

## ***Interactive comment on “Laboratory Spectral Calibration of the TanSat Atmospheric Carbon Dioxide Grating Spectrometer” by Zhongdong Yang et al.***

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Response to Anonymous Referee #3

We appreciate referee #3 for a careful review and insightful questions and comments. We address his/her comments and questions sequentially as the following:

Specific Comments:

Q1. Page 1, lines 5 and 6: I suggest adding the names of the W and S bands when the wavelengths are specified for the first time.

A1. We accept this comment, add following words: “Weak and Strong absorption  
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bands of CO<sub>2</sub> respectively.”

Q2. Page 1, line 23: It is stated that the ACGS has a wide dynamical range and a high spectral resolution. This must be quantified. For the spectral resolution, another possibility would be to refer the reader to the section where those values are specified.

A2. We give the quantified number of the dynamical range and spectral resolution at next page.

Q3. Page 2, line 6: Level 1 products are mentioned here and in the abstract. A brief description of them could be included here.

A3. We accept this comment, add following words: “. . . .the Level 1 products that are the preprocessed products used to transform the inherent instrument measurements into radiometrically calibrated spectra.”

Q4. Page 2, line 11 and page 4, line 25: I suggest writing Lee et al. instead of Lee and etc.

A4. We accepted.

Q5. Page 2, line 19: How was the extrapolation performed, and how reliable are those values expected to be?

A5. We completed the retrieval algorithm and software of atmospheric CO<sub>2</sub> column density of the ACGS also using these extrapolation part, the retrieved results indicate the extrapolation is available and reliable.

Q6. Page 3, lines 5 and 6: I suggest being completely consistent with the spectral ranges of the bands. For example, for the strong CO<sub>2</sub> band there are three slightly different values: 2041 nm here, 2040.54 nm in line 8 of page 7, and 2042 in Table 1 (although those are the requirements).

A6. We accepted this suggest using the final tested results.

Q7. Page 4, line 31: The value of 0.2 pm corresponds to one of the wavemeters, according to Table 3.

A7. We used two wavemeters in this work. The value of 0.2 pm corresponds to one of the wavemeter 621B-VIS only. The unit in Table 3 should be pm, not ppm, it is corrected.

Q8. Figure 1 and Table 3: The NIR wavemeter of Table 3 is referred as VIS wavemeter on Figure 1. I suggest changing the name in Figure 1.

A8. We accepted

Q9. Page 6, line 7: When it is mentioned that “By averaging tens of frames”, is there a specific number?

A9. This is not a specific number, we choose it because it is enough to eliminate the noise of laser and detector.

Q10. Page 7, line 6: The reason for which those specific channels of that specific footprint are shown could be explained.

A10. We accept and add following sentence in the article. “We selected those channels at the center and both sides of detector because those can represent all channels of the detector.”

Q11. Page 7, line 18: To which previous results do you refer? I suggest specifying this and adding references.

A11. There are OCO-1 and OCO-2 results, we add these references.

Q12. Page 7, lines 28 and 29: The WCO2 band is mentioned twice. One of them should be the SCO2 band.

A12. We corrected this error.

Q13. Figure 3: I suggest increasing the size of the font in axes and titles.

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A13. We accept.

Q14. Figure 4: In the caption, SCO2 band is mentioned twice (also for the row in the middle).

A14. We corrected this error.

Q15. Figure 5: I suggest rewriting the second sentence of the caption to improve clarity.

A15. We accept.

We accept all of following technical corrections:

Page 1, line 6: I suggest writing: The spectral resolving power values are: : :

Page 1, line 10: I suggest writing: : : in the three bands.

Page 1, line 11: I suggest writing: The resulting variations: : :

Page 2, line 10: I suggest writing: In detail: : :

Page 2, line 15: I suggest writing: There are also some differences : : : (removing “have”).

Page 3, line 13, and Table 1: km should be written with lowercase k.

Figure 4: I suggest correcting some typographical errors in the title of the figure. Also, “variations” is used in the figure, and “bias” in the text.

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