Reviewer 1

1. You define the TTL as tropical transition layer, but should also define it in terms of altitude, and maybe also theta, space since you provide specific results that are in the TTL, both regionally and globally.

Yes – we somehow made no mention of TTL in the introduction. We have now added a paragraph in the introduction which gives a brief summary of the important features of the TTL for this work, and made a couple of other minor changes with the same aim in mind.

2. Your point that aircraft measurements from a particular region, when used to calculate global emissions, may bias those calculations is reasonable. However they could also help refine the regional emissions from a given area, which could then be used to improve the global emission estimates.

Good point as long as there are enough measurements. We have added a sentence to this effect at the end of the 2nd para of the discussion.

3. In the Introduction, on page 20657, line 28 you first mention coarse resolution but don't define it until line 10 on the next page, 20658. Also on p. 20658, line 18 you mention high resolution and define it later. It would be helpful to define both course and high resolutions when they are first mentioned.

This is a valid point but tricky to deal with given how we have structured the paper. We prefer to leave it as it is given that the first use of coarse and of high are general and we define them for our work when we describe our methodology.

4. P. 20659, lines 13 and 14 please provide references for the photolysis and OH reactions for your CH3Br tracer.

References added.

5. Also on p. 20659, lines 24 and 26 you mention "sigma-height hybrid levels". It would be useful to define these for those that do not regularly use global models.

We have included a short explanation in para 4 of Methodology.

6. Section 4.2.2; P. 20663, line 26 and 27 you note that the contribution of extratropical emissions to the total TTL mixing ratio is small. How was this determined, e.g. did your CH3Br tracer have identifiers for tropical and extratropical emissions?

Yes. By using separate tracers for tropical and extratropical emissions we found that the extratropical contribution to the total TTL mixing ratio was small (~10% for the Uniform tracer in the HR model). We therefore note that the effect of extratropical emissions on CHBr3 TTL mixing ratios can, to first order, be discounted. We did not include this explanation in the manuscript, but could do so if requested.

7. P. 20664, lines 20-22, you discuss mixing ratio levels between 365 and 370K. This is the first mention of theta levels and it is important to relate those to the km altitude levels you have previously been referring to.

This paragraph has been split in two with the second one now focussing on the distribution in potential temperature. This can be inferred from Figs 4 and 5 since potential temperature contours are shown in Figs 4a and 5a.

The text implies that the maximum mixing ratio is above 15.7 km, which would then imply that there would be vertical as well as horizontal transport from the location of convection.

The calculated maximum is below 15.7 km (see panels c & d in Figs 4 and 5). We have removed the statement about horizontal transport which we feel is confusing the main point.

8. Section 5, p. 20667, lines 10-11, please provide references for your comments on dibromomethane, e.g. 2-3 month tropical lifetime and dominant open ocean sources.

We have added references and this sentence now reads:

On the other hand, the calculated TTL mixing ratio of the other major short-lived contributor to stratospheric bromine, dibromomethane (CH_2Br_2), will be relatively unaffected by the model resolution as it has a ~3 month tropical lifetime (Carpenter et al., 2014) and dominant open ocean sources (Ziska et al., 2013).

We have also added a reference to the recent paper on iodine by Saiz-Lopez et al.