

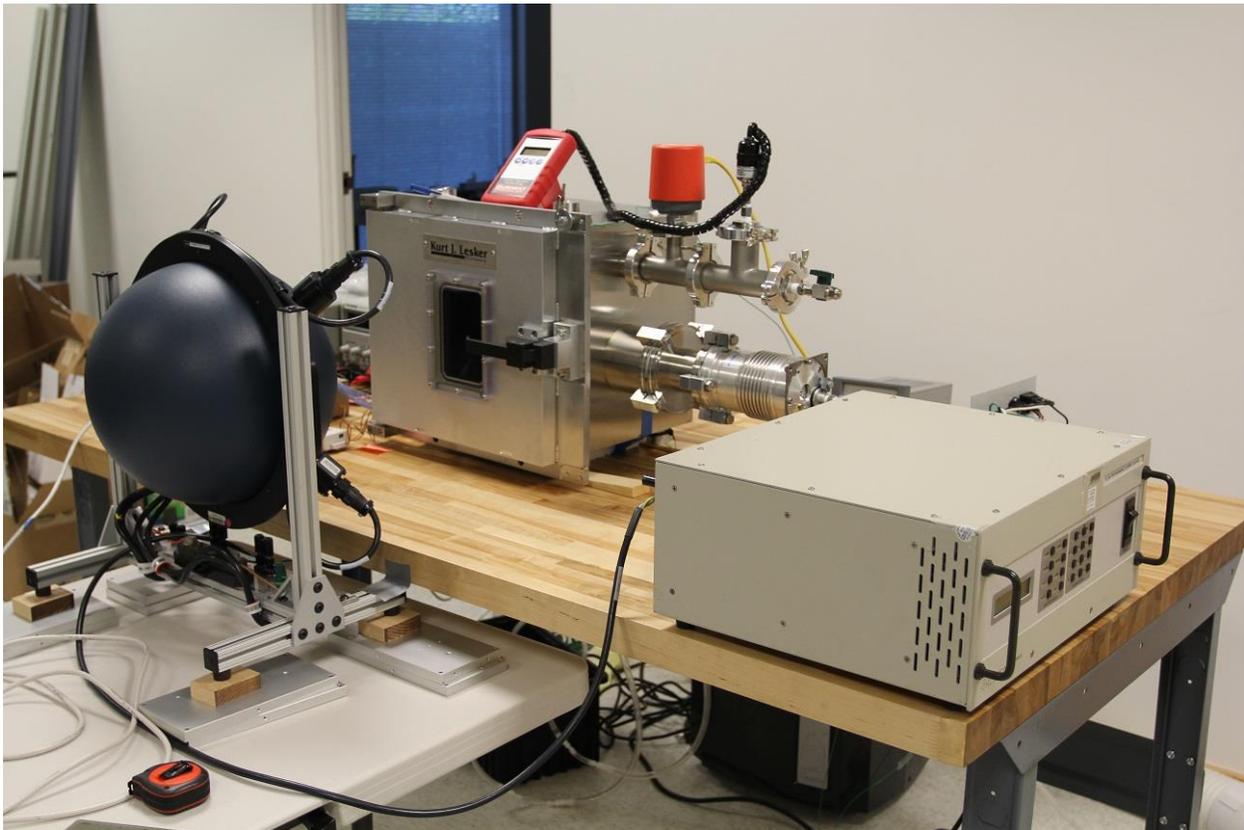
Variation of Hawkeye Response with Temperature

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Overview - the variation of the Hawkeye radiometric response with temperature was measured in the thermal-vacuum test series for each unit. Testing in the vacuum chamber was good, as we could go cold without condensation problems, but we had to work through a thick double pane window that was a bit small. The test arrangement is shown in Figure One.

Figure One: Vacuum chamber Testing with the NASA Sphere



Due to the difference in table heights the sphere was not very close to the chamber, so only the central portion of each image is well illuminated. In this test we are looking for relative variations in response to room temperature, so that is acceptable.

