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Comment

Interactive comment on “Regional lightning NO_x sources during the TROCCINOX experiment” by C. Mari et al.

C. Mari et al.

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We thank the referee for its useful review.

We fully agree with both referees that the vertical placement of flashes and the production rates of lightning-NO_x per flash are key issues. The sensitivity of the simulation to these parameters is not discussed in this paper. The aim of the paper is indeed different. Our proposed approach is to use the model in its standard version, the same that was used for the forecast of lightning-NO_x during the TROCCINOX field campaign in 2004 (<http://mesonh.aero.obs-mip.fr/mesonh/troccinox>). Our objective was then to test whether this approach (no-apriori vertical placement) is reasonable or not compared to the measurements. We find that this parameterized approach gives realistic results; we then derive a budget of the convective terms and make a first attempt toward global

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source estimation. The sensitivity tests with the different proposed approaches are certainly crucial and could be done in a separate paper. However, the exercise has its own limit. As stated by the referee 2, the choice of different flashes rates and production rates can lead to similar results as the numbers can compensate each other. In order to increase our understanding of the lightning NO_x source, and subsequently improve the representation of this source in the models, the comparison with explicit electrical schemes based on explicit microphysics is promising (see for example Zhang et al. (2003) or Barthe et al. (2006)).

The following sentence has been added to the “ Model description ”:

It is important to note that the vertical distribution of lightning flashes is more certainly unimodal or bimodal than uniform as discussed in MacGorman and Rust [1998] and DeCaria et al. [2000, 2005]. The sensitivity of the simulation to the vertical placement of lightning IC and CG is not covered in the present paper.

All technical comments and corrections pointed out by the referee have been taken into account in the new version.

Added References:

Barthe, C., JP. Pinty, C. Mari, Lightning-produced NO_x in an explicit scheme: a STERAO case study; accepted to JGR, 2006.

Zhang et al., Numerical modeling of lightning-produced NO_x using an explicit lightning scheme: 1. Two-dimensional simulation as a proof of concept, JGR, 108(D18), 224, 2003.

Ridley B.A., K.E. Pickering and J.E. Dye, Comments on the parameterization of

lightning-produced NO in global chemistry-transport models, *Atm. Env.*, 39, 6184-6187, 2005.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 6, 5197, 2006.

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6, S3148–S3150, 2006

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