Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Transport of Asian trace gases via eddy shedding from the Asian summer monsoon anticyclone and associated impacts on ozone heating rates" *by* Suvarna Fadnavis et al.

Anonymous Referee #1

Received and published: 27 March 2018

The paper by Fadnavis et al. investigates transport of trace gases via eddy shading from the Asian summer monsoon anticyclone and associated impacts on ozone heating rates using model simulations as well as observations. The paper is generally well written and structured. However, in some parts of the paper additional information on the method applied (e. g. the power spectrum analyses) or clear discussion on some specific results (the Asia10 simulation) are missing. I would recommend some major revisions before the paper can be accepted for publication in ACP. See my detailed comments listed below.

Specific comments:
Title: "Asian trace gases"? I guess "Asian" is obsolete. It should rather read only "trace gases" or do you mean "Asian emissions"?

P2, L22: The sentence should be rephrased, "are instrumental in distributing the Asian trace gases….." sounds weird. Also here, shouldn't it rather read "Asian emissions" instead of "Asian trace gases"? I would suggest to rephrase the sentence as follows: "Our analyses indicates that eddies detached from the anticyclone serve (or are helpful) in transporting Asian emissions (or trace gases) away from the Asian region to the West Pacific…….".

P2, L24: It is not clear which frequency exactly is meant. Do you mean frequency in occurrence of eddy shedding events?

P2, L26: I would suggest to rephrase the sentence as follows: "Model sensitivity experiments considering a 10% reduction……….".

P5, L96: I would suggest to rephrase the sentence as follows: "In this study, we discuss/investigate/answer the following questions: (1) how frequently did eddy shedding events occur during the last two decades…….".

P6, L111ff: That in MIPAS-E the E stands for Envisat is not explained. It is not even mentioned that MIPAS was on board of Envisat. So either this information should be added or the E should be skipped.

P6, L119: The sentence should rather read: "Here, we analyze the MIPAS observations of CO, PAN, and O_3 obtained during 1-8 July 2003.

P7, L129, Section header: In case of model simulations I would not call it "Ex-

perimental". Therefore, I would suggest to rename the section into "Model set-up" or "Simulation experiment set-up".

P7, L139: Here I would replace "at" with "with a" so that it reads "The model simulations were performed with a T42 spectral resolution……..".

P8, L163: Better than what? I guess you mean "best portrayed at…."

Fig 1 and 2: These figures show the same fields, namely PV and winds, but at two different potential temperature levels. These two levels are just 20 K apart, but the distributions looks completely different and shows different dynamical features. I don't understand why? I would expect that the distributions at 350 and 370 K would look quite similar.

Fig 1 and 2 caption: In Fig 1 caption it is written "at the 370 K potential temperature surface, while in Fig 2 it is written "at the 370 K level". It should be done the same way for both figure captions.

Fig 2: There are no black/red/blue arrows in this figure.

P10, L200ff: Some more information on the power spectrum analysis should be given. How is it done? References? Why is it done? What kind of information does one gain from using this kind of analysis?

P10, L208: What is the purpose of a lag-lead correlation?

Figure 3: Is "cc" in Fig c and d standing for correlation coefficient? What do the three dashed lines in Fig 3 a and b show?

Figure 4: Why are there so many gaps in the MIPAS data? Why looks MIPAS so different compared to ERA-Interim and ECHAM5-HAMMOZ? Generally, Fig a-d look quite weird. Is the binning, gridding and interpolation of the data correct? Is the color bar for MIPAS exactly the same as the ones for ERA-interim and ECHAM5-HAMMOZ? It looks a bit like something went wrong. There should be enough data to get a smooth ozone distribution.

Figure 5 and 6: Same as for Figure 3, I don't understand why the figures look so weird and why there are so many data gaps.

P13, L257-258: It is correct that MIPAS has a lower spatial coverage than ERA-Interim and ECHAM5-HAMMOZ, but the temporal coverage is much better and thus covers up for the lack in spatial resolution.

P13, L269, Section header: Ozone is not shown here. So either remove ozone from the section header or add in L260 also ozone with the remark that it is shown in the supplement.

Figure 7: Why are there no wind vectors added in the PAN figures (Fig. 7 e-f)? In the CO figures the dashed lines are not that clearly visible. Here it would be better to use white instead.

P14, L274ff: Why does the ozone distribution show completely different features than PAN and CO?

P15, L296: Fig S1 shows CDNC and ICNC. How does this relate to the emission discussed here? May it be that there is a figure missing in the supplement?

P15, L309: Which model results are shown in Figure 8? I thought it were the

CTRL simulation results. Where are then the results for Asia10 simulation shown? The entire discussion on the Asia10 simulation is confusing and should be improved.

P17, L351: See my comments above on the abstract: Do you mean an occurrence frequency?

P17, L353: What exactly has been correlated with PV?

P19, L385: Why 10%? Why has this factor been chosen? This is nowhere in the paper motivated.

P19, L395-396: Small differences? Generally, I would say that the distributions of MIPAS looks quite different to ERA-Interim and ECHAM5-HAMMOZ.

Technical corrections:
P9, L184 and 186: space between number and unit is missing.

P12, L236: shows → show

P12, L246: The space between the number and unit is missing.

P13, L256: special → spatial

P15, L308: and the other trace gases → and other trace gases

P16, L326: showing → shows

P16, L327: indicates → indicating

P16, L331: leads → lead

Figure 8 caption: indicates tropopause → indicates the tropopause

P18, L365: during last two → during the last two

P18, L366: over last two decades → over the last two decades

P20, L401: with gratitude → with gratitude of

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