Response to Reviewer #1.

We would like to thank the reviewer for taking the time to review our article, and for providing critical feedback on the manuscript. Below, we cycle through each of the comments in order of their appearance and provide a response. All edits will be implemented into the final manuscript where necessary.

(1) The CH_4 measurement with accuracy of "2-4 ppb on 2 km^2" is very challenging. The accuracy by remote sensing technique with existing spectrometers using solar reflected light is about 10 ppb. The L1B product is usually defined as calibrated radiance spectra. What are required for characterization, calibration and level 1 products? How stable the wavelength or the instrument response function of the spectrometer should be during the flight to achieve accuracy of 2-4 ppb? How accurate are radiometrically calibrated (in Figure 2)?

This is certainly a challenging question to answer and will require a dedicated description of the MethaneSAT platform, and a future publication is planned for MethaneSAT that will address these requirements. However, for the present paper, for MethaneSAT, our models predict that an instrument SNR of approximately 1,000 will provide the necessary requirements to retrieve CH4 to a precision of 2-4 ppb over 2km2. We have added this to the document to provide a general idea of the instrument specifications of MethaneSAT.

(2) Chapters. The title of the Chapter 2 is "instrument", but it describes the research flight. There is only "2.1" and no "2.2".
We have altered the numbering of this section, to follow Chapter 2: MethaneAIR, 2.1: MethaneAIR Instrument, 2.2: Research Flight Details.

(1) Page 4, Line 87 "Are not monitored in the L0-L1B"
Does it mean "Laboratory-measured wavelength is not used. Wavelength is tuned during the trace gas retrieved"?
For TROPOMI L0-L1B processing, they did not implement an algorithm to monitor for changes in the wavelength, the lab measurements were not optimized. They use the lab-measured data only. Indeed, the wavelength is fine-tuned/optimized in the L1-2 algorithm for the retrieval. We adjusted the sentence.

(2) Page 4, Figure 1
*The description of the area such as Colorado, New Mexico etc. and legend of "RF **" will help readers' understanding.*
We have added state names to the image such that one can track the flight path over the various U.S. states.

(3) Page 10, Line 258, "approximately 30 %". Does it mean "difference in FWHM of ILS"?
Yes, it does – we have clarified the text to make this clear to the readers.

(4) Page 10, Line 264, Page "in order to pinpoint the exact location"
How accurate the orthorectification should be from the cruising altitude?
The accuracy of the orthorectification will determine the positioning accuracy of the point sources and is proportional to the sampling power of the instrument. GEO-AKAZE provides positioning accuracy that is less than approximately 30 m, the resolution of the base MSI imagery. We have added a sentence.

(5) Page 11, Figure 4
It is difficult to distinguish between bold dots and asterisks.
There are more than one plots at indices of 500 and 1000. Why?
We have made the points (dots and stars) larger to make it clear there are two different sets of data being plotted here: Lab measured ISRF FWHM and calculated. The colors represent the various ISRFs – we have added more context to the caption. The 500/1000 erroneous points are part of the same set of ISRF lab measurements.

(6) Page 18, Line 425 "small increase in cabin temperature"
It is not clear how small the increase is. The actual temperature variation will help readers understanding.

We have specified that the temperature increase was very limited, 3-4 degrees Kelvin.

(1) Page 4, Line 90, "for each sensor"
Does it mean CH_4 and O_2 spectrometers?
Yes, we have adjusted the text.
(2) Page 12, Line 281, "+/- 10 m file". Is it "+/- 10 m"?
Yes, this is a typo and has been adjusted.