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Interactive comment on "Radiometric calibration of a non-imaging airborne spectrometer to measure the Greenland Ice Sheet surface" *by* Christopher J. Crawford et al.

Anonymous Referee #3

Summary The aim of this work is to evaluate the performance of an airborne visible-to-shortwave infrared (VSWIR) spectrometer by comparing observed radiances with the same collocated with the Landsat 8 OLI sensor and with modeled (MODTRAN) upwelling radiances. The VSWIR detector is part of a suite of sensors used to validate a lidar prototype, which was used in preparation of the ICESat-2 laser altimeter mission. The work presented focuses one case study, a flight over bright and dark surfaces in Greenland during summer of 2015.

Overall, the approach presented is the standard procedure for vicarious calibration of an airborne or satellite sensor: observed radiances are compared against modeled

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Discussion paper

radiances calculated using all possible ancillary information available regarding the state of the atmosphere and surface at the time of the observation. The description of instrumentation, flight plan and modeling and satellite used constitute all the right tools for such assessment. The descriptions of instrument setup and verification along details provided are adequate

However, there are two major issues that need to be properly addressed and this is the reason I think the paper should be returned for major changes and encourage resubmission (or even reject it to provide more time to work on them). First is the atmospheric aerosol data used for the simulation are not adequate. The Aeronet Level 1.0 data used is most likely most likely contaminated by clouds as the extremely very values in figure 12 demonstrated. Even the low values ($\sim$0.15) are considered clean-to-moderate-low concentration of aerosols. Given the large dynamic range in aerosol loading shown in the plot, it renders the computations questionable at this point. It is recommended that Aeronet level 2.0 (version 3) should be used. Second and more importantly, the paper fails to make the case on what is the novel scientific and/or atmospheric technique contribution of the work presented. As it is now, it just reads as a technical report using standard techniques and procedures to carry out a vicarious calibration.

Some minor comments/clarifications requested: Why no lidar information is used for the constraining the atmospheric radiance simulation? It is my understanding that ICESat-2 is not an atmospheric profilers so I assume the lidar airborne version used in this campaign does not have this capability either. I think it would be desirable to clarify why the lidar onboard is not suitable to aerosol applications.

Through the text all references to figures should specifically to what panel the text refers to. Most of the figures have multiple sub-figures and they are not labeled. Please do so.

Figures Figure 1 does not seem to add information, consider removing it. Figures 2

and 3 : not clear figures. Upper right panels all lines look the same have similar colors. Upper left panel: not clear what it is being compared. Please clarify in caption and main text. Bottom panel: not clear the plot means, what do you mean with stability in this case? Figure 9: all 4 figures did not print well. Particularly the right two panels are just not informative because the lack of contrast even when figure is seen in a computer screen. I think the right two panels can be removed. Figure 11: for consistency with other figures, plot wavelengths in the x-axis. Figure 12: Aeronet figures from Aeronet website are not publication quality material Please plot the data with adequate plotting software.

Figure 15: upper right figure has very poor contrast and it does not provide additional information. Consider removing it. Bottom center images: lines are too thin and difficult to tell the different in them.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-170, 2018.