

THERMAL INFRARED WORKSHOP
TOPICS TO COVER

Importance of Cross-calibration - provided by Interdisciplinary Investigators

Mathematical Modeling of Thermal Infrared Instruments

RADIOMETRIC CALIBRATION

Standards

Working Standards and transfer standards

Transfer Radiometers

Internal Standards

Use of Standards

Data Analysis and Archiving

SPECTRAL RESPONSE

Measurement Methods

Out-of-band Response

Filters, aging, orbital degradation and witness samples

Data Analysis and archiving

In-orbit Verification

SPATIAL RESPONSE

Measurement Methods

Quantities to be Measured

Test Equipment

Off-Axis

Cleanliness, BRDF

Data Analysis and Archiving

In-Orbit Verification

TEMPORAL RESPONSE

Measurement Methods

Test Equipment

Data Analysis and Archiving

Memory Effects

POINTING PRECISION AND ACCURACY 1)

Measurement Methods

Equipment

Achievable Precision

Data Analysis and Archiving

SUMMARY

- 1) Pointing precision and accuracy may cut across several spectral intervals. This topic might be considered for a separate short workshop.

RECOMMENDATIONS FOR PEER CALIBRATION PDR AND CDR

GOAL: In-depth, technical review in a format that allows inputs from a peer panel of experts

COMPOSITION: Team Members, Calibration Working Group Members, Project Engineers and NIST Personnel

TIMING: Not later than PDR and CDR (to be negotiated with Project Manager and Project Scientist)

OUTPUT: Formal Report by Peer Panel which is submitted to Engineering Panel, and will include Action Items and suggestions. Action Items to carry full weight with Action Items from Engineering PDR and CDR.

CALIBRATION PDR and CDR

**GOAL: IN-DEPTH, TECHNICAL REVIEW AND
INPUTS BY EXPERTS (PEERS)**

**COMPOSITION: TEAM MEMBERS, CALIBRATION
W. G. MEMBERS, PROJECT ENGINEERS,
NIST**

TIMING: NOT LATER THAN PDR, CDR

**OUTPUT: FORMAL REPORT BY PEER PANEL
SUBMITTED TO ENGINEERING PANEL
CAN INCLUDE ACTION ITEMS AND
SUGGESTIONS**

**CALIBRATION PEER REVIEW
PRIOR TO PDR & CDR
GENERAL TOPICS**

- * **Overview and top level schedule**
- * **Calibration requirements and rationale**
- * **Description of mathematical model
philosophy, status**
- * **Calibration plan -- pre-flight**
 - * **calibration schedule -- including durations**
 - * **quantities to be calibrated**
 - * **standards**
 - * **methods**
set-up and fixtures
procedures
 - * **transfer to inflight calibration**
uncertainty analysis -- precision and accuracy
- * **Data analysis, determination of instrument parameters**
- * **Cal. data archiving and documentation**
- * **In-flight calibration**
 - * **quantities not measured and rationale**
 - * **quantities to be measured and rationale**
method, frequency
uncertainty analysis -- precision and accuracy
- * **Long term stability - (Validation)**
- * **Data analysis and use in operational data reduction**
**Conclusion (including comparison of required and
achievable results)**

- * **Topics emphasized at PDR**

TOPICS FOR CALIBRATION PEER REVIEWS

Calibration Preliminary Design Review

The maturity of instrument design is that the analysis is nearly complete and the basic approaches and designs are finished. Not all the details of the design are complete, and the drawing sets are incomplete.

Describe Measurement Objectives

Relationship to Topical Science Workshops

Describe Instrument Performance Requirements

Describe the On-Board Instrument Engineering Systems

Analyze how these engineering systems will be used

Review the ground calibration and characterization plans

Describe the strategy and schematic design for the calibration fixtures

Document the concepts for tracking the Level 1 product for this instrument throughout the life of this mission

Show how your Level 1 data set will be comparable with other complementary and similar Level 1 data sets from other EOS instruments (including those from non-US sources or platforms)

Review the data product validation plans and show how the in-orbit metrology scales will be traced to the validation measurements program metrology scales where applicable.

A mature draft of your Calibration Plan is required 60 days before this review.

Peer Calibration Review Notes

1. What is the peer calibration review?

-a process by which the calibration plans, methods, and procedures employed by EOS instrument calibration teams will be accurately and closely examined on a technical basis and ultimately validated.

2. Why is the peer calibration review performed?

-to verify that the calibration of each EOS instrument has as its goal the preflight determination and inflight monitoring of instrument performance for the production of a calibrated level 1 data set for the duration of the mission.

3. Who performs the peer calibration review?

- representatives of the EOS calibration office
- non-EOS personnel
- other EOS instrument calibration team members (especially those members that anticipate that they will need the data product of another instrument to produce a higher order data product from their data)

4. When is the peer calibration review performed?

-in a sense, it is ongoing with representatives of the EOS calibration office at this time reviewing calibration plans and management plans.

-as plans mature and become more detailed, the EOS and non-EOS representatives will become involved.

5. How is the peer calibration review accomplished?

-by circulating detailed, mature calibration reports (ie. calibration plans, calibration management plans) to specific non-EOS and EOS calibration-knowledgeable personnel with a request for specific technical comments.

-receipt and review of these comments by the EOS calibration office

-discussion of comments at future EOS calibration panel meetings. Between these meetings written, oral, and electronic correspondence will be used through the EOS calibration office.

CALIBRATION PEER REVIEW
POSSIBLE TOPICS

Overview and top level schedule

Calibration requirements and rationale

Description of Mathematical Model
philosophy, status

Calibration Plan - pre flight
quantities to be measured, schedule and duration to do it
methods, standards
set-up and fixtures
procedures
transfer to in-flight calibration engineering systems
uncertainty, precision and accuracy analysis

In-flight calibration
quantities to be measured and rationale
quantities not to be measured and rationale
methods, frequency
uncertainty, precision and accuracy analysis

Long-term stability and Validation approaches

Conclusion (including comparison of required and achievable results)