

Source apportionment of primary and secondary HCHO is a meaning work to understand the atmospheric chemistry of HCHO and control HCHO pollution. The authors explore the source of HCHO in the YRD using the satellite HCHO and O₃ and CO from CNEMC network following multiple linear regression analysis. I recommend publication with reference to the following comments.

1. The authors use HCHO from satellite and primary tracer CO and secondary tracer O₃ from ground in-situ measurements to explore the primary and secondary source of HCHO. HCHO data is column density while O₃ and CO are concentrations at the surface. How the authors link the two different data to determine the source of HCHO. Why not use O₃ and CO data from satellite?
2. Section 3.1: The authors compared the OMPS data with FTS data, but did not illustrate why to compare the two different dataset.
3. The authors discussed whether primary emission or secondary formation contributed significantly to the variations of HCHO, e.g. L15-20, P9, L5-10, P10, but did not tell the reader how they determine the contribution of primary and secondary sources to the variations of HCHO. The authors need a standard to quantify the contribution to the variations of HCHO.
4. The author discussed the primary and secondary sources of HCHO in the three megacity Shanghai, Nanjing and Hangzhou, e.g. the spatial and seasonal variations. They should also discuss the commonness and difference of HCHO in the three cities.
5. Sec. 4.2: The discussion of HCHO control measures should use more results from this study instead of just citing the references.
6. In sec. 5 summary: The authors declare “only secondary HCHO can be used as the proxy for VOCs reactivity”, however, in sec. 4.1, the authors pointed out “Total HCHO can be regarded as the proxy for VOCs reactivity over a three-year study period”. It seems paradoxical. The authors should make it explicit.
7. So separating HCHO from different sources is full of great significance insensitivity studies of O₃ production.
8. Line 12 in Page 2: “causing” should be “cause”.
9. Line 13 in Page 2: “favor to” should be “be in favor of”.

10. Line 21 in Page 5: "Surface air pollutants monitored by CNEMC was provided" should be "Surface air pollutants monitored by CNEMC were provided"
11. Line 10 in Page 7: "the distribution of HCHO VCDs were homogenous" should be "the distribution of HCHO VCDs was homogenous".
12. Line 28 in Page 8: "The distribution of the three station selected to explore the primary and secondary sources of HCHO are shown" should be "The distribution of the three station selected to explore the primary and secondary sources of HCHO is shown"
13. Line 4 in Page 11: The year "2015" should be "2005". The paper published in 2010 cannot research O₃ pollution in 2015.
14. Figure 3, the label of Yellow Sea and Bohai Sea goes against each other.
15. Figure 7: what are the P-value from the significance tests?