

Atmos. Chem. Phys. Discuss., author comment AC1
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Reply on RC1

Haiyue Tan et al.

Author comment on "An integrated analysis of contemporary methane emissions and concentration trends over China using in situ and satellite observations and model simulations" by Haiyue Tan et al., Atmos. Chem. Phys. Discuss.,
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Response to Reviewer #1

Comment [1-1]: The manuscript describes the recent methane budgets and concentrations over China, and contains comparisons and analyses of the model results from a global chemical transport model with three observation datasets. The authors elucidate the contributions of region-sector-specific methane emissions to methane concentrations and trends which allow to better diagnose and understand the drivers of methane changes in China. The topic of the manuscript is certainly within the scope of ACP. Overall, the manuscript is well written and easy to follow, so it can be accepted after a minor revision.

Response [1-1]: We sincerely thank the reviewer for the valuable comments, and time spent reviewing the manuscript. The revised manuscript has implemented all of them. Please see our responses to each comment below.

Comment [1-2]: In Section 2.3, the GEOS-Chem model setup is described. But I cannot find the description about how long the simulations spinup or the statement about initial methane concentrations. Additional brief information about how it conducted would be welcomed.

Response [1-2]: Thank you for pointing it out. We have tested that changes in the initial CH₄ conditions in January 1980 would not affect simulation results after January 2000, supporting a spin-up time of 20 years. We now add the following information in Section 2.3: "All the simulations are initiated in the year 1980 and we focus on the model results in the period of 2007–2018. We find that changes in the initial CH₄ conditions in January 1980 would not affect simulation results after January 2000, indicating that a spin-up time of over 20 years is sufficient for our analyses."

Comment [1-3]: The description of CH₄ mixing ratio or concentration should be consistent. The former is used in the abstract and the latter in most other parts. The "mixing ratio" often collocates with the unit of "ppbv" such as methane in this paper and

"concentration" with "molec/cm³" such as OH.

Response [1-3]: We now change in the text "CH₄ concentrations" into "CH₄ mixing ratios" following the suggestion except "CH₄ concentration trends" in the title for keeping it concise.