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Reply to Attn of: 913

May 8, 1992

To: SEP/MODIS Program Scientist

cc: From: 913/Deputy MODIS Science Team Leader

V. V. Salomonson

W. L. Barnes

L. M. Stuart

J. L. Barker

J. K. Harnden

R. R. Weber

Subject: MODIS Spectral Filter Specs

Since the MODIS Science Team meeting in April, the MODIS Science Team and Technical Team have been working on resolving the difficulty that SBRC has had in meeting the filter specifications of the MODIS (formerly MODIS-N) contract. The attached memo describes some of the background of this study as of last week, and includes attachments 1 (SBRC request to the Science Team on April 27) and 2 (final Science Team response that seems to be acceptable to SBRC).

For your information, the modifications can be summarized as follows:

1. The center wavelength of 9 visible/near-infrared bands have been adjusted slightly (1-14 nm).
2. The center wavelength tolerance of 7 bands has been tightened.
3. Eight bandwidths have been changed (1 narrower, 7 broader).
4. The bandwidth tolerances of 31 bands were relaxed.

Overall, the MODIS Science Team accepted 39 of SBRC's 51 suggested changes. In exchange for this relaxation of the specifications, the Project is requesting that SBRC accept a tightening of the absolute accuracy specification for three thermal infrared bands (20, 31 and 32) as suggested by Team Members O. Brown, I. Barton, and Z. Wan.

Michael D. King

Enclosures

Goddard Space Flight Center
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Reply to Attn of 900

May 4, 1992

TO: 422/MODIS-N Instrument Manager
FROM: 900/MODIS-N Science Team Leader
SUBJECT: Modifications to MODIS-N Filter Specifications

The MODIS-N Science Team has studied the SBRC set of proposed filter specification modifications dated 4/27/92 (Attachment 1) and has, for the most part, concurred. This agreement has only been possible due to SBRC's agreement that trading excess center wavelength tolerance for the SBRC desired increases in bandwidth tolerance is acceptable. Therefore, the wavelength tolerances of 26 bands have been tightened to account for the relaxation of their corresponding bandwidth tolerances.

Bands 13,14, and 15 have not been changed appreciably due to Gordon and Slater's inability to find and/or develop required s/w in the time allocated. They plan to continue working on these bands over the next few weeks. Most of the other desired changes have been met or exceeded with only a few exceptions. Also, the center wavelength of 9 of the bands have been shifted slightly to better accomodate atmospheric and surface spectral structure. The errors in SBRC's compilation of BW tolerance and Desired BW Tolerance for bands 8 and 16 (Attachment 1) have been corrected in Attachment 2 and these changes have been pointed out to key members of the Team.

The changes recommended by the Science Team are summarized in Attachment 2. Columns labeled "Desired" are SBRC's suggested changes; columns labeled "New" are the changes recommended by the Science Team; all other columns are the present specification values.

Finally, as we have discussed previously, there is a continuing demand from those members of the Science Team responsible for surface temperature products to change the calibration accuracy specification for bands 20, 31, and 32 from 1% to 0.50%, 0.25%, and 0.25% respectively. Modeling by your Technical Team and SBRC together with recent measurements on the ERS-1 ATSR indicate that these changes are within the realm of reason. Therefore, it would seem reasonable to explore the possibility of trading the above described relaxations of filter specifications for tightened calibration specifications with

SBRC. I would like to discuss the impact of such a change at your convenience.


For Vincent V. Salomonson

2 Attachments

Desired Criteria

- 1: Center Wavelength Tolerance $\geq 0.25\%$ of Center Wavelength
- 2: Bandwidth $\geq 1.5\%$ of Center Wavelength
- 3: Bandwidth Tolerance: 0.35% Bands 8-16, 0.6% All Others

