

Dear Sir,

On behalf of my co-authors, I would like to sincerely thank the editor for processing and reviewing the revised manuscript. I also thank the editor and all the three referees for their constructive comments and suggestions which improved the manuscript significantly. As suggested by the editor, we will definitely take-up a separate study on air trajectory calculation during the passage of tropical cyclone.

Following the editor's and the reviewer's suggestion and comments, we have revised the manuscript accordingly. Necessary English grammar corrections are also made in the revised manuscript.

Point-by-point responses on how we have addressed each recommendation/suggestions are attached herewith.

We are herewith submitting the revised manuscript (track change) with figures and table for the consideration of publication in your esteemed journal 'Atmospheric Physics and Chemistry'. I request you to kindly process the manuscript and do the needful. Please acknowledge the receipt of the same.

Thanking you
With best regards
Siddarth Shankar Das

Response to Editor's Comments

We would like to sincerely thank the Editor for a very positive evaluation and constructive comments and suggestion which improved the manuscript significantly. Necessary English grammar corrections are also made in the revised manuscript Point-by-point response on how we have addressed each recommendations and suggestion are given below.

**116: '0.8-1 km/day, which is thrice than that of non-convective day descending rate.' — unclear. First 'thrice than that' would be much clearer as 'three times that'. ('thrice' is old-fashioned and not in common use.) Second I'm not clear what you mean by 'non-convective day descending rate'. Do you mean typical descent rate on a non-convective day? Do you mean 'day-time' (if so why)? Or what? 'descending' should be replaced by 'descent' in the two occurrences in the sentence as a whole. The text on this topic later in the paper (1215-217) should also be clarified.*

In the present manuscript, non-convective days mean cloud free or clear-sky days. Non-convective days decent rate was estimated by Gettelman et al. (2004) and it is an average value. Non-convective days is the average of day and night time (diurnal mean). The sentence is rephrased in the Abstract.

The decent rate estimated by Gettelman et al. (2004) during clear-sky days is 0.1-0.3 km/day. Our estimation on decent rate during the passage of tropical cyclone is 0.8-1 km/day which is three-times that of clear sky days. This estimation was previously suggested by Referee #1.

**161: 'Liang et al. (2009) have described the time scale of stratospheric ozone intrusion that occurs in 3 steps, and takes about three months to reach from stratosphere to lower troposphere.' — I suppose that this is a description that starts from a level significantly above the tropopause. It is a little confusing bearing in mind your 'slow' vs 'fast' characterisation later. Surely the processes that you identify as 'slow' act on time scales much less than three months? I suggest that you are clearer about what 'slow' means. [Note that this was a point highlighted previously by Referee 3 — you say in your reply 'Thanks for pointing out this aspect and appropriate modifications are done in the revised manuscript' — but in my view you have not provided the appropriate modification.]*

This sentence is omitted in the revised manuscript to avoid the confusion between slow and fast processes. Subsequent sentence is also modified accordingly.

1115: 'The tropical cyclones are the synoptic-scale disturbances of organised convective systems which weaken the tropopause by overshooting convection.' — this seems a strange characterisation of tropical cyclones. But perhaps you are simply trying to say that one effect of tropical cyclones is to organise convection?

This sentence is revised in this version of manuscript.

1369: 'descend' > 'descent'

Corrected

**1341: 'Numerical simulation shows the presence of stable dry ozone rich stratospheric air in the upper and middle troposphere over the cyclone prone area.' — this seems very misleading to me — as far as I can tell you have no numerical model results including ozone — so the 'ozone-rich' is a guess (based on the fact that the numerical simulations seem to show air that is 'meteorologically' stratospheric. Referee 3 has previously suggested trajectory studies to resolve some of this ambiguity — I accept that carrying out trajectory studies is outside the scope of this paper, but I do strongly recommend some kind of statement at this point of the paper saying something like 'The descent of stratospheric air has been deduced indirectly here from a combination of ozone observations and meteorological observations and modelling. A natural next step to confirm this descent would be to carry out trajectory (or chemical tracer) studies in the WRF model.' — This sort of statement would, in my view, add to the value of your paper rather than diminish it.*

Following the editor's suggestion, we have revised the sentence accordingly in the revised manuscript.

1470: 'planed' > 'planned'

Corrected.

1715: 'Arctic' > Arctic'

Corrected

Reference : Gettelman, A., Forster, P. M. de F., Fujiwara, M., Fu, Q., Vömel, H., Gohar, L. K., Johanson, C., and Ammerman, M., 2004.: Radiation balance of the tropical tropopause layer. Journal of Geophysical Research, 109, D07103, doi: 10.1029/2003JD004190.