

Interactive comment on “Mapping the drivers of formaldehyde (HCHO) variability from 2015–2019 over eastern China: insights from FTIR observation and GEOS-Chem model simulation” by Youwen Sun et al.

Anonymous Referee #1

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This paper presented a long term observation of formaldehyde from 2015 to 2019 by ground-based high-resolution FTIR at Hefei, eastern China. They used the dataset to assess the performance of the GEOS-Chem model simulation for the specifics of polluted regions over eastern China. The intercomparison of HCHO VMRs between FTIR and GEOS-Chem showed a good agreement; the seasonal and annual trends of HCHO are also well characterized. The tropospheric HCHO VMR from 2015 to 2019 kept increasing. The tracers from ground observation were used to characterize the source of HCHO. Estimates of OH radical production from the photolysis of HCHO

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at the measurement site are also obtained. Finally, contributions of various emission sectors and geographical transport to the observed HCHO summertime enhancements are determined using a GEOS-Chem sensitivity study. Overall, this manuscript is well structured, written, and its topic fits the scope of ACP. I recommend this paper for publication subjects to some minor comments.

General comments. 1. Section 2: Characterizations for the retrieval and error analysis should be more detailed. Though ACP mainly focuses on general significance to atmospheric science rather than technical research, a more detailed description for verifying the reliability of the data is needed.

2. The statistics of the GEOS-Chem emission inventories are used to interpreting the HCHO variability. More analysis of data and evidence is needed. There should be at least references to the rates of change of CH₄ and various NMVOCs reported in the literature over the same time periods.

Specific comments for correction.

1. Abstract: The abstract should reflect that measurements from only one FTIR site (Hefei) were used for investigating the HCHO variability.

2. Page 3: The first two paragraphs to be quite long while they bring very little useful information to the manuscript, and hence they are not necessary. A concise description is suggested.

3. Page6, line 24: YRD should be defined.

4. Page 10, line 25: Where is the location of the CRDS analyzer? At the site where the Ox in situ measurements is performed?

5. Page 11, line 12: accounted

6. Page11, line 33: Modelled HCHO was decreased by...

7. Page11, line 37: As a short-lived species

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