

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-246

Anonymous Referee #1

Referee comment on "Quantifying methane emissions from the global scale down to point sources using satellite observations of atmospheric methane" by Daniel J. Jacob et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-246-RC1>, 2022

The manuscript makes an important contribution and timely contribution by reviewing available and anticipated satellite observations capable of quantifying methane emissions. The review is rigorous and thorough. I have only a few minor comments that the authors may wish to consider.

- In the discussion of analysis of the 1.65 micron band in Section 2.2, the authors note how Ω_{CH_4} and Ω_{CO_2} are retrieved simultaneously with X_{CO_2} derived from global atmospheric transport models. It would be useful for the authors to expand on how effective this analysis would be for sources where carbon dioxide is co-emitted with methane (e.g., flares and engines with poor combustion efficiency), compared to sources where methane and carbon dioxide are not co-emitted (e.g., landfills and livestock operations).
- On lines 315, 692 and 696, the authors comment on the potential effectiveness of satellites in detecting point source emissions from oil and gas operations by citing Cusworth, et al. (2022). While this is a valuable benchmark, Cusworth, et al. reports on emissions only from the San Joaquin Valley, Uintah, Denver-Julesberg, Permian, and Marcellus basins. These are important production regions but it should be noted that there are multiple other production regions that have different emission profiles and even among the basins observed by Cusworth, there is significant variability in emission rates (see Alvarez, et al., Science, doi: 10.1126/science.aar7204 for a more comprehensive sampling). Satellite observations will have varying effectiveness in different basins and this should be acknowledged.