

Satellite Instrument Pre- and Post-Launch Calibration

Tuesday 7th May 2013, Darmstadt, Germany



Satellite Instrument Pre- and Post-Launch Characterization

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The perfect OCR Mission ?

• A perfect instrument (system)

noise, polar, stray-light, spectral response, variation with field-of-view

 \rightarrow unrealistic or too expensive

• A perfect characterization

- Pre-flight : full characterization
- In-flight : complete on-board device

 \rightarrow unrealistic or too expensive

• A perfect situation

- no evolution, no issues, everything as expected

→ unrealistic (from experiences)

Context

- Knowledge of the instrumental radiometric behavior is crucial for OC applications
 - because the signal of interest is roughly 10% of the TOA signal
 - very challenging accuracy : 0.5% on the TOA reflectance
 - that's not only 0.5% on calibration, but for the total of all contributors

 \rightarrow challenging

- Experience and feedback from past/current OCR missions
 - Lessons learnt from individual past/current mission
 - Also feedback from cross-comparison, or cross-validation

Context

- IOCCG Report#13 Mission Requirements for Future Ocean-Color Sensors
 - Multi-agency discussion and consensus
 - State of the art report / recommendations
- Need for international/common effort
 - CEOS OCR-VC Virtual Constellation : whitepaper from the INSITU-OCR
 - Calibration Task force
 - other example : GSICS

Characterization keynotes

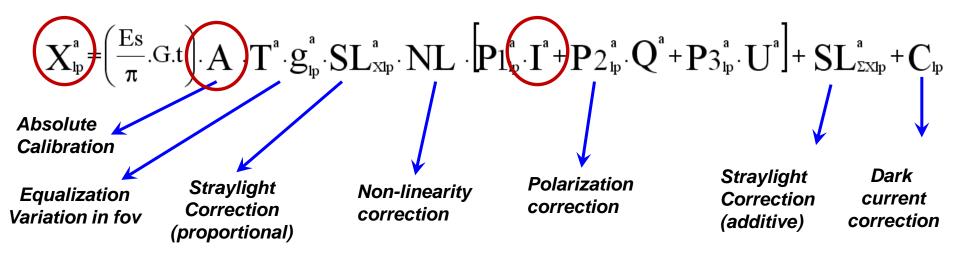
• Pre-launch characterization according Report#13

- Absolute calibration (radiance/reflectance)
- Relative calibration
- Spectral characterization (inc. rejection)
- Straylight characterization
- Polarization
- Linearity, dynamic, SNR
- Temperature and offsets
- Registration, MTF

Characterization vs Calibration

Radiometric behavior of the instrument

• Ex: link the input radiance I to the measured digits X



Several characterizations need to be done (before cal) in order to
1/ obtain a quantity that is simply proportional to the input radiance
2/ guarantee the general radiometric quality

Characterization keynotes

• Post-launch characterization according Report#13

- Ideally all pre-launch characterization \rightarrow as if unrealistic
- Usually more « validation » if not characterization
- Calibration adjustment always required
 - vicarious adjustment for level-2 but need level-1 consistency/accuracy first
- Trending is crucial

Additional aspects

- Be prepared to the unexpected (lessons learnt from MODIS)
- About the interest to provide cross-comparisons or validation approaches
 - On-board = very useful, but also need validation

Planning

14:45-14:50 Introduction

14:50-15:00 OCM-2 calibration and characterization
15:00-15:10 MERIS calibration and characterization
15:10-15:20 OLCI calibration and characterization
15:20-15:30 GOCI calibration and characterization
15:30-15:40 MODIS calibration and characterization
15:40-15:50 SGLI calibration and characterization

15:50-15:55 Break

15:55-16:05 GSICS

16:05-16:15 IOCCG Calibration Task Force

16:15-17:15 Discussion on future cooperation

Summary