

Interactive comment on “Potential of remote sensing of cirrus optical thickness by airborne spectral radiance measurements in different viewing angles and nadir geometry” by Kevin Wolf et al.

Anonymous Referee #2

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This paper aims to understand the differences of nadir and off-nadir measurements for cirrus optical thickness retrievals. The simple simulations did show the differences between the nadir and off-nadir measurements. However, the observations failed to present the same picture rather than show significant differences between active and passive measurements. Thus, the paper is not coherently organized. Other than this major issue, the paper made many inconsistent statements or conclusions. Therefore, significant revisions are needed to make it publishable.

Page 2: there are significant discussions for SVC, but techniques presented here are

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not suitable for dealing with cirrus with such small optical depth- large uncertainties among them.

Page 2, last sentence – “it is not an accurate statement if you consider passive sensor measurements.”

Page 3: Lines 5-6: the cirrus optical thickness of water clouds does not make sense – “re-write.”

Page 4: Line 18: If you conclude that it is impossible here. You don’t need any further study in this paper. Yes, it is challenging, which indicates that we need more observational constraints to improve the retrieval.

Page 4, Lines 19-21: The statements here are not accurate. Off-nadir measurements are widely used for space-base cirrus remote sensing. As you know, most satellite passive sensors are wide swath measurements .

Page 4, Line 25, “highly sensitive”: An overstatement. Yes, it is more sensitive, but it is highly dependent on the magnitude of off-angle.

Page 5, Line 15: What does “F” in “FDISORT” mean?

Page 6: Figure 2 caption in the PDF misses words.

Page 6, line 15: The statement of “cirrus can not be detected” is not accurate. Cirrus is a general category including high clouds with optical depth up to 3.

Page 7, lines 4-5: To draw this conclusion, you’d better to present calculation results with a higher optical depth.

Page 7, line 15: This statement does not consistent with the statements in the next paragraph.

Page 8, line 1-2: To draw this conclusion, you need to make many assumptions.

Page 8, line 7: Based on the statement, it seems that you don’t consider angle smaller

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than 60 degree as the off-nadir observations. That is not right.

Page 9, line 9-10: It is hard to understand this sentence.

Page 12, figure 7: It is hard to see the location of the optical port in (b). A better figure may be needed.

Page 12, line 12: UV and VIS were defined early.

Page 12, line 13: DOAS was defined early. –Avoid multiple definitions.

Page 15, line 3: “cross-calibrate both instrument” is no right. As you discussed in the paper, SMART is lab calibrated.

Page 16, lines 1-2: Giving absolute numbers are needed, but it will be good to present relative differences too.

Page 18, line 3: Based on Fig. 10, I'd like to say that 2.9 is a big number, which is difficult to support the stable calibration consistent.

Page 19, Line 26: The statement here is not consistent with the lowest box in Fig. 11.

Page 20, line 20: Even for lidar guy, it is hard to see contrails in Fig. 13. How about to plot Fig. 13 as a color figure to make the fine feature easy to identify.

Page 22, line 22: For cirrus cloud optical depth around 1, it is hard to claim that the lower layer is obscured by the upper cloud layer. The lower layer can be clearly identified from lidar image.

Page 23, line 3: Is 10% here mean error or random error? You need to explain the +0.2 overestimation.

Page 23, lines 16-23: Which kind of calibration errors explain the good linear correlations and 0.66 or 0.69 slopes?

Page 24, lines 10-11: For large ice crystals, why do you expect optical depth difference between 532 nm and 1180 nm?

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