Test sequence: this test was done once for each unit. For Unit 1 I only did the test at three temperature points, since I had not done it before and didn't realize that the temperature effect was fairly significant for the near infrared bands. For Unit 2 I added two more temperature plateaus to better map the variation. Figure Two shows the results for Unit 1, and Figure Three for Unit 2.

Figure Two: Temperature Effect for Unit 1

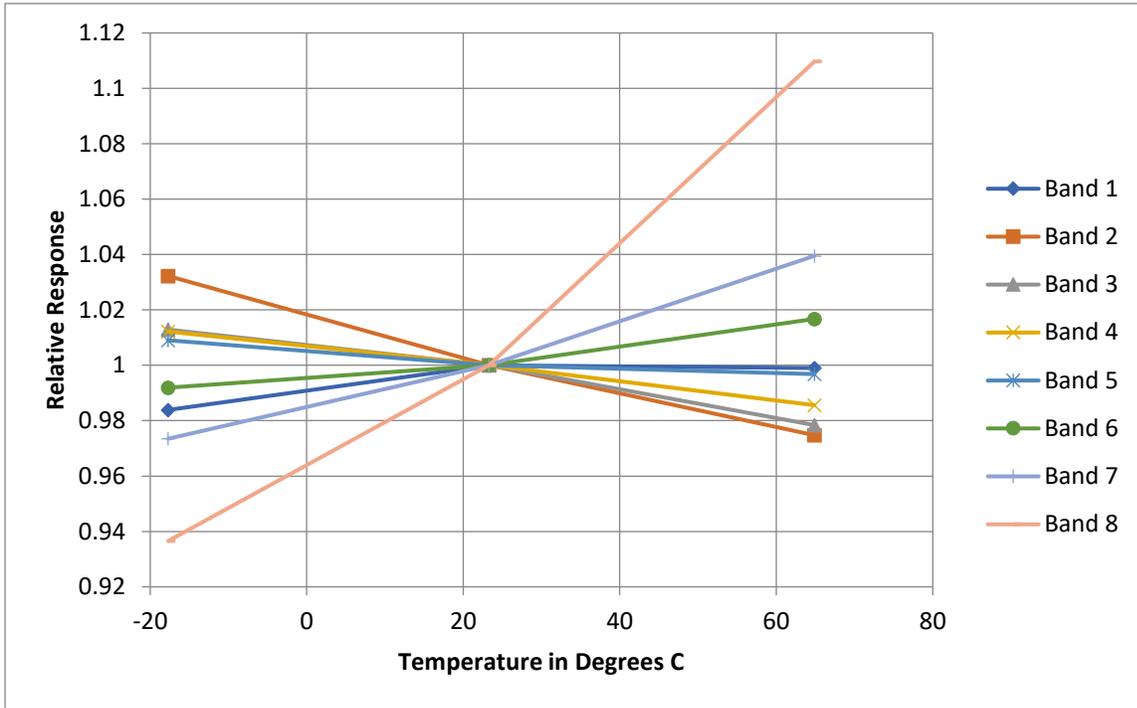
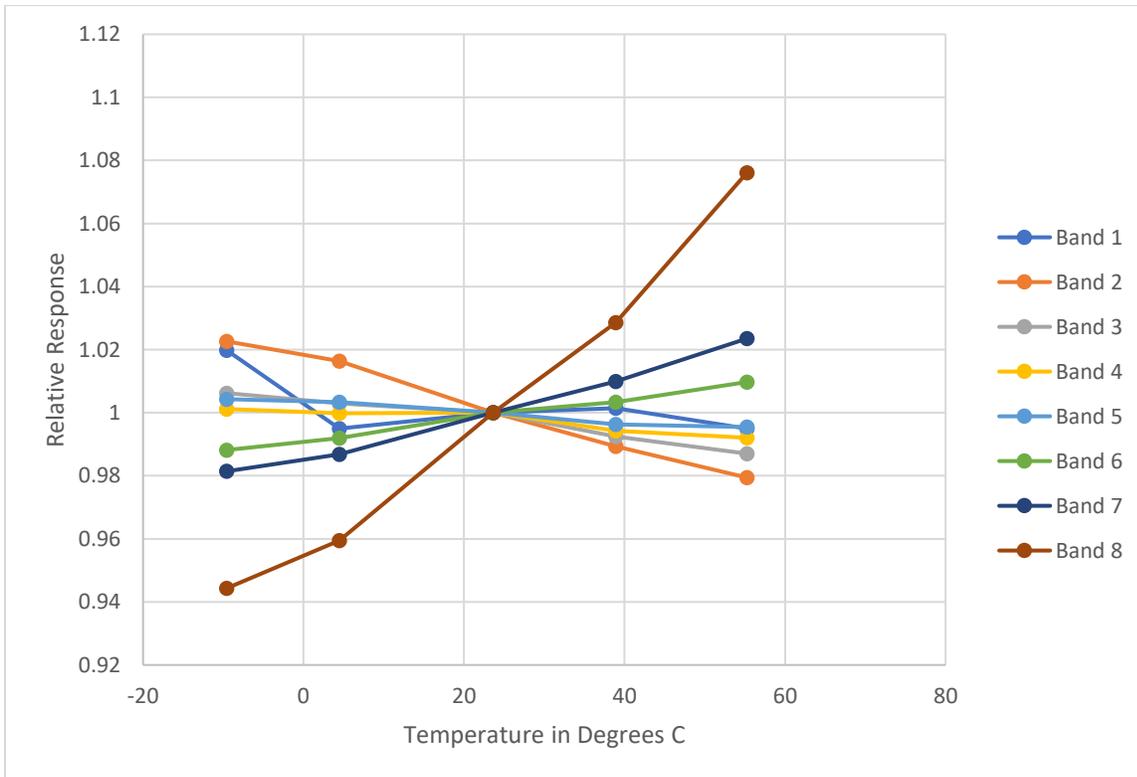


