FM3/FM4 Status
GLM Science Team Meeting

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Drawing Not To Scale

GOES-T/U Update

- GOES-T
  - TVAC door close scheduled next week
  - Mechanical Environments early 2021
  - Ship to Cape September 2021
  - **Launch December 7, 2021**
- GOES-U
  - GLM FM4 Installed on EPP early 2022
  - Environmental testing Starts early 2023
  - Ship to Cape December 2023
  - **Launch April 2024**

FM3R SU

- FM3 SU rebuilt after failures from a single lot of ceramic capacitors

Focal Plane Array Assembly (FPAA)	SN3 → SN5
Sensor Electronics Box (SEB)	SN3 → SN5

- SN5 SEB exhibited noise anomaly in TVAC
  - Replaced with SN3 SEB after reliability of capacitor lot established with additional operating hours
- Instrument level environmental testing completed April 2020
  - Vibration testing completed during initial COVID-19 restrictions
- Powered Bench Acceptance Tests in Denver deferred to reduce required personnel travel
- GOES-T Pre-Environment CPT successfully completed
- GLM will support GOES-T TVAC predominately with personnel in Palo Alto
  - Remote Instrument Control Room established in Palo Alto with access to voice communications, telemetry, and instrument commanding

FM4R SU

- FM4 SU rebuilt after failures from a single lot of ceramic capacitors

FPAA	SN4 → SN4 after repair and 1000 hour burn-in
SEB	SN4 → SN5 after noise anomaly root cause identified and corrected

- SN5 SEB noise anomaly investigation identified a marginal timing condition fully correctable via a commandable timing change
  - Propagation of DC Restore pulse from generation to DC Restore circuit reduced commanded pulse width reducing the restore time below the settling time.
  - Corrected by commanding a longer pulse width (DC Restore "Triple Wide" timing)
  - Improved noise **and** "first pixel" overshoot compared to previous flight models
  - Will evaluate Triple Wide DC Restore for FM3 during GOES-T TVAC
  - FM1 and FM2 may benefit from this change
    - May allow lower thresholds due to reduced noise and first pixel overshoot
- TVAC Completed August 2020, remaining instrument level tests complete early 2021 (EMI, Vibe, Mass Properties)
  - FM4 SU will be stored in Palo Alto until required by GOES-U I&T

