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Interactive comment on "Modelling study of the impact of deep convection on the UTLS air composition – Part I: Analysis of ozone precursors" *by* V. Marécal et al.

Anonymous Referee #3

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The paper is devoted to the study of the TTL chemical composition perturbed by deep convection over Brazil. The authors focus on a severe convective rain event near Bauru. The simulations are performed using a regional scale model. Unfortunately, there were no chemistry data available during this particular event to confirm the model outputs and support the interpretations. The work is thus to be regarded as an idealized study which conclusions need to be confirm (or not !) by future campaigns.

I suggest to add two references in the introduction: [Wang and Prinn, 2000; Barth et al., 2001; DeCaria et al., 2005]

I have to say that I am still poorly convinced about the model performance in terms of surface accumulated precipitation. Figure 4 shows that the model does not capture well the position of the front. Simulated maxima of precipitation are found below 23.4°S where the radar sees no precipitation at all. Could the authors comment on that point? At least, the success of the comparison should be moderated in the conclusion and abstract.

One main conclusion of the paper is that when the source of lightning NOx is trigerred, OH mixing ratios and loss of VOC by oxidation are increased. DeCaria et al. [2005] have found that adding lightning NOx to their cloud scale simulation, results in a dramatic reduction of HOx through the NO+HO2, NO2+HO2, and loss of OH via production of HNO3. The difference between the two simulations reaches 75%. Could the authors comment on that point ? Can they reconciliate the two approaches ?

More details on the lightning NOx parameterization should be given to the reader as this source is discussed several times in the text.

The discussion on isoprene, ethene and propene is interesting but the authors should not restrict their analysis to these molecules in term of ozone precursors. Water vapor is a major precursor of HOx in the upper troposphere perturbed by convection. How does the waper vapor profile evolve in the upper troposphere ? Other important HOx precursors transported into the upper troposphere are H2O2 and CH3OOH. What are the vertical profiles of these species ? How do these profiles evolve with lightning NOx ? For the interpretation on ozone precursors to be complete, the role of water vapor and peroxides (at least H2O2, CH3OOH) should be discussed in details in Part I.

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