648, 14-15: close to the backward trajectories, biomass burning was observed!

p. 10649, 17: repetition of 10; 9-19 could perhaps be smoothed.

p. 10650, 18: TTL.

p. 10651, 5: What is BLC?

p. 10659, 11: Jaegl′e

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Figures: Should generally be larger and of higher resolution (dpi) with lossless compression.

Fig. 5: It is hard to recognize the NOx measurements. What is the use of the additional colorscale (from green to violet), if the measurements are all just red?

Fig. 6: In a) and b) there is only one backward trajectory visible, not a group of trajectories at different altitudes as disscussed in the manuscript (10659, 5).

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 10647, 2009.