

The OCO-3 mission; measurement objectives and expected performance based on one year of simulated data

Response to Anonymous Reviewer 2

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Thank you for the very useful comments on our work. We appreciate your time and interest. The reviewer's comments are in black text and [our responses are given in blue](#).

We'd like to note that we took the opportunity to make a few minor changes and improvements to the manuscript during the response-to-reviewers process. Namely the discussion in various places was abbreviated in an attempt to improve the overall flow of the manuscript. The most significant edit was made in Section 3.1 "Simulated OCO-3 observation geometry". Also, a few minor text changes were made throughout to reflect slight updates to the knowledge of expected OCO-3 operations since the time of the original submission in early October, 2018 (nearly 5 months ago).

1. It is not stated whether the spacecraft pitch and roll is either taken into account (i.e. the PMA can compensate for spacecraft pitch and roll in real time) or is assumed to be small enough that the results aren't affected; it would be interesting to know whether the spacecraft orientation is a problem in terms of achieving the required pointing accuracy. [This is a good point. Yes, the PMA does compensate for ISS pitch and roll. We updated the text in Section : "Sampling from the International Space Station - routine measurements" to better describe the expected operations and provided a reference to an ISS technical document that specifies orbit parameters and other interesting information.](#)
2. In the spatial comparison shown in Figure 8, the lack of OCO-2 soundings over the Amazon, sub-Saharan Africa, and China compared with OCO-3 stands out; is this due to the 'deficiencies in the simulation setup' mentioned on page 19 line 28, meaning that in reality we might expect these regions to be filtered out in the OCO-3 data as well as in OCO-2? [Yes, our expectation is that the OCO-3 data as presented here is a bit over optimistic relative to what is expected from real data. Think of it as a "best case" scenario, if all systems function perfectly, e.g., perfect instrument calibration and spectroscopy. Some text has been added to the discussion in Section 5.1 "Simulated L1b radiance characteristics" in reference to Fig 8 to more explicitly call out and explain the expected lack of data in these three particular regions.](#)
3. Page 2 Line 7: GOSAT-2 has now been launched, on 29th October 2018 [We slightly modified the discussion in the Introduction to more accurately describe the current situation as the original text was a bit out of date.](#)
4. Page 6 Line 4: Update on whether analysis of thermal vacuum testing data is complete (I assume the results will go in the forthcoming manuscript mentioned on Line 5) [The final OCO-3 TVAC data is still under analysis and the results are](#)

planned for publication, likely post-launch. The discussion in Section 2.2 “OCO-3 pointing mirror assembly overview” was updated and consolidated in Section 5.1 “Simulated L1b radiance characteristics” to more accurately describe the current situation as the original text was a bit out of date.

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5. Page 18 Line 23: I assume this refers to the same testing data mentioned on Page 6 Line 4; perhaps an ‘in preparation’ reference would help clarify this? To clarify the message, the discussion of instrument calibration was removed from Section 2.2 “OCO-3 pointing mirror assembly overview” and consolidated in Section 5.1 “Simulated L1b radiance characteristics”.
6. Page 20 Line 6: Close brackets on ‘Figure 7’ Corrected.
7. Page 25 Line 18: Acronym ‘IDP’ not defined? The IMAP-DOAS Preprocessor (IDP) was first defined in Section 4.1 “Preprocessors”. We now spell it out explicitly again in the header of Section 5 for the convenience of the reader.
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8. Page 25 Line 25: Move ‘e.g.’ inside the brackets, i.e. ‘. . . gases from space (e.g. Aben et al., 2007; Butz et al., 2009)’ Corrected.