

## ***Interactive comment on “Characterization of a boreal convective boundary layer and its impact on atmospheric chemistry during HUMPPA-COPEC-2010” by H. G. Ouwersloot et al.***

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Referee #3 raised several issues that helped to improve our manuscript. He/she suggested a modification of some parts of the introduction in order to become more focused. Following this advice we have rewritten the first paragraphs.

The statements that the observations that are obtained during the HUMPPA-COPEC-2010 campaign could be representative for the future boreal climate and that a changing climate would impact the boundary layer dynamics are meant to put both the data and our characterization of a daily evolution into perspective. As the boundary layer prototypes will still be applicable, we do not see a problem to reconcile both parts.

C6583

Therefore, the statements are retained. For justification, we will add a citation to support these statements as suggested by the referee.

The different expected boundary layer types will be introduced in the introduction.

The modifications of the chemistry scheme compared to the one used by Van Stratum et al. (2012) will be mentioned. Also, as the referee suggested, the short lived species are dependent on the initialization, which is why we try to use those initializations which match observations best. A statement about this will be added in Section 3.3.

The classification of boundary layer types was done by visual inspection, as irregularities in many radiosonde profiles hindered a more quantitative technique with software. This will be clarified in the document.

Entrainment of air from the free troposphere always warms the boundary layer. The confusion might be caused by the sentence ‘[...] this [cooling] effect is stronger than the heating effect due to surface fluxes and entrainment, [...]’. In this sentence, the ‘due to’ relates to heating, but might be misinterpreted as explaining why the cooling effect is stronger. This sentence will be updated to prevent this ambiguity.

It will be further clarified that the Amazonian case still has boreal conditions, but Amazonian chemistry.

As the referee suggested, the changes in OH due to the different representations of the boundary layer height will be compared to changes due to different chemical schemes as previously published.

### **Minor comments**

Since the pressure profiles were output of the data assimilation software that was provided by the manufacturer of the radiosondes and we did not calculate by hand or with our own software, we will not change “The software of the ground station calculates” to “We calculated”, but we will substitute “calculates” with “determined”.

C6584

Page 13628, line 1: "the observations can thus be linked to the representations" will be replaced by "the observations can thus be compared to the representations"

Page 13633, line 29: "fades" will be replaced by "becomes negligible"

Page 13634, line 21: To clarify "The rate at which the boundary layer height decreases" will be replaced by "The rate of boundary layer height decrease"

All other corrections, including those to the figures, have been applied as proposed by Referee #3.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/12/C6583/2012/acpd-12-C6583-2012-supplement.pdf>

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 12, 13619, 2012.

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