

Interactive comment on “The impact of a future H₂-based road transportation sector on the composition and chemistry of the atmosphere – Part 2: Stratospheric ozone” by D. Wang et al.

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C: The second paper on the impact of the change from fossil fuel to hydrogen in road transportation focuses on changes of stratospheric ozone. This paper is much too long with respect to the minor and often not significant effects (typically much less than 1%). The used model is state of the art but it should be sufficient to summarize the results as an additional section with 1 or 2 figures (maybe Figs. 3 and 8) in the first paper of the series, also since most of the effects are related to NO_x changes in the troposphere and the small and uncertain contribution from transport across the tropopause. The merging also avoids the repetition of the lengthy scenario description. Figures 6 and

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11 might go to a supplement after improvement. For Figure 1 a reference to WMO (2011) is sufficient. The other figures can be summarized in the text. The project report with more details should be included in the reference list.

R: The reduced effect on ozone disagrees with some of the earlier studies, so this warrants a detailed discussion of the findings to make sure the reader understands the differences from the earlier studies. This justifies the length of the paper and why there remains a need for two separate papers to discuss the tropospheric and stratospheric findings.

C: Page 19429: Do changes in SO₂ and sulfate aerosol interact with the PSC-chemistry? How are the discontinuities in meteorology at the end of a year handled when repeating the year?

R: The repeat meteorology approach is a commonly used method and except for a short period at the transition of the year, there is no meaningful effect on the findings one would get with a smoother transition from year to year. Changes in SO₂ do interact with the chemistry in the model but there is not a significant effect on the stratosphere.

C: Page 19432 and Fig. 5: Is most of the additional HO_x from H₂+O(1D)? Surprisingly only secondary reactions are discussed here.

R: The focus in the paper is on the ozone effects; however, the revised paper discusses the importance of the HO_x production from H₂.

C: Page 19435: The ozone increase in the lower stratosphere of high southern latitudes and the difference between FC and ICE need more explanation. Is it related to heterogeneous chemistry?

R: This effect is largely because of changes at midlatitudes affecting the amount of ozone transported to high latitudes. This effect is also commonly seen in other types of perturbations, e.g., high altitude aircraft effects on ozone.

C: The different kinds of blue in the figures are difficult to distinguish, please improve

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color scheme. Include mean tropopause in latitude/altitude plots.

R: We will look at revising the figures but there is limited time to get this done.

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