Reply to RC3

Manuscript information:
- Title: Mean age from observations in the lowermost stratosphere: an improved method and interhemispheric differences
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- MS No.: egusphere-2022-1197
- MS type: Research article
- Iteration: Final response

We would like to thank the reviewer for the kind words and the constructive comments. In the following document, the reviewers’ comments are marked in italic font and indented, our answers are in regular font. Changes in the manuscript are marked-up in red and listed as framed screenshots below the respective comment. The line numbers in our listed changes refer to the marked-up version of the revised manuscript, that is provided separately.

Point-by-Point reply

1. Line 25. ... isentrope, and approximates

Done.

2. Line 39. ... made contact with

Done.

3. Line 48. making fewer assumptions compared to deriving age spectra.

Done.

4. Line 51. ... measurements, an infinite lifetime is commonly assumed.

Done.
5. **Line 308. Our findings indicate that... (no comma needed after ‘indicate’)**

Done.

| 315 | Our findings indicate that on the one hand, during ST1 old air from higher altitudes descends in a confined way at high latitudes. There is a sharp vortex edge with a strong gradient in the SH. On the other hand, during POG2 descending old air is |

6. **Lines 313, 385, 390, 420: ‘extend’ should be ‘extent’**.

Done.

| 310 | mixed vertically and horizontally with young air in the LMS. The vortex edge is less sharp than during ST1, resulting in younger air at high latitudes and altitudes and older air outside the POG2 vortex region compared to ST1. In addition, as discussed by Jesswein et al. (2021) the extent of the respective polar vortices and therefore also the location of the respective vortex edge |

| 380 | The contribution of the individual parameters (i)-(v) is shown in Fig. 6. Each row depicts isolated sensitivities to uncertainties in a single parameter with all other parameters being held at their best estimate. This allows us to test the relative importance of the individual parameters to the exTR-TR method’s overall sensitivity. Most strikingly, uncertainties in the ratio of moments (parameter (v)) seem to contribute only to a negligible extent to the overall sensitivity (panels (m), (n), (o)). Measurement uncertainties in the stratospheric mixing ratio $x(x)$ contribute evenly distributed to the overall sensitivity to a moderate extent (panels (j), (k), (l)). Due to the slightly worse measurement precision during |

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| 420 | TR method instead, the number and extent of negative mean age values is reduced. Maximum absolute differences between |