Attachment B

MODIS Science Team Meeting
Calibration Working Group Meeting
Holiday Inn, College Park, MD
October 11, 1994

Calibration Group Team Action Items from MODIS Science Team Meeting, May 4 - 6 , 1994

The following action items were discussed with Jim Young; and the responses are based on Jim's inputs:

1. In previous meetings, SBRC presented data on the emissivity of the blackbody calibration source (BCS) surface as a function of wavelength. These data indicated that the reflectance of the surface increased from the visible to the infrared. It was stated by SBRC at this meeting that the BCS was not entirely black and that the back wall of the BCS is visible to the eye when looking into the source. If the emissivity/reflectance data is valid, this would make the BCS an even worse blackbody than in the visible. This apparent conflict and potential problem needs to be examined.

Answer:

The BCS should be an extremely good BB if we have a system looking at it in the direction MODIS will be looking at it. At an oblique angle, the cavity effects are lost.

A lot of emissivity data on panels 1, 2, and 3 has been obtained for the BCS. This is only used for MWIR and LWIR (3.5 microns to 15 microns). If we use type 3 anodize, it has very high emissivity in the 3 to 5 micron region. At 10 microns, the emissivity starts to decrease. When we consider multiple bounces, even with an intrinsic reflectance of 10%, it would be no trouble at all. A memo was written on this: "BB Calibration Source Radiometric Model Analysis, September 29, 1994, N04291.

2. A question arose on how polished is the super-polished spherical mirror in the SSMA.

Answer:

7 Angstroms.

3. A question arose on how SBRC plans to verify and maintain the wavelength integrity of the SSMA.

Answer:

The SSMA wavelength calibration capability became the SpMA. We have three sources: Tungsten filament , IR ceramic, and emission lamps (like a mercury arc lamp with individual lines). The first two are used as continuum sources for relative spectral response of MODIS. These sources also provide input to a calibrated reference detector to take out the instrument effects. The emission lamps provide wavelength calibrations. The monochromator will be periodically calibrated.

4. The effect of earth shine on the in-flight blackbody was questioned. In particular, the effect on the blackbody of flying over scenes such as Antarctica and cold clouds at 200 K was questioned. SBRC stated that they can run MSAP with the earth temperature at 200 K to quantify the effect.

Answer:

I believe Tom Pagano has information on this action item.

5. A clarification was requested as to whether SBRC will measure the actual emissivity of the on-board and external blackbodies or will they merely measure witness samples of these blackbodies? Are these measurements as a function of wavelength?

Answer:

SBRC will not measure the emissivity of the onboard blackbody directly. Reflectivity will be measured. Will use two laser wavelengths (Helium Neon laser at 3.39 microns and a CO2 laser at 10.6 microns). Will illuminate the BB in the direction MODIS would look at it and measure with an integrating sphere the energy reflected out of the cavity. One other method uses a laser to illuminate the BB and a small detector is moved over the hemisphere to make BRDF measurements. A memo was written on those two approaches : "Methodology of the Measurement and Analysis of OBC BB BRDF and Total Integrated Scatter, June 6, 1994, PL3095-N03965.

6. A question and several doubts arose concerning the availability of sufficient light from the integrating sphere to successfully perform the stray light test.

Answer:

Jim has no reservations about the radiance levels available for most of the bands. The maximum radiance level for the integrating sphere is significantly larger than earth unity Albedo for wavelengths greater than 0.5 microns. There will be difficulty in merging the data together in an appropriate manner (integrating sphere is positioned at multiple locations; need to handle some overlap properly). A memo which may be helpful is:
"Spherical Integrating Source (SIS 100) Radiometric Model Simulation", 1 September 94, N04231.

7. SBRC has not submitted a formal timeline for the thermal vacuum testing. There is significant concern surrounding the lack of time for thermal vacuum testing given the magnitude of the job.

Answer:

There is some top level EM timeline in the October '94 MODIS Science Team presentation and a similar timeline for the PFM.

8. A question arose concerning the effect of scan angle on the magnitude of the stray light problem.

Answer:

SBRC plans to measure the far field stray light with integrating sphere at various locations and MODIS looking in the Nadir location. Measurements could be made at different scan angles, but that is not the intent now.

For near field scatter, these measurements can be made at any location along the scan line. Jim believes more than one near field effect could be done.

9. A clarification was requested as to whether SBRC plans to actually measure the transmission of the solar diffuser screen.

Answer:

SBRC will make a transmission measurement in the lab.

10. A question arose concerning the magnitude of the effect on the radiometric error incurred when sunlight hits the internal side of the sunshade and is then scattered or reflected onto the blackbody.

Answer:

SBRC needs clarification on this question.

Mike Roberto
October 7, 1994