| Band | Center Wavelength (nm) | Wavelength Tolerance (\pm nm) | Wavelength Tolerance (%) | Desired Tolerance (\pm nm) | Bandwidth (nm) | Percentage of Wavelength (%) | Desired Bandwidth (nm) | Bandwidth Tolerance (nm) | Desired Tolerance (nm) |
|------|------------------------|----------------------------------|--------------------------|-------------------------------|----------------|------------------------------|------------------------|--------------------------|------------------------|
| 1 | 659 | 5 | 0.76 | | 50 | 7.59 | | 3.3 | 4.0 |
| 2 | 865 | 5 | 0.58 | | 40 | 4.62 | | 4.3 | 5.2 |
| 3 | 470 | 5 | 1.06 | | 20 | 4.26 | | 2.4 | 2.8 |
| 4 | 555 | 5 | 0.90 | | 20 | 3.60 | | 2.8 | 3.3 |
| 5 | 1240 | 6 | 0.48 | | 20 | 1.61 | | 6.2 | 7.4 |
| 6 | 1640 | 8 | 0.49 | | 20 | 1.22 | 24.6 | 8.2 | 9.8 |
| 7 | 2130 | 10 | 0.47 | | 50 | 2.35 | | 10.7 | 12.8 |
| 8 | 415 | 2 | 0.48 | | 15 | 3.61 | | 2.1 | 2.5 |
| 9 | 443 | 1 | 0.23 | 1.1 | 10 | 2.26 | | 1.1 | 1.6 |
| 10 | 490 | 1 | 0.20 | 1.2 | 10 | 2.04 | | 1.2 | 1.7 |
| 11 | 531 | 2 | 0.38 | | 10 | 1.88 | | 1.3 | 1.9 |
| 12 | 555 | 5 | 0.90 | | 10 | 1.80 | | 1.4 | 1.9 |
| 13 | 667 | +1,-2 | 0.15 | 1.7 | 10 | 1.50 | | 1.7 | 2.3 |
| 14 | 681 | 1 | 0.15 | 1.7 | 10 | 1.47 | 10.2 | 1.7 | 2.4 |
| 15 | 750 | 2 | 0.27 | | 10 | 1.33 | 11.3 | 1.9 | 2.6 |
| 16 | 865 | 5 | 0.58 | | 15 | 1.73 | | 4.3 | 5.2 |
| 17 | 905 | 1 | 0.11 | 2.3 | 30 | 3.31 | | 4.5 | 5.4 |
| 18 | 936 | 1 | 0.11 | 2.3 | 10 | 1.07 | 14.0 | 4.7 | 5.6 |
| 19 | 940 | 1 | 0.11 | 2.4 | 50 | 5.32 | | 4.7 | 5.6 |
| 20 | 3750 | 19 | 0.51 | | 180 | 4.80 | | 18.8 | 22.5 |
| 21 | 3750 | 19 | 0.51 | | 50 | 1.33 | 56.3 | 18.8 | 22.5 |
| 22 | 3959 | 20 | 0.51 | | 50 | 1.26 | 59.4 | 19.8 | 23.8 |
| 23 | 4050 | 20 | 0.49 | | 50 | 1.23 | 60.8 | 20.3 | 24.3 |
| 24 | 4465 | 22 | 0.49 | | 50 | 1.12 | 67.0 | 22.3 | 26.8 |
| 25 | 4515 | 22 | 0.49 | | 50 | 1.11 | 67.7 | 22.6 | 27.1 |
| 26 | 4565 | 23 | 0.50 | | 50 | 1.10 | 68.5 | 22.8 | 27.4 |
| 27 | 6715 | 34 | 0.51 | | 360 | 5.36 | | 33.6 | 40.3 |
| 28 | 7325 | 37 | 0.51 | | 300 | 4.10 | | 36.6 | 44.0 |
| 29 | 8550 | 43 | 0.50 | | 300 | 3.51 | | 42.8 | 51.3 |
| 30 | 9730 | 49 | 0.50 | | 300 | 3.08 | | 48.7 | 58.4 |
| 31 | 11030 | 55 | 0.50 | | 500 | 4.53 | | 55.2 | 66.2 |
| 32 | 12020 | 60 | 0.50 | | 500 | 4.16 | | 60.1 | 72.1 |
| 33 | 13335 | 67 | 0.50 | | 300 | 2.25 | | 66.7 | 80.0 |
| 34 | 13635 | 68 | 0.50 | | 300 | 2.20 | | 68.2 | 81.8 |
| 35 | 13935 | 70 | 0.50 | | 300 | 2.15 | | 69.7 | 83.6 |
| 36 | 14235 | 71 | 0.50 | | 300 | 2.11 | | 71.2 | 85.4 |

