Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-997-RC2, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Trace gas composition in the Asian summer monsoon anticyclone: A case study based on aircraft observations and model simulations" *by* Klaus-D. Gottschaldt et al.

Anonymous Referee #2

Received and published: 4 January 2017

General:
The paper shows new in-situ data observed in the upper tropospheric part of the Asian monsoon anticyclone. Because trace gas observations in this region are very rare, it is important to publish this data. The observations show a very unique type of air composition in this region with contributions of variety of different processes. Due to the nature of the subject, it is probably difficult to give a more clear picture. As one of the most important findings, the unexpected high ozone levels are reported. Of course, it is difficult to explain this effect only from experimental data. However, using model (EMAC), it would be desirable to see how in the region around 150 hPa, the forming of the enhanced ozone levels during summer and September can be understood, or,

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at least is resolved by EMAC. Furthermore, the paper tries to report everything one can say without trying to concentrate on the most important points. Thus, I would recommend to get rid of some unnecessary ballast (for some ideas see below). Thus because of these two reason (missing model-related explanation of enhanced ozone levels and too many details) the paper needs a major revision.

Minor points:

1. P 3/L 25
   "On the contrary" - what do you mean. Contrary to "no decrease" is decrease. Please reformulate

2. P 6/L 27
   You are talking about streamlines but your never show them. You are only showing trajectories which, in general, do not follow streamlines. (only for a stationary flow streamlines and trajectories are the same lines). After presenting your data (Fig 1) and the vertical and horizontal cross sections through the model (Fig 2) it would be nice to see also the meteorology at e.g. p=150 hPa showing streamlines of the geopotential for few days before the flight.

3. P 6/L 33
   POI2 - here is potential to shorten the text. This flight segment has nothing to do with ASMA

4. P 7/L 15
   POI4 - too much information. However, the difference between the slow rotation (lower level) and fast rotation (higher level) is an interesting feature.

5. P 7/P 8
   POI5/POI6 - in my opinion there is no reason to discuss these two flight segments separately. Also one trajectory figure would be enough. The difference between

the Iranian and Tibetan mode cannot be seen from your investigation. I would recommend to remove this part of the text

6. caption of Fig 3
   Please explain only a, b, c, and d panels in this caption. For POI5/6 would be enough to write: same like for POI3

7. P9-11
   I agree that the model performs good to represent the in-situ measurements. In the following chapter the tracer-tracer correlations are discussed. It would be nice to see (or only to know) how such correlations are represented in the model. Typically, models do not correctly represent such correlations. Maybe EMAC is better?

8. P11/L3
   "...which is carried forward to the related large scale trace gas distributions" - this sentence is not clear for me. Please reformulate

9. P11 L15
   "might not leave too much freedom" - much too speculative

10. P13 L20
    Figure 6 is difficult to understand. In particular the marks "N" and "S" are very confusing. I do not see north or south of the ASMA here.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-997, 2016.

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