

## ***Interactive comment on “The influence of the vertical distribution of emissions on tropospheric chemistry” by A. Pozzer et al.***

**Anonymous Referee #2**

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This manuscript reports on the impact of the injection of anthropogenic and biomass burning emissions with the “emissions height” altitude repartition from the EMEP data base. Two simulations have been performed with the climate-chemistry-model ECAM: one with the emissions height repartition and one with all the emissions at the surface. The paper shows the difference between these two simulations on atmospheric concentrations and the comparisons with aircraft and ground stations measurements. The paper is well written and clearly presents the results. However there are some important points that make the paper not suitable for publication in ACP.

Main concerns:

Presentation of emissions: Aircraft emissions are omitted? And later you compare your results to aircraft measurements. You should use only the EDGAR/EMEP emis-

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sion height reparation as they have been produced by EMEP group and not add your “personal judgement” such as for F57 (grossly wrong for that one!), B30, F58 and L41 to W10. The concept of “personal judgement” is unfortunately not science! You should have separated anthropogenic emissions and biomass burning in two different simulations as long as you can justify your choice of emissions height for biomass burning first. (for example 3 simulations done: no emission height, emission height on anthropogenic only and finally emission height on biomass burning only)

The nudging: You are talking about the model been “weakly nudged” and the lightning and biogenic NO<sub>x</sub> emissions been “similar”? Unfortunately later hidden in small print under Table 1 we can find the there is differences of 10% in biogenic emissions and 5% in lightning emissions between the two simulations. That gives concern to the comparison to measurements presented later in the paper and the improvements shown by using “emissions height” in the model. How are the meteorology different between the two simulations?

Comparison to measurements: I won’t come back to emissions (aircraft) and meteorology (differences) problems presented above. The comparisons are made for the year 2000 emissions particularly for the biomass burning. Are all the measurements used for your comparison from year 2000? As your model is “weakly nudged” would it be better to compare your results to “climatology” produced for example by the MOZAIC project? Otherwise there may be a strong impact due to inter-annual variability.

Specific comments:

Would be good to know how many model levels are within the first 800m?

Figure 1: presents only difference in biomass burning (as in “60% of the BB is within the PBL”) or the difference between the two simulations (so it should be “60% of BB and anthropogenic emissions are in the PBL”). And how did you defined the PBL?

In “Global distribution of selected compounds”: what is “oxidation capacity (ozone con-

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tributes to it)"? You should have CO, NOx/NOy, HOx and Ozone paragraphs.

In "Comparison with observations": How did you interpolate the results to be compared to aircraft measurements? How do you deal with the "non-polluted" flask samples collection when comparing to your results?

In "conclusion": "the emissions have been distributed vertically to 6 different altitudes" is not really what has been done, particularly for biomass burning!

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 9, 16051, 2009.

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