

## ***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.***

### **Anonymous Referee #2**

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The manuscript presented a study on retrievals of  $^{13}\text{CH}_4$  from TROPOMI and Sentinel 5/UVNS. It is well written and very informative. I suggest it be accepted from publication after minor revision.

Major comments:

1. Although reference papers are provided, I think it is helpful for the reader if the authors can provide a clearer description of the remoTeC algorithm, for example, the components of the state vector etc.
2. More explanations about why the average kernel for  $^{13}\text{CH}_4$  is different from  $^{12}\text{CH}_4$  are also welcome.

Minor comments:

1. Line 21, Page 1: 'The disagreement ...' The bottom-up approaches have large uncertainty as well.
2. Line 22, Page1: 'or incorrect transport ...', There also are large uncertainties in modelling CH<sub>4</sub> chemical losses.
3. Line 15, Page 3: 'Parker et al.,...', Works by Frankenberg et al., 2005 and 2011 should also be cited.
4. Line 10, Page 5: A comparison of <sup>13</sup>CH<sub>4</sub> and <sup>12</sup>CH<sub>4</sub> absorptions at different atmosphere levels can be useful for the reader to understand the different sensitivity of the TROMOPI instrument to their abundance.
5. Line 28, Page 6: '...and that is potential...', The whole sentence is not clear.
6. Fig 1: no unit shown for Jacobian. Also, no right-hand scale for <sup>12</sup>CH<sub>4</sub>.
7. Line 5, '...errors in Figure 4..'. Some explanation about the spots with high uncertainty (>1.5 ppb) will be helpful

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Discussion paper

