

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-13

Anonymous Referee #3

Referee comment on "The reduction in C₂H₆ from 2015 to 2020 over Hefei, eastern China, points to air quality improvement in China" by Youwen Sun et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-13-RC1>, 2021

General comments:

This paper presents a study to quantify the variability, source and transport of Ethane (C₂H₆) using solar absorption measurements from a ground-based high resolution Fourier transform infrared spectrometer performed over Hefei, eastern China. The measurements of five years (2015 - 2020) have been used to evaluate the GEOS-Chem model simulations, as well as to analyze dependencies on meteorological and emission factors using generalized additive models. Finally, the authors highlighted the sensitivities of model results to quantify relative contributions of various source categories and regions to the observed C₂H₆ abundances.

I have some concerns, which are mentioned below in the major and minor comments section. I recommend the publication of the manuscript after these points are addressed.

Major comments:

P7 L23: It is hard to see the difference in the C₂H₆ emission distribution from the plots of Fig. A1. Perhaps, showing the relative difference w.r.t. the annual mean would be a good way to highlight the seasonal change.

P10 L4: the overestimation of 17.4% in December is not so evident from the figure. Please give more information on how this is calculated?

P11 L40: the values do not match the figure, e.g., biogenic, please verify the absolute and relative contribution for other components as well.

P11 L41: these numbers should change based on the corrections done for the above comment.

Figure 3: Please provide some explanation on why the measurement uncertainties are lower during the summer time and vice-a-versa.

Minor comments:

P1 L32: together with atmospheric modelling

P1 L36: no brackets needed

P3 L4: ... namely the infrared working group (IRWG) of the Network for the Detection of ...

P4 L19: please provide the spectral range of the NIR and MIR observations.

P5 L30: shouldn't this be table 1?

P6 L7: zero level uncertainty reported is different from the value in table 1

P14 L36: and -3.93%, respectively