

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2022-518

Anonymous Referee #2

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Referee comment on "Toward a versatile spaceborne architecture for immediate monitoring of the global methane pledge" by Yuchen Wang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-518-RC2>, 2023

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This paper aims at proposing a framework to utilize current space-borne methane observations to monitor regional emission hotspots and qualify super emitters. The framework combines two methods: one based on global mapping using TROPOMI and the other based on PRISMA (or other high-resolution mappings for small target areas). However, it is not clear what makes this framework different from previous studies (many are cited here), and it is suggested that the authors should clearly state the novel aspects of their method.

Additionally, the approach is only demonstrated over short periods for five small areas, and the results are well compared with previous studies. The method for identifying high-emission areas and plumes appears to be "visual inspection", which raises questions about how this "framework" could scale to "immediate monitoring of the global methane." This is a key point that needs to be addressed for "a versatile spaceborne architecture." Besides, the detection limit of this method and how it deals with hotspots from natural sources or other anthropogenic sectors other than oil and gas (landfill, agriculture) should be better illustrated before the paper is considered for publication.

### Technical Points:

The title and the abstract are a bit perplexing. The multi-tiered reads mostly two-tiered. I think clarifying these basic points would be helpful for the reader. In the abstract, it would be nice if the authors could briefly describe what this "versatile spaceborne architecture" is, and what data it is based on using what methods. At the moment, one needs to read the paper to a large extent to get some idea of "this framework". The paper could also benefit from adjusting the scope of the text to the results presented here.

Line 51: Ocko et al., 2021 only refers to the anthropogenic methane sources. It is

important to state this precisely, not to confuse it with the large portion of methane emissions from natural sources. The current text might be misleading.

Line 55, line 59, and many other places: please check references.

Fig. 1 How is "colocation" defined? Using what kind of criteria?

Fig. 2 What temporal periods are considered here to calculate the percentage?

Fig. 4 How to reconcile PRISMA and TROPOMI results? It seems there are still differences in the order of magnitude.