

General Comments:

This paper describes results from early flight tests of the HySICS sensor. The paper is well written, well organized, and is not over-sold. Additionally, the paper points out shortcomings and possible improvements to the instrument. The data are well presented and support the discussion. This reviewer has few criticisms. Ideally, it would have been nice to have had better/more data to work with to better explore the uncertainties associated with flat-fielding, but of course one must work with the data one has. There were a couple minor typographical errors and at least some sections that were confusing (at least to me). These are described below. Although this paper addresses a sensor that is still “a work in progress,” and thus may be considered of limited interest, this paper is important and warrants publication because the HySICS sensor promises order-of-magnitude reduction in critical spectral irradiance uncertainties.

Comment on the following: Like probably all researchers, having suffered through poor comments from reviewers, I strongly suggest the authors recognize the fallibility of this reviewer and do not exert undue effort addressing my comments that are trivial or off-the-mark. Hopefully some of the comments on a very nice paper are useful.

Additional comment: It appears there are at least two versions of the manuscript, and thus my comments may be incorrectly referenced for the most current version.

Individual issues/questions:

1. Page 3, line 16. Is there a concern about the durability of carbon nanotubes? In particular, is there a concern these will break off in launch and contaminate the instrument? (Addressing this question is probably not needed in this paper, just a thought.)
2. Page 3, line 20 & 21. I was confused by the statement “smoothly-varying blaze-angle.” I gather there was actually more of a “step-function” between regions of the blaze angle on the grating. Note: The problem with the current grating is addressed on p. 21, line 2, in the phrase “... by using a continually-varying blaze-angle ...” Is there a distinction between “smoothly-varying” and “continually-varying”?
3. Broader question: With the aperture approach, is there a long-term degradation concern about portions of the optics interacting with the solar signal and other portions of the optics not interacting with the solar signal? (Answering this may be beyond the scope of this paper.)
4. Comment: Very nice discussion of the calibration factors on p. 8.
5. Page 13, lines 11 & 12: It appears diffraction results are shown in the bottom of Fig. 2 as well as in Fig. 3. I thought a bit more description of the diffraction pattern on the bottom of Fig. 2 was warranted (even though I think I understand it).
6. Question: Are “fixed pattern noise” and “flat-fielding uncertainties” basically referring to the same thing? Most of the discussion seems to focus on “flat field

uncertainties,” but the phrase “fixed pattern noise” is used a couple times (at least) Sec. 4.4.4, line13, & p. 10, line 3.

7. Page 25, sentence beginning at line 10: I find this sentence confusing – seems to say Earth-reflected irradiance is plotted in Fig.11. Should this be the uncertainty in earth-reflected irradiance?

Technical corrections:

1. I did not see where the “SSI” acronym was defined. As this is clearly important to the discussion, it should be defined in spite of being well known.
2. Of less importance, the NPOESS acronym is also not defined.
3. Page 4, line 20. Is the word “apertures” missing between “installed” and “have”?
4. Page 13, line 4 in Figure caption: Typo “burring” should be “blurring”?