

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-143

Anonymous Referee #2

Referee comment on "Climatology and variability of air mass transport from the boundary layer to the Asian monsoon anticyclone" by Matthias Nützel et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-143-RC2>, 2022

The paper analyses the PBL sources and the pathways of transport in the AMA UTLS region at climatological level, by use of multiannual back-trajectories and, to understand the convection contribution, CCM simulations.

General comments:

The paper gives an exhaustive view of the transport processes in the region, it's well written, structured and the figures are well presented. The major problem of this paper lies in its verbosity and repetitiveness, which makes the manuscript extremely long and dispersive. I would therefore encourage the paper for publication, after some editing and after addressing some minor points.

Specific comments:

The abstract is one particular example of a section that needs to be more concise. It should rather focus on the main points that the authors think the paper is addressing without diluting with too many unnecessary details!

Similarly, between the Introduction and the Data and methods sections, there are several repetitions on the models description and how they will be used.

Line 118: The authors say "Therefore" a modified version of the so-called SAHI index has been used. It would be useful to have a short explanation of what the SAHI is and a more precise explanation of which are the reasons why it has to be modified for the purposes of

this analysis.

Line 152: What does it mean by "Pressure below the trajectories"? Is it the pressure right below the lowest trajectories or right below the mean position of the trajectories? Or the mean value of the pressure in the whole layer below the trajectories?

Line 160: It is not clear to me how the choice of the 295m threshold value for the AMA has been made. Is it by comparing the AMA boundaries shape with what obtained from ERA-Interim data?

Line 176: The authors compare the 14 years trajectories analysis with the 1981 to 2010 one from the CCM. As the 14 trajectories years has been chosen among the more westward and more eastward shift years of the AMA, I was wondering if it is really representative of the climatology of the period. In addition, are the differences between the CCM and the trajectories analysis related mostly to the convective activity or may be related to the transport behaviour of air masses during the non-considered years?

Line 213: I would suggest choosing a different wording than "re-circulation", which recall more the horizontal recirculating patten in the AMA rather than the vertical displacement.

Caption figure 8: can you rephrase the "will be noted at the crossing point also later in time"? It's not clear what you mean with that.

Line 255: Why here you choose 2 km and in the figure 3 km as a threshold for the TP?

Figure 10 and similar: I had some problems understanding how to read the TOT variable. Is it really a percentage (the % of the total trajectories who start in the AMA) or it is just a way to represent the total number of trajectories by the 1 to 4000 conversion? As it's in the same plot as the regional contribution, I would suggest making a clearer separation of the TOT AMA variable from the other percentages, as it would be otherwise confusing!

Line 262: Does it imply that the uplift is more intense in the TP and IND region, while the WP is contributing as much only because of the larger spatial extent of the defined region?

Page 21: this whole section can be summarized in a few sentences!

Discussion and Summary and conclusion:

Those two sections are also excessively verbose and with several repetitions between the two. I would suggest cleaning the text and really focus on the important messages (for example the section 5.2 and 5.3 could be significantly shortened) and avoid stating the same conclusion between sections 5 and 6.

Technical comments:

Line 3: "analyses".

Line 3: in the same line there is the use of English and American notation. Please correct!

Line 29: In the Asian summer monsoon (ASM) regions, the heating....

Caption Figure 1: Better specify here how the TP contours are chosen rather than on Figure 2.

Line 230: put a comma between "indicated above" and "the trajectories start to fill"

Line 390: the comma after the "help to discern" can be removed.