**Overview**   The paper describes a new instrument and accompanying techniques that may be used to determine cloud hemispherical cloud fraction and explores the possibility of additional cloud/atmospheric products, including color and brightness temperature), sky/cloud emissivity, precipitable water vapor, and cloud height. The ability to retrieve cloud fraction day and night would be a valuable tool. The paper would benefit from some further explanation and clarification for some of the methods presented. The paper could also be improved by quantifying some of the comparisons better and reducing the amount of qualitative descriptions. These and other comments/questions follow:

**Page 7986 Line 10**   Is there some reason you wouldn't mention the name of the field campaign (at least in the text if you're hitting a word limit in the abstract)?

**Page 7988 Line 12**   "FITS"
You should spell out this acronym if there is something interesting about the file type otherwise just leave it out.

**Page 7989 Line 8**   "10-bit resolution allows for better sensitivity near the sun"
Can you include the resolution of the TSI for comparison?

**Page 7989 Line 19**   In equation 1 (and the rest of the equations) make sure that you've explained all the variables.

**Page 7990 Line 27**   "The response is very linear"
**Page 7995 Line 4-5** "The agreement is remarkably good"
**Page 7997 Line 14** "The correlation is fairly good"
**Page 7998 Line 9**   "Agreement is good"
Qualitative statements like this aren't that helpful. It's better to use quantitative statements with these comparisons, be it with the linear correlation coefficient or reporting the average difference between two datasets. It makes for a more meaningful comparison. I would suggest changing these and any that I may have missed.

**Page 7990 Line 27-29**   Since the data in Figure 4 shows the response at the center of the array, did you do the same analysis across the array and is

the center representative of these results? You might want to mention this or describe how the linearity is affected across the range.

**Page 7991 Line 19-20** Can you provide a reference for the precision of AERI's calibration or provide some information about its latest calibration?

**Page 7992 Line 16** I don't love that gold line. I wonder if it would be easier to see a line with connected points, or try some different colors there maybe.

**Page 7992 Line 22-23** "A cloud/no cloud decision can be simply made by choosing a single threshold value, above which an individual pixel is determined to be cloudy."
Certainly the cloud/no cloud decision can be made simply but how about the determination of the threshold? How will you choose that? I didn't see any discussion of this.

**Page 7993 Line 12** "of 0.03 < thin cloud < 0.05 and opaque cloud $\geq$ 0.05"
How were these thresholds determined? You should include some explanation of these values.

**Page 7997 Line 13** "standard mid-latitude summer atmosphere"
Which one did you use? Please add a citation for this.

**Page 7997 Line 14** You refer to a "dataset" for the sonde data. Did you use sonde data from one particular time? If so, you should include that time. I would also include the lapse rate that you derived from the data for completeness. And do I understand this correctly that you took the MLS atmosphere and replaced the temperature profile using the lapse rate derived from the sonde data? Please be more explicit about that.

**Page 7998 Line 10** Are you suggesting that the clouds are colder than the surrounding air or that the lapse rate in your calculations is not correct or something else? What lapse rate did you use in the end (see my earlier comment)?