MCST All Hands Meeting Minutes 4NOV93

Time: Every Thursday, 1-2:45 p.m., in 22/G95

ATTENDEES:

Name	Phone	Organization
Baden, Joan *(Recorder)*	X61378	RDC
Braun, Charles	982-3754	RDC
Bryant, Tom	982-3769	RDC
Burelbach, Jon	X66166	RDC
Guenther, Bruce *(Chair)*	X65205	925
Harnden, Joann	x64133	925
Knight, Edward	X62382	RDC
Knowles, Dan	X61378	RDC
Kvaran, Geir	X62382	RDC
Ungar, Stephen	X64007	GSFC

MINUTES:

Every Friday at 12 p.m. there will be brown-bag seminars given by MCST Technical personnel in building 22, G95. If you would like to give a talk yourself, please contact Tom Bryant (982-3769). **The next BB Seminar will be given on December 3rd by Jon Burelbach on the Internet.**

There will NOT be an All-Hands Meeting (AHM) on November 25th because everyone will be eating Turkey - most likely - or some vegetarian look-alike bird concoction since MCST has many "veggie" personnel.

Charles Braun has been asked to give a Brown Bag seminar (would like Jim Butler to attend) in the near future (probably February/94) on *"Optics of Metal Coatings and Interface Filters"*. Braun noted today that he has put out a first draft of the Cal Val Module.

Bruce Guenther started off the AHM by giving a presentation on *"Lunar Observations/Strategies"* (Enclosure). Bruce stated in his presentation that he and John Barker have devised a Catalog Technique/Survey for SWAMP & CEOS and went on to display the Site Survey Form, Test Site Database Requirements, and Computer Facility process.

Guenther has a meeting on November 23rd with Jeannine Harrison and Mike Heney and expects to be briefed beforehand on database issues by Knight and Knowles at 11 a.m., November 18th to prepare for this meeting.

Ed Knight reported that SBRC considered descoping the MODIS Ground-Based Calibrator (MGBC). Knight has since distributed a memo stating the risks of doing so (Enclosure).

Geir Kvaran stated that he has gotten the L-1B code done, and is now in the process of getting it into CADRE. He noted that ACROBAT (network) is now up and running again.

Joann Harnden said she would help out with Geir's efforts. Joann noted that her response to Phil Slater's visit on November 1 and 2 was a good one, and addressed the fact that Phil had alot of Time and Expense problems that need to be addressed. (For an elaboration on Phil's concerns, *see* Cal Workshop Minutes; For a copy contact: Joan Baden).

Al McKay noted that he is working on the Barker inputs to the Calibration Plan and provided a list of submissions not provided for the Cal Plan (Enclosure).

Burelbach noted that while perusing the net, he came across some U.S.G.S. spectra. This dataset is available over the network and could prove to be quite useful. 12-150μm eventually available on CD ROM.

Bruce stated, At 1km FOV, how to simulate something that is 1-2feet square?

There was a discussion involving Ungar/Burelbach/Guenther on using a terrain mixing model and Bruce asked Ungar to get a number from him to talk to the CERES people to find out if they have already excercised some of these simulation techniques.

There was a discussion of the SRCA Bulb Lifetime Requirements which are dependent on the Bulb Decay Mechanisms. There are no conclusions as yet from this discussion. Would like to address this issue before CDR Guenther stated.

Stephen Ungar noted general dissatisfaction with PRA (Photon Rsrch Associates).

Email recipients: If you would like to receive a copy of the minutes with enclosures, please contact Joan Baden (286-1378).

<u>ACTION ITEMS:</u>

#14 Braun coordinate with Tom Bryant on a date for his presentation.

#15 Geir Kvaran to present Beta delivery upon review by Joann Harnden. Kvaran to give 15 minute status (BETA) presentation at the November 18th meeting.

#16 Tom Bryant to present MMS presentation at AHM on November 18th.

#17 Tom Goff: Notify Joan that you have reviewed the SRCA (#1510) memo.

#18 Steve Ungar to get the CERES # from Bruce and contact them.

