

Dear editor,

We appreciate the opportunity to submit a revised version of our manuscript and thank the reviewer for their helpful comment.

In response to the remaining reviewer comment, we have added one paragraph and a results table to supporting information section one that details the sensitivity tests for the plume identification algorithm. We have also added language within said paragraph clarifying the criteria for valid true plumes during visual review.

Copied below is the reviewer's comment in black italics with the newly added paragraph copied as a response in blue.

We look forward to the opportunity to publish in ACP.

Sincerely,

Jack Warren, on behalf of the authors.

I have one remaining comment/issue prior to recommending for publication. The authors now clarify that their plume detection approach hasn't been tested on single-blind controlled releases, because in those studies the source origin is known. However, they still justify the use of their hard coded values for automated plume detection as these values presumably reduce false positives. They mention that they tested over a range of values. For reproducibility and to motivate further study, can the authors include the results of this sensitivity study? Also, how can one claim they reduced false positives in absence of a truth dataset? Or, how was "truth" assessed?

Sensitivity studies were conducted to find the combination of parameters that led to the greatest number of verifiable plumes found, with a reasonable fraction (<60%) of false positives. Plumes were considered valid if the plume was associated with identifiable infrastructure and appeared visually comparable to prior plumes detected by the platform, including those verified by controlled release testing. The size of the box used to calculate the gridded flux divergence product was tested over values ranging from 200 to 800 m. The thresholds for masking gridded DI "clumps" and XCH₄ plumes were tested for values from 1 to 2.4 times the standard deviation of the scene's gridded flux or XCH₄. The number of contiguous DI pixels required for a plume detection was varied from 8 - 36; the number of contiguous XCH₄ pixels required for a plume detection was varied from 100 to 500. The values tested, results, and parameters chosen are shown in Table S1.1. We thoroughly tested scenes in the Permian, Appalachian, and Haynesville basins because these areas have differing surface albedos and wind speeds, and numerous visible plumes. These values will need to be reassessed for different platforms - for example MethaneSAT, which had more coarse resolution than MethaneAIR, required a separate sensitivity study and different values for these parameters.