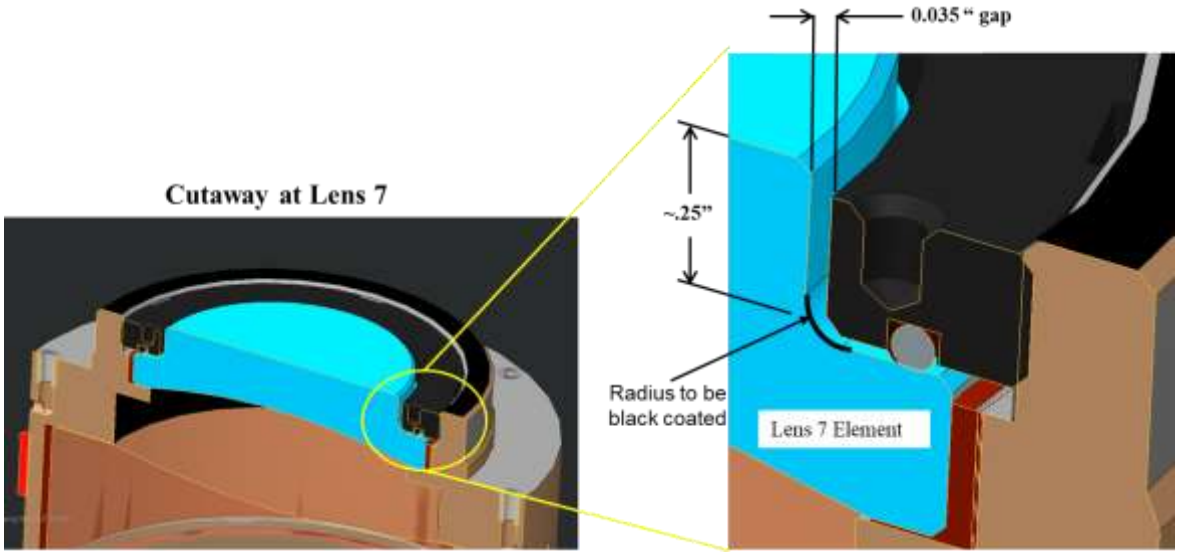
Differences between FM3/4 and FM1/2

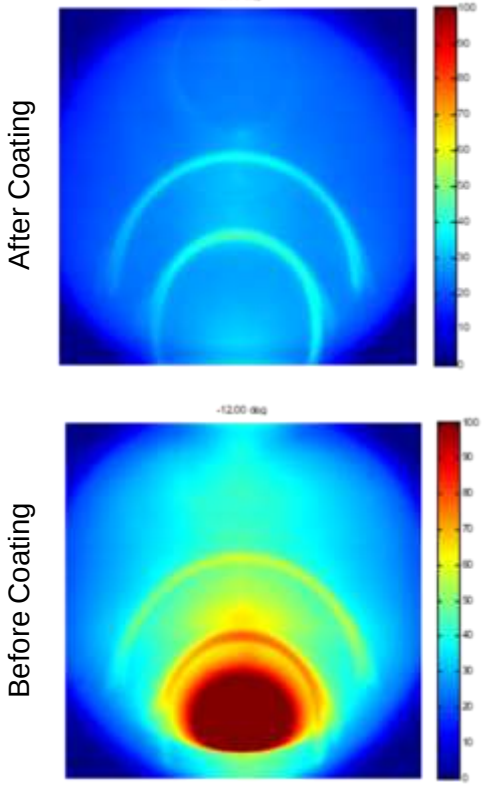
- Lessons learned from FM1 and FM2 used to make modifications to FM3/FM4
  - Minor modification to lens assembly to mitigate stray light
  - Component value changes to camera electronics to reduce saturated pixels at high illumination
  - Several minor modifications that do not impact performance
    - Improved startup sequence for Loop Heat Pipe
    - New alignment cube material and attachment design
- Remainder of instruments identical to FM1 and FM2

Stray Light Mitigation Design Change

Stray light mitigation applied black coating to inner radius of Lens element 7 to reduce internal reflection at edge of lens

Surface located at base of gap between lens element and Lens Retainer



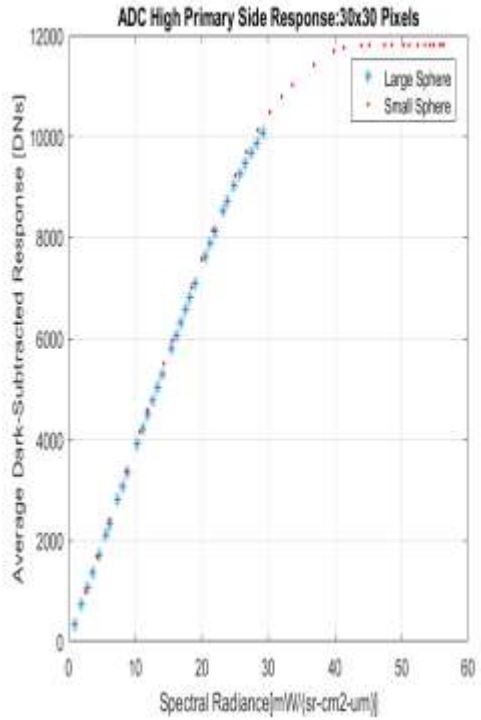


Gain and Overshoot Design Change

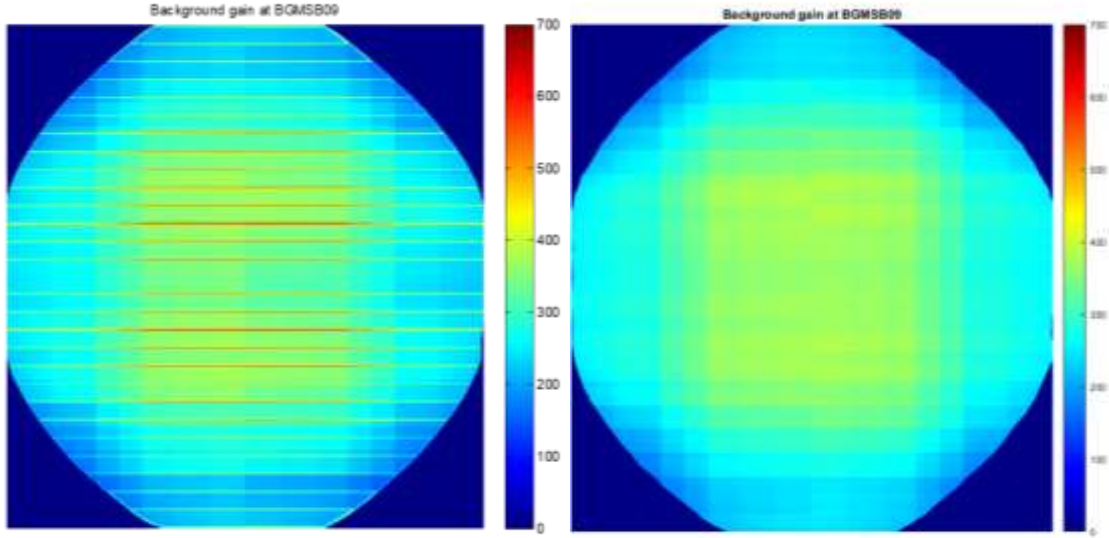
- FM1/2 experiences saturated pixels at brightest background illumination
  - Higher than expected gain (DN per µJ/sr-m^2)
  - Overshoot at high contrast boundaries
  - “First Pixel” Overshoot
- Design modifications implemented on FM3/4
  - Changed component values in video electronics to reduce gain
  - Changed CCD bias voltages to reduce overshoot
    - Unexpected impact on linearity
    - Not as severe as reported at last year’s meeting

Design Change Results

Response Compression
at High Illuminations



Reduced Overshoot



FM2 FM3