

***Interactive comment on “A study of synthetic
 $^{13}\text{CH}_4$ retrievals from TROPOMI and Sentinel
5/UVNS Part 1: non scattering atmosphere” by
Edward Malina et al.***

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Dear Professor Roeckmann,

Thank you for your comment. Our assessment of your comment is that our basic assumption of a $\delta^{13}\text{C}$ requirement of 10 per mil uncertainty is insufficient to differentiate between methane source types, based on the fact that would be impossible to differentiate unique source from the tropospheric background $\delta^{13}\text{C}$.

Our terminology in referring to sources was inaccurate in our manuscript. This created the wrong impression that we claim to be able to differentiate between pure sources.

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In fact, we do acknowledge that this is very unlikely. Rather, what we are hoping to achieve with Sentinel 5 (we conclude that Sentinel 5P is not currently suited to this task) is regional source type differentiation. For example (Fisher et al., 2017) show that wetland emissions from boreal regions have an integrated signature of -70 per mil, which were identified using aircraft over wide tracks of land. We therefore think that using S5 we may be able to distinguish between a wetland region, and for example a biomass burning region with this requirement of 10 per mil. Fisher et al. suggest that regional isotopic signatures could be incorporated into global and regional models. These models could then be compared against S5 measurements of $\delta^{13}\text{C}$.

We will therefore clarify our requirements accordingly.

Fisher, R. E. et al. (2017) 'Measurement of the ^{13}C isotopic signature of methane emissions from northern European wetlands', *Global Biogeochemical Cycles*, 31(3), pp. 605–623. doi: 10.1002/2016GB005504.

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