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Geoscientific Model Development Discussions

Interactive comment on "A Lagrangian model of air-mass photochemistry and mixing using a trajectory ensemble: the Cambridge Tropospheric Trajectory model of Chemistry And Transport (CiTTyCAT) version 4.2" *by* T. A. M. Pugh et al.

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General comment

Pugh et al. present a description of the CiTTyCAT model for the analysis and interpretation of both ground-based and airborne measurements. They provide a balanced information on the theory used (with equations) and on all model components. All the modes in which the model can be used are properly described along with their aims, advantages and limitations. Diverse processes ranging from chemistry to trans-

port are represented by the model that make it appropriate for addressinf the scientific questions the authors work on. The manuscript is well structured and very clear and I recommend publication in GMD.

Specific comments

1) The limonene oxidation mechanism by Stockwell et al. (1997) here used artificially produces methacrolein (MACR) that is only an isoprene product. This is a source of error especially when the model is used:

- to reproduce the MVK/MACR and (MVK+MACR)/ISOP ratios

- to constrain isoprene emissions

- to estimate HO_x constraining by the photochemical age as in Karl et al.(2007)

This source of error likely explains part of the model overestimate for MVK+MACR reported by Pugh et al.(2010b). Therefore, this problem should be acknowledged and an alternative should be either planned or implemented.

2) Regarding soil NOx emissions there is a recent algorithm (Steinkamp and Lawrence, 2011) that builds on Yienger and Levy (1995) and has been evaluated against measurements. This algorithm could be mentioned and its inclusion planned.

References

Karl, T., A. Guenther, R. J. Yokelson, J. Greenberg, M. Potosnak, D. R. Blake, and P. Artaxo (2007), The tropical forest and fire emissions experiment: Emission, chemistry, and transport of biogenic volatile organic compounds in the lower atmosphere over Amazonia, J. Geophys. Res., 112, D18302, doi:10.1029/2007JD008539.

Steinkamp, J. and Lawrence, M. G.: Improvement and evaluation of simulated global biogenic soil NO emissions in an AC-GCM, Atmos. Chem. Phys., 11, 6063-6082, doi:10.5194/acp-11-6063-2011, 2011.