

Many thanks to the editor for the comments, they have helped to improve the manuscript. In the following, we address all the points raised in the editor report (denoted by italic letters). Text changes in the manuscript are highlighted in red or blue.

My impression is that you have answer most of the referee comments thoroughly. Therefore, I am pleased to accept your paper for publication subject to minor suggestions as described below.

(1) ***L25: Please define TROPOMI and CAMS***

A. These are changed to "TROPOspheric Monitoring Instrument (TROPOMI) and Copernicus Atmosphere Monitoring Service (CAMS)" in the manuscript.

(2) ***L40: SE has not been defined***

A. It is changed to South-East in the manuscript.

(3) ***Table 1: The second to last line should say subTR-SH instead of subTR-NH***

A. It is changed in the manuscript.

(4) ***L101: Please expand upon the 40 different species as requested / responded to reviewer 2***

A. This part is changed to "The age spectrum G is computed by releasing 240 pulses of inert trace gas species from six distinct source regions, with each region pulsing 40 different species. All the 40 species are artificial pulse tracers in the model for the age spectrum calculation. These pulse tracers approximate a delta distribution lower boundary condition $\chi_0^j(\Omega_i, t) = \delta(t - t_j)$, where j ranges from 1 to 40, defining the tracer pulses at specific source times t_j . The pulse tracer mixing ratios are initially set to one within the boundary layer of the source region for a duration of 30 days. Outside of the initialization region, these mixing ratios in the boundary are set to zero in each time step. The 40 species are passive tracers without chemistry involved in the simulations, which represent the air released at different time within 10 years." in the manuscript.

(5) ***L115. (NOAA)(Dutton et al., 2024) to (NOAA, Dutton et al., 2024)***

A. It is changed in the manuscript.

(6) ***L133: The transport contributions from both ... to The transport contributions **to the global stratosphere** from both ...***

A. It is changed in the manuscript.

(7) ***L153: as requested by reviewer 1 please explain in the text 'surplus of summertime air' as discussed in the response to reviewers.***

A. This part is changed to "In the tropics, the AM origin air fraction is lower due to wintertime air ascending. However, a lot of AM origin air is transported to the high latitude region during summer driven by the ASM circulation, while the AM origin air is more suppressed and isolated inside the source region during winter. Hence there is evidently a surplus of summertime air compared to wintertime air making its way into the high latitude region." in the manuscript.

- (8) ***L169 Something is missing in “is primarily limited to the troposphere during boreal, transported ...”. Perhaps “is primarily limited to the troposphere during boreal ****winter****, transported***
- A. It is changed to "is primarily limited to the troposphere during boreal summer, transported ..." in the manuscript.
- (9) ***L185 Antarctic region nearly exhibits a six-month shift to Antarctic region exhibits a nearly six-month shift***
- A. It is changed in the manuscript.
- (10) ***Figure 5 caption: air mass fractions ****top***** ***or (a-f)*** ***and anomalies ****bottom***** ***or (g-i)***
- A. It is changed to air mass fractions *****(a-f)*** and anomalies *****(g-l)*** in the manuscript.
- (11) ***L299: is related to particularly strong transport from AM region (Fig. 7b). ****but warrants further investigation****. (or something similar).***
- A. It is changed to "is related to particularly strong transport from AM region (Fig. 7b), which warrants further investigation" in the manuscript.
- (12) ***L361: Note that the QBO was defined in the prior sentence so there is no need to repeat “the Quasi-Biennial Oscillation (QBO)” just say QBO***
- A. It is changed in the whole manuscript.
- (13) ***L392-392: Brewer Dobson circulation to BDC***
- A. It is changed in the whole manuscript.
- (14) ***L405 Please add the ACE-FTS data availability.***
- A. The ACE-FTS data availability is added in the manuscript.