SCIENCE TEAM RECOMMENDATIONS FOR MODIS-N FILTER MODS (5/06/92)

Desired Criteria

- 1: Center Wavelength Tolerance $\geq 0.25\%$ of Center Wavelength
- 2: Bandwidth $\geq 1.5\%$ of Center Wavelength
- 3: Bandwidth Tolerance: 0.35% Bands 8-16, 0.6% All Others

| Band | Center WL (nm) | New WL (nm) | WL Tolerance (\pm nm) | Desired Tolerance (\pm nm) | New WL Tolerance (\pm nm) | BW (nm) | Desired BW (nm) | New BW | BW Tolerance (nm) | Desired Tolerance (nm) | New Tolerance (nm) |
|------|----------------|-------------|--------------------------|-------------------------------|------------------------------|---------|-----------------|--------|-------------------|------------------------|--------------------|
| 1 | 659 | 645 | 5 | | 4 | 50 | | | 3.3 | 4.0 | 4.0 |
| 2 | 865 | 858 | 5 | | 2.2 | 40 | | 35 | 4.3 | 5.2 | 4.3 |
| 3 | 470 | 469 | 5 | | 4 | 20 | | | 2.4 | 2.8 | 2.8 |
| 4 | 555 | | 5 | | 4 | 20 | | | 2.8 | 3.3 | 3.3 |
| 5 | 1240 | | 6 | | 5 | 20 | | | 6.2 | 7.4 | 7.4 |
| 6 | 1640 | | 8 | | 7 | 20 | 24.6 | 24.6 | 8.2 | 9.8 | 9.8 |
| 7 | 2130 | | 10 | | 8 | 50 | | | 10.7 | 12.8 | 12.8 |
| 8 | 415 | 412 | 2 | | | 15 | | | 1.0 | 1.5 | 1.5 |
| 9 | 443 | | 1 | 1.1 | 1.1 | 10 | | | 1.1 | 1.6 | 1.6 |
| 10 | 490 | 488 | 1 | 1.2 | 1.2 | 10 | | | 1.2 | 1.7 | 1.7 |
| 11 | 531 | | 2 | | | 10 | | | 1.3 | 1.9 | 1.9 |
| 12 | 555 | 551 | 5 | | | 10 | | | 1.4 | 1.9 | 1.4 |
| 13 | 667 | | +1,-2 | 1.7 | +1,-2 | 10 | | | 1.7 | 2.3 | 1.7 |
| 14 | 681 | 678 | 1 | 1.7 | 1 | 10 | 10.2 | 10 | 1.7 | 2.4 | 1.7 |
| 15 | 750 | 748 | 2 | | | 10 | 11.3 | 10 | 1.9 | 2.6 | 1.9 |
| 16 | 865 | 869 | 5 | | | 15 | | | 4.3 | 5.2 | 4.3 |
| 17 | 905 | | 1 | 2.3 | 2.3 | 30 | | | 4.5 | 5.4 | 5.4 |
| 18 | 936 | | 1 | 2.3 | 2.3 | 10 | 14.0 | 10 | 4.7 | 5.6 | 5.6 |
| 19 | 940 | | 1 | 2.4 | 2.4 | 50 | | | 4.7 | 5.6 | 5.6 |
| 20 | 3750 | | 19 | | | 180 | | | 18.8 | 22.5 | 22.5 |
| 21 | 3750 | | 19 | | | 50 | 56.3 | 56.3 | 18.8 | 22.5 | 22.5 |
| 22 | 3959 | | 20 | | | 50 | 59.4 | 59.4 | 19.8 | 23.8 | 23.8 |
| 23 | 4050 | | 20 | | | 50 | 60.8 | 60.8 | 20.3 | 24.3 | 24.3 |
| 24 | 4465 | | 22 | | | 50 | 67.0 | 65 | 22.3 | 26.8 | 26.8 |