Figure Three: Temperature Effect for Unit Two



The anomaly for Band 1, Unit 2 is believed to be caused by my bumping the table in conjunction with Band 1 suffering some vignetting by the chamber window-sphere aperture geometry. I had very little margin on placement to get all 8 bands. I don't believe it is real. Table One below summarizes the response variation for all bands, assuming it is linear, and ignoring the band 1 Unit 2 coldest point.

Table Two: Response variation in Percent per degree C around 23.5 degrees C

Band	Unit 1	Unit 2
1	0.018	0.000
2	-0.070	-0.067
3	-0.042	-0.030
4	-0.032	-0.014
5	-0.015	-0.014
6	0.030	0.033
7	0.080	0.065
8	0.210	0.203

The two units are fairly consistent.

The Finderscope also shows a comparable shift to Band 8 over temperature, with the sensitivity increasing at higher temperatures. Unit 1 increases at 0.213 percent per degree C, and Unit 2 at 0.192. The Finderscope is not planned to be used for radiometry at present, though.

Data Files: the Unit 1 data comes from the directory below. This was a pre-SecondVibe test that was only one cycle long to make sure we were not going to expensive vibration testing with an instrument that had a problem. During the rest of the unit 1 thermal-vac testing the light source was a white card illuminated by a 500 watt shop light, and the images were only used to verify shutter operation and aliveness.

C:\FlightOneCalibrationBackup\Alan\Pre-SecondVibeTests-051617\ThermalVac-PreVibe-052017

For Unit 2 we also used a white card and shop light for most of the cycles. We used the sphere for data collected on Day 1. The files are archived in:

C:\FlightTwoCalibrationBackup\Alan3\U2-ThermalVac\Day1

If there is any doubt as to which light source was used, in all bands the shop light images show horizontal banding since the voltage was not regulated. The NASA sphere does not.