

Comment on Revised manuscript “TransClim (v1.0): A chemistry-climate response model for assessing the effect of mitigation strategies for road traffic on ozone”

The authors have made substantial efforts to thoroughly revise the manuscript taking into account the comments from both the reviewers. In particular, substantial effort has been made to amend the content and structure of the methods section, which improves the manuscript’s readability. Furthermore additional evaluation of TransClim has been conducted on different source regions and for different emission scalings, which help document the performance of the model. I have made a few additional minor comments below for consideration by the authors (with line numbers relating to those in the revised non-track changed manuscript). Once these have been considered I am happy for the revised manuscript to be accepted for publication.

Throughout the revised manuscript I did a few sentences referring to TransClim assessing the climate effect of changes in road traffic emissions (section 2.1) and in other parts (e.g. section 2.3) specifically mentioning that TransClim assesses the impact on tropospheric O₃ and on climate via radiative forcing. For clarity it would be good to check throughout the manuscript and make consistent reference as to how TransClim assesses the impact on climate (i.e. via changes in tropospheric O₃ and stratosphere-adjusted radiative flux change at top of the atmosphere). For example can the link be made on Lines 98-100.

On Section 2.3 I am still wearing of calling them requirements. It is stated in the revised manuscript that the requirements were set out in Rieger (2018) where further testing of the algorithms took place. Also the sentence before the bullet points states “Here, we summarize the resulting key points for the final algorithm of TransClim”. Therefore it seems to me that section 2.3 is more like objectives of TransClim or even processes included within the model.

In figure captions use schematic instead of sketch.

Line 167 - change end of sentence to “enables quantification of the climate response to a small perturbation.”

Line 179 to 183 – In both bullet point 2 the calculation is referred to as “the stratosphere-adjusted radiative fluxes of the perturbed O₃ field”. Is point 2 stating the total O₃ change from emission perturbations and point 3 is the difference between the total O₃ and the O₃ from traffic only. Can you just make clear what point 2 is (total O₃ from all road emission perturbations?)

Line 209 – change fix to “fixed”

Line 230-231 – Consider revising to “Rieger, (2018) tested several different algorithms and the one that produced the best results is used in TransClim and described here”.

Line 279-280 – “... the change of the variable x towards the EMAC reference simulation.”. Should this be rephrased to say “... the change of the variable x with respect to the EMAC reference simulation.”?

Line 283 – 284 – Similar to above. Change “... at top of the atmosphere of the emission scenario towards the control scenario ...” to “... at top of the atmosphere for the emission scenario with respect to the control scenario ...”

On Fig 4 and in section 2.6 it is mentioned that the algorithm is applied in each grid box (b) for each emission region (i). Would it be better to mention that the algorithm is applied on grid box in section 2.5 as well so that there is consistency between the sections?

Line 315 – don't need "regarded"

Line 332-330 – so similar problem as presented in Fig 5 but positive bias now?

Line 512-513 – Should this mention that the TransClim O3 response is based on simultaneous emission changes from all three precursors (NO_x, CO and VOCs)?

Fig A1 – It is correct that there are negative values for Fl_{xn}(O₃) at TOA? Is this including stratospheric O₃ too?