CERES and EarthCARE BBR Intercomparison Opportunities

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NASA Langley Research Center

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