LUNAR OBSERVATIONS

FIRSTLY FOR SINGLE INSTRUMENT, 5 YEAR DATASET

Confirm Barker chart on requirement for complementary methodologies covering differing time intervals for calibration

Previous NASA missions with similar requirements, first use of diffuser and diffuser stability monitor was not fully successful

Consequently, NASA has invested more than $2.25 Million <u>each</u> year (plus shuttle ride every 10 months) for about 8 years to resolve these issues on space hardware

[Protocols under negotiation with IEOS call for acquisition of data for calibration to be obtained with priority which is exceeded only by priority for actions for health and safety of platform and accommodated instruments]

LUNAR STRATEGY IS A BARGAIN

Primary data acquisition program cost relatively inexpensive

Derived dataset applicable to broad range of instruments, is multi-disciplinary

Target is expected (with high degree of certainty) to be stable

Ancillary measurement checks for space instrument looking at moon
- MTF at sharp limb on onset
- measured against dark, cold space background
- map near and far out-of-field stray light with 0.5 degree source
- confirm transient response and band-to-band registration

STATUS OF FLAGSTAFF INVESTIGATION

RECOMMENDED COURSE OF ACTION

FY94

Initiate funding of VNIR (ready) dataset; commit for minimum observing period of lunar libration

Agree to fund SWIR build in FY95, provide small forward funding for that activity

Confirm to AM our need for support spacecraft observations to point instruments at the moon (all AM1 instruments would get significant benefit from a lunar pointing maneuver)

Confirm to "common spacecraft procurement activity" our requirement for these observations to **fix** our radiometry against the moon for the 15 year dataset - no thrusters please

FY95

Build the SWIR ground lunar mapping module

Initiate SWIR observation program to obtain 4.5 year lunar database; continue VNIR observations through end of SWIR 4.5 year dataset

Anticipate that ETM-type resolution instruments will be used for global change and will need supporting lunar dataset for their long-term measurements

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

NASA

Reply to Attn of: 925

July 19, 1993

Dear Colleague,

As one of the people involved in making ground-based measurements of reflected solar radiation in the visible and near infrared and emitted radiation in the infrared for use with aircraft and spacecraft mounted radiometers, your knowledge of ground-based data sites is very valuable to us. Your knowledge on the ground sites that you use, the data taking facilities provided with them and existing data sets from there will be of immense help to us in planning after-launch instrument calibration and data validation programs for global change research programs.

This information is being requested of you by the CEOS Cal/Val Working Group. CEOS is the Committee on Earth Observation Satellites, and the Cal/Val Working Group is a standing committee to CEOS on instrument calibration and data product validation. CEOS was formed in the 1980's at the recommendation of a G 7 Economic Summit, and the Cal/Val Working Group is interested in encouraging collaborations between investigators acquiring data useful for global change studies.

These data will be placed in the CEOS Cal/Val dossier and distributed widely to identify existing ground measurement sites. Our objective with this study is to encourage close cooperation between investigators using satellite data with investigators using primarily ground data.

What we envision is a continuing program to perform on board calibration of space-based instruments with a simultaneous program using ground-based sites to collect data at ground level the same as that being observed from space. With the proper algorithms and analysis to correct for sampling differences and other effects, it should be possible to validate the data products of the instrument by relating them to the same set of variables being observed at the ground site.

Please send completed forms to me at

Ground Site Survey
B. Guenther
NASA/Goddard Space Flight Center
Mail Code 925
Greenbelt, Maryland 20771
U.S.A.
Telephone +01-301-286-5205

Sincerely,

Bruce Guenther, Head
Sensor Development and Characterization Branch

SITE SURVEY FORM

Location:	Latitude:	Longitude:	Elevation (m):
Size of Site:	Normal	Extended	
Climate Zone and Other Salient Features			
Vegetation Cover			
Reflectance Properties:	Wavelength Range:	λ = - μm	
Range or scale of sampling (m)	30	300	3000
ρ min , ρ max =			
Equipment Available at Site			
Occupancy of Site	Full time_____	If Occasionally, How Often?	Rarely_____
Specific Data Already Taken at Site			
Data taken by your Program at Site			
Nearest Weather Station (Including Site)	Address:	Phone: Fax:	
Primary Purpose of Data Collection Programs, including whether the data are for satellite sensor calibration or data product validation.			

Please list important or unique features about site or activity relevant to potential users. Include a brief description of infra structure at the site such as buildings to house staff or assemble instruments, electricity, running water, and computer net working capabilities such as an Internet.			
Relevant Publications			
Names of PIs for Experiment or Site	Addresses	Phones	Faxes

Science Processing Support Office
NASA/GSFC

Greenbelt, MD 20771

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TFDB

Test Sites and Field Experiments Database

Quick Reference Guide

Log Into the TFDB:

Your equipment determines which connection method to use: dial-up or network. If you have a terminal or PC with a modem and communications software, you can use dial-up access. If your terminal is connected to a computer that is on a national network (e.g., NAN or SPAN), you can use the network access procedures. In the examples given below computer prompts are shown in *Italics* and user entries are shown in bold text.

Dial-up:

301-286-9000 (2400 baud)

or

301-286-4000 (9600 baud)

Enter number: **sisc <CR><CR>**

Enter username> **your name**

Local > **c spso2**

Login: **tfdb**

Password: **spsotfdb**

Using Internet::

telnet spso2.gsfc.nasa.gov

or

telnet 128.183.112.16

Login: **tfdb**

Password: **spsotfdb**

Using NSIDecNet (VAX/VMS):

rlogin spso2 /username=tfdb

Password: **spsotfdb**

Using NSIDecNet (Unix):

rlogin spso2 -l tfdb

Password: **spsotfdb**

(Note: **Emulate VT100 terminal** type when communicating to the TFDB)

Access Information:

This TFDB is completely menu driven and requires no special keys. Use of cursor keys allows to move between menu options and <CR> executes the selected option.

There are three wanys of moving through menus:

1. Move the cursor with **arrow keys.**
2. Use **Space Bar** to move from top to bottom of menu options.
3. Type the **initial letter(s)** of an item. *Caution*: if the letters you type uniquely identify that item in the list, the item will also be automatically "chosen" (i.e., executed). To type a new set of initial letter(s), tab to the next item and start typing again.

To enter information in the various fields of user information, upload software information, and comments form; use **tab and arrow keys** to move from one field to another field. The <CR> will provide with either menu options or implement selected menu option.

Help:

Help is available for each menu option through selecting help from appropriate menu.

Exit The TFDB:

User can Exit the TFDBby selecting **Exit The TFDB** option from any menu and answer **Yes**. If answersed **No** program will return to the menu. This option has been provided in most of the menus.

User Support:

User's guide and related TFDB documents can be obtained from:

Dr. Bruce Guenther
Code 925
NASA/GSFC
Greenbelt, MD 20771
(301) 286-5205

or

Yun-Chi Lu
Code 902
NASA/GSFC
Greenbelt, MD 20771
(301) 286-4093

If you encounter problems or have comments, please contact:

Lalit Wanchoo (301) 794-5469
wanchoo@spso.gsfc.nasa.gov

November 4, 1993

To: Harry Montgomery
From: Ed Knight

cc: John Barker
Bruce Guenther

Subject: Eliminating the MGBC (the descope option)

References: 1. "Alternate Tests to MGBC," PL3095-N03196, by Tom Pagano 10/29/93. 2. "Review ramifications of MGBC deletion," PL3095-N03195, by Jim Young 10/29/93. 3. "Review of MODIS Characterization and Calibration Philosophy," PL3095-N01790 (W913), by Jim Young 11/16/92. 4. "Atmospheric Transmittance Analysis for MODIS Spectral Bands," PL3095-Q02925 (W1434), by J. Walker, 12/21/92.

Introduction

I have reviewed the above references as well as the Calibration Management Plan. I feel we need to raise the following concerns about the descope option that eliminates the MGBC. The conclusion summarizes these concerns in bullet form.

Overall

There will be greater uncertainties associated will all characterizations done in ambient rather than thermal vacuum. SBRC's own analysis (PL3095-Q02925, W1434) indicates that atmospheric absorption in the ambient test set up will be significant for some bands. This and similar effects could increase measurement uncertainties above a level necessary to demonstrate specification compliance. SBRC should provide more detail on the uncertainties involved in not doing the vacuum tests directly.

To quote Jim Young, "Without MGBC, full up system testing is basically limited to radiometric calibration using SIS(100) and BCS." We would therefore be doing our absolute radiometric calibration under conditions that were measured only indirectly. This increases all uncertainties associated with the radiometric measurements and radiometric models. For example, there is a radiometric uncertainty associated with the crosstalk and ghosting. This uncertainty will be larger if ghosting is measured in ambient instead of thermal vacuum. SBRC should examine whether their uncertainty budgets can tolerate such increases.

Spectral Band Registration

Without the MGBC, it will be significantly more difficult to verify compliance with this requirement. Pagano suggests compensating by using the IAC in ambient and the SRCA is thermal vacuum. Currently, the along-track registration algorithms for the SRCA have not been developed, and the general feeling is that the SRCA will not be very accurate in the along-track direction. Additionally, registration is aperture dependent. SBRC should provide a better understanding of the accuracy to which along-track registration can be verified.

Historically, SBRC has observed differences in spectral band registration due to how the cold focal planes are cooled. Cherie Congedo's STOP analysis (Weber Team Meeting, 10/19/93) confirms this. In ambient, the cold detector planes are cooled using the bench test cooler. In thermal vacuum, the radiative cooler is used. The magnitude of this difference needs to be understood.

Tom Pagano stated during our teleconference that he felt we were overspending on spectral registration. The philosophy behind his compensation scheme is that SBRC could essentially abandon the goal of 0.1 pixel coregistration and merely show compliance with the 0.2 pixel requirement. This philosophy may meet resistance from the science team.

Spectral Measurements

The MGBC would provide system level spectral tests in vacuum. If it is eliminated, Pagano proposes that system level tests could still be done in ambient. Component measurements could be done in both ambient and thermal vacuum conditions. Additionally, the SRCA could check the transfer between ambient and thermal vacuum.

SEAWiFS experience indicates that system level results do closely match combined component measurements. The scheme proposed by Pagano seems feasible with the following risks:

a. We risk the component measurements not being accurate enough. Component level measurements must be made with sufficient accuracy so that the total system level accuracy is small. Spectral component data provided to date have not included a satisfactory account of their measurement uncertainties. If we are going to rely on component measurements, we need evidence that these are being done well.

b. We risk not catching shifts in the system that affect the system level spectral response. Many changes such as alignment of the optics can affect the

system level response and would not be measurable on the component level. Pagano's scheme relies on the SRCA to catch these shifts. Yet the SRCA is supposedly only accurate enough to measure CW shifts that are between 1 and 10 nm (band dependent) for bands below 1 μm. Our sensitivity studies show that shifts smaller than these can be significant, and we would now fail to catch them. Additionally, this increases the risk for all thermal bands, which the SRCA cannot measure. We need evidence that there will be no system level changes between ambient and vacuum that can't be detected on the component level.

c. This puts significant burden on the SRCA to catch shifts between ambient and thermal vacuum conditions. The didymium glass becomes a key element. If it changes or our spectral resolution of it is insufficient, the SRCA will be unable to track the differences. We need substantially more confidence in the SRCA than we would have needed previously.

Ghosting and Crosstalk

The MGBC contains FOV, reticles, and screens necessary to do complete ghosting and crosstalk characterization. The IAC has a FOV one third that of the MGBC, and currently uses only slits for reticles. Under the descope, we will lose the tests needed to correct for ghosting or crosstalk in software. SBRC will no longer be able to measure worst case ghosting, and will have to demonstrate verification with the transient response specification more indirectly. We will need more confidence that this limited FOV/reticle combination can adequately represent a cloud for ghosting purposes in measuring transient response.

Summary

In this memo, I've attempted to raise the concerns I've spotted about eliminating the MGBC. There may be others, and some of these may be easily solved. Nonetheless, we should examine these in the coming weeks.

These concerns were:

- The uncertainties of all measured quantities will be greater. SBRC should provide more details of these uncertainties.
- Radiometric uncertainties will increase. SBRC should examine this effect on their ability to meet the radiometric accuracy requirement.
- The SRCA may not be able to characterize along track registration well enough. SBRC should provide a better understanding of the actual uncertainties in using the SRCA to precisely measure along track SBR.

- Differences in cooling methods historically have affected Spectral Band Registration. The magnitude of this effect needs to be understood.
- Spectral characterization becomes dependent on component level measurements. SBRC should demonstrate that these measurements will be made with sufficiently small uncertainties to meet the total system requirements.
- System level spectral changes between ambient and thermal vacuum will not be detected below a certain magnitude for the reflective bands and for any of the thermal bands. We need evidence that such changes will not occur.
- The descope puts greater dependence on the SRCA's ability to self-calibrate. We need more confidence that this will not increase risks substantially.
- The loss of the MGBC reduces our ability to characterize ghosting and stray light. SBRC should demonstrate that they will still meet the transient response requirement with these lower quality tests.

Please let me know what you learn at the CDR dry run about these issues.

Edward J. Knight

Edward J. Knight/RDC/

MODIS Calibration Plan Inputs

Status - Friday, November 5, 1993

Item	Status of initial draft
On-board calibration - Pre-launch. SBRC/Young	Received
On-board calibration - Post-launch. MCST/Harnden	Written, not yet reviewed
Image-derived calibration. MCST/Harnden	Written, not yet reviewed
Instrument model - Pre-launch. SBRC/Pagano	Received
Instrument model - Post-launch. MCST/Montgomery	Received
End-to-end performance model. MCST/Ungar	Received
Ocean field campaign/calibration. U of Miami/Gordon	Received
Land vicarious calibration. U of AZ/ Thorne	Received
Aircraft radiance flight experiments. GSFC/Abel	Received
Geolocation. SDST/Masuoka	Received
Direct lunar calibration. USGS/Kieffer	Input received. Probably needs reformatting, at least, to select materials that address topic.
Integration. MCST/Barker	Written. Being revised.