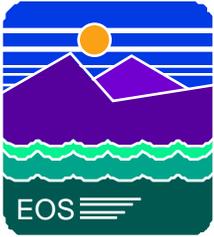# MCST Thermal Emissive Bands Calibration
Progress Report
to the
MODIS Science Team

October 24, 1997

Progress Report Briefing Outline and Schedule

	Topic	Time
1.0	Introduction -Key Issues -Objectives -Progress/Caveats -UW Workshop Key Issues Summary	10 minutes
2.0	Summary of Test Data and Analysis Progress to date	10 minutes
3.0	Instrument Key Features and Performance Summaries -Reference Configuration Charts -Performance Summary ("Murphy Charts") -Preliminary Radiance Uncertainty Estimates -Projected Lsat's and Tsat's -Calibration Temperature Ranges (Specified and recent ST requests) -Scan Mirror Reflectivity vs AOI -ACD non-linearities -ECAL results	30 minutes
4.0	Relative Spectral Responses -wavelength correction procedures overview -band-by-band summary	25 minutes
5.0	L vs DN Calibration Summary -overview of L vs DN algorithm -radiometric stability/repeatability -temperature effects on calibration coefficients -BCS calibration vs OBC calibration -Mirror Side A vs Mirror Side B comparisons -Primary Electronics vs Redundant Electronics comparisons	2.5 hours
6.0	BCS to OBC Blackbody Calibration Transfer Results -Review of Qiu/Godden, Xiong and Young Methodologies -Summary of Results, Key Issues and Recommended Values	45 minutes
7.0	Discussion of PC Bands Crosstalk Analysis and Correction Methodologies	30 minutes
	Total	~ 5 hours

Introduction

- Top Level Status Summary
- Key Issues
- Objectives of this Report
- Progress/Caveats
- Key Issues from the September 11-12 Madison Workshop
- Credits
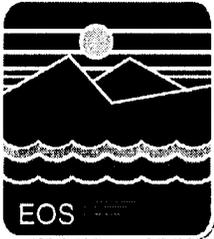
Reasonable results fitting data to L vs DN algorithm

- difficult to characterize data to level of L_{typ} specifications over desired fitting ranges [good progress]

Retrieving reasonable OBC-BB parameters from BCS to OBC-BB thermal vacuum blackbody transfer [good progress]

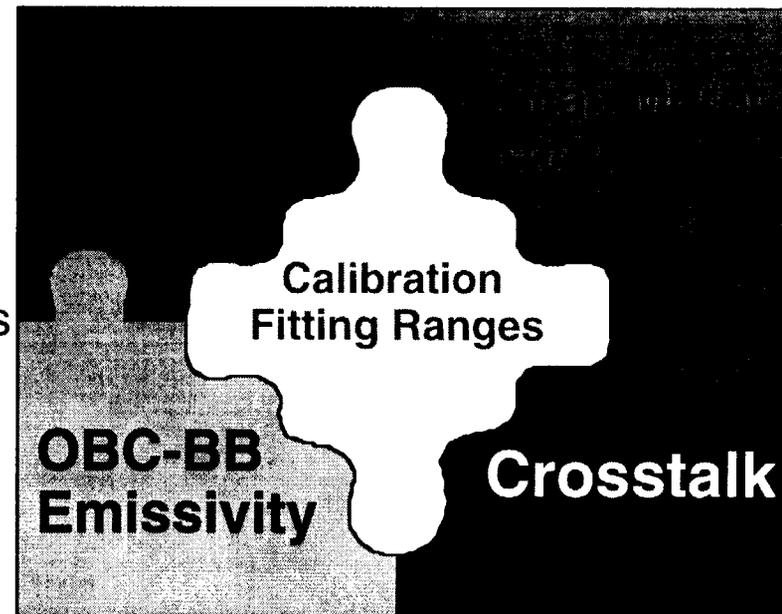Reasonable convergence regarding RSR wavelength scale [good progress]

Most pieces are in place

Some issues unfinished

- Band 21 Calibration
- Spatial/Spectral "crosstalk" in PC bands
- Electronic effects ~1/2 to 1%

Situation encouraging

You will hear something on each of these items in presentation today

Calibration Fitting Ranges

OBC-BB Emissivity

Crosstalk

Key Issues

- Algorithm polynomial order/Band
- Calibration fitting ranges
- Wavelength calibration/correction
- Band 21 calibration alternatives
- Crosstalk characterization/correction implementation
- BCS to OBC Blackbody calibration transfer
- Electronics effects
- Determination of Uncertainties
- Validation approaches

Objectives of this Report

- Provide the Science Team with an overview of the Thermal Emissive Bands calibration methodology, algorithms and performance

- Address Key Issues Identified in the September 11-12 Madison Workshop

- Identify key issues for continued investigation and developement

- Acquire Consent-to-Build L1B at launch code
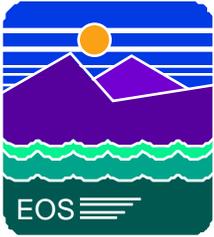
Progress and Caveats

- Developed L vs DN algorithm as alternative to the more complex V vs L algorithm

- Demonstrated V vs L algorithm functionality

- Madison Workshop (9/11-9/12)

- Coordinated with Science Team regarding calibration fitting ranges

- Coordinated with UW regarding wavelength calibration

- Integration of In-band RSRs with OOB-Dispersive measurements pending normalization clarification

- Band 21 calibration to be derived from detector measurements and system level ECAL results

- Feedback to FM-1 Test Program

- Much work to be done on PC bands crosstalk quantitative assessment and correction algoritm

Key Issues from the Madison Workshop

1) Proceed with L vs DN algorithm as baseline for L1B code
   - Continue development and assessment of V vs L algorithm as potential improvement for PM mission
   - Update ATBD with L vs DN algorithm

2) Select calibration fitting ranges on band-by-band basis with Science Team inputs
   - continue quadratic vs cubic, and selective weighting fitting studies
   - investigate alternate calibration data sets
   - investigate using 1/2 of selected data sets to determine calibration coefficients, and determine performance with remaining 1/2 of the data

Key Issues from the Madison Workshop -continued

3) MCST and UW converge on appropriate RSR wavelength scale correction procedure

   – maintain L1B capability for processing with channel-level RSRs

   – remove Band 35 13.88 micrometer CO_2 absorption feature

4) Continue BCS to OBC Blackbody transfer investigation and sensitivity analyses

   – assess role and impact of scan mirror reflectance uncertainties on transfer results (OBC emissivity, temperature errors, etc.)

5) Continue investigation of PC crosstalk correction algorithm

- parametrically assess impact on calibration coefficients
- develop strawman correction algorithm
- determine appropriate coefficients from measured crosstalk data
- assess impact to L1B code development, testing, processing and validation efforts

Credits for Preparation of this Report

- Jack Xiong
- Tim Dorman
- Jeff Bowser
- Shi-Yue Qiu
- Tim Zukowski
- GSC and RDC Support Staff
- SBRS System Engineering

Previous Analyses by:

- Mohammad Khayat
- Duane Rosenberg

Weeks to Launch

33!

31 October 1997