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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Trapping, chemistry and export of trace gases in the South Asian summer monsoon observed during CARIBIC flights in 2008" *by* A. Rauthe-Schöch et al.

Anonymous Referee #2

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The manuscript describes a very interesting study based on the CARIBIC aircraft measurements of several components. The data is discussed in details with many well structured figures covering a variety of aspects. Systematic analysis are performed and summarize the data. By facilitating a Lagrangian particle dispersion model the sources and receptors of the air concentration measured are evaluated. In my opinion this section needs improvement which would require major revision of the paper.

General remarks:

In the paper the emission regions which influence the measurements are often men-

tioned, however a more detailed description or even a plot of an emission inventory is missing.

The influence of scavenging as well as convection is often referred to in the manuscript, but neither vertical winds, nor precipitation patterns are part of the meteorological parameters described, it would be useful, if also those 2 were discussed. (e.g. p 6978, line 25). Maybe it would also be interesting to compare measured components which experience scavenging, to those which are less likely removed, to see which sectors of the flighttracks were especially influenced by scavenging.

Other comments:

p 6972 line 7: What does it mean for the atmospheric composition that there is exchange with soil and leaf water and how does this relate to the measurements discussed here?

p 6973 line 20: For figure 1 it is only mentioned that ECMWF winds are plotted, a bit more description on the wind patterns shown should be added.

p 6975 line 27: What is meant with the single trajectory mode? Do you write out particle positions or do you calculate cluster mean trajectories? Why was this mode used?

p 6979 line 9: What was the PV threshold used for the definition of the tropopause here?

p 6979 line 15: It would be helpful to have some maximum or mean concentration of the various substances in the text when describing the figures.

p 6981 line 27: Maybe the Somali jet could be indicated with an S in Fig 1

Figure 5:

p 6985 line 7: Why was the first descend of 5km used? For emission uptake not only the first descend, but all trajectory points in the PBL are important. So should it be not lower and shouldn't it be all trajectory points under a certain altitude go into the

statistic? This information can be retrieved directly from the model, as it is represented by the lowest output layer.

It is interesting to see how different the 2 region of influence are for the August flights, but again, to see where the greatest potential for emission uptake is would be essential.

p 6989 line 19: How can I see from the figures that the trapping is temporary - please explain in the text.

p 6991 line 17: “The flights largely . . . “ it’s hard to understand this sentence, maybe you could rephrase/split

p 6992 line 24: Why are the profiles distinct? Please give a better explanation.

Figure 9:

The figure would be better readable if the trajectory starting position were plotted on the flighttrack - as a dot e.g.

Figure 9b (lower panel) shows that there are 2 main source regions - one east of the flighttrack one west - it would be interesting to relate the measurements to the corresponding sector.

Figure 11, 12:

It is somehow interesting to see where the air goes after it was sampled, but in my opinion not very representative for the overall transport pattern. Such an analysis is better applied directly to emissions. I would recommend to focus more on the source regions and add this analysis to the SI.

Technical comments:

The abbreviation definitions is not consistent - e.g. ozone is defined in the introduction already and then again at the beginning of section 2.1 - this is the case for more substances/terms.

3.1.1 - in the heading maybe add “aircraft” or “measurement” position is

p 6978 line 4: which flight in August - add date

p 6982 line 16: write Fig 8b instead of Panel B - makes it better readable

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 6967, 2015.