

## ***Interactive comment on “Remote sensing of methane leakage from natural gas and petroleum systems revisited” by Oliver Schneising et al.***

**Anonymous Referee #2**

Received and published: 29 May 2020

The paper addresses the climate benefit of changing energy generation from coal to oil or natural gas, which has been particularly active in the United States. The authors quantify the fugitive methane emissions from the oil and natural gas industry using satellite retrievals of XCH<sub>4</sub> from Sentinel 5P TROPOMI and systematically assess whether these fugitive emissions are below the break-even rate for direct climate benefit. The paper thus addresses important and timely questions on climate actions and presents how these can be verified with novel satellite measurements of atmospheric composition; therefore, I consider the paper to be well in the scope of ACP.

The authors have put together a concise study and used valid, clearly outlined methods for obtaining the results. All methods and calculations have been described with necessary details and thus seem to fully allow traceability of the results. While the

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method used for emission estimates is not novel, the newly available TROPOMI data and, on the other hand, ongoing changes in the oil and gas production merit revisiting the topic, as has been done in this paper. The literature references are, for the most part, substantial which puts the paper well in context within the research field and gives appropriate credit to the work that this study builds upon or otherwise touches. However, I do agree with Reviewer #1 on the importance of considering the recently published Zhang et al. (2020) results in this work – this addition will further increase the quality of this paper. Regarding the Reviewer’s comment on how to communicate the results, I appreciate Schneising et al.’s discreet voice of describing the results and conclusions.

The paper reads exceptionally well and has a clear structure and logic that is easy to follow. The language is fluent and precise, and delightfully versatile. The title is informative and reflects the contents of the paper sufficiently, and the essential elements of the study are summarised in the abstract. I found all figures and the table useful. Overall, I only have a few minor comments and questions on some details because I read the paper with great interest. These are listed below.

Specific comments:

Section 2: The authors do a thorough job in explaining criteria that they have found necessary for selecting the data in order to produce reliable emission estimates. I’m curious how demanding these criteria are; which one is the most excluding or is this case-dependent? I assume these criteria were set by experimenting. Are the criteria equally good for all cases?

Page 11, lines 2–5: The authors comment that the actions to reduce fugitive emissions have been successful. Are these actions potentially mentioned or described in any citable source? I think this is a strong point towards verifying climate actions and reaching company sustainability goals but would be interesting to know what kind of actions have taken place and when.

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Section 3.7: Does the selected resolution of the XCH<sub>4</sub> gridding affect your results? Did you experiment with different grid resolutions?

Technical corrections:

Figures 4, 5, 7, 8, 10 captions: coordinate E should be W

Figure 11 caption: coordinate W should be E

Page 4, line 27: straight-forward should be straightforward

Eq. (1) lacks period from the end.

Eq. (3) lacks period from the end.

Page 7, line 24: remove comma after “note”

Page 8, line 2: 5 → five

Figure 6 (also elsewhere): spelling of the time interval could be harmonised (2009-2011 but 2018/2019).

Page 14, line 10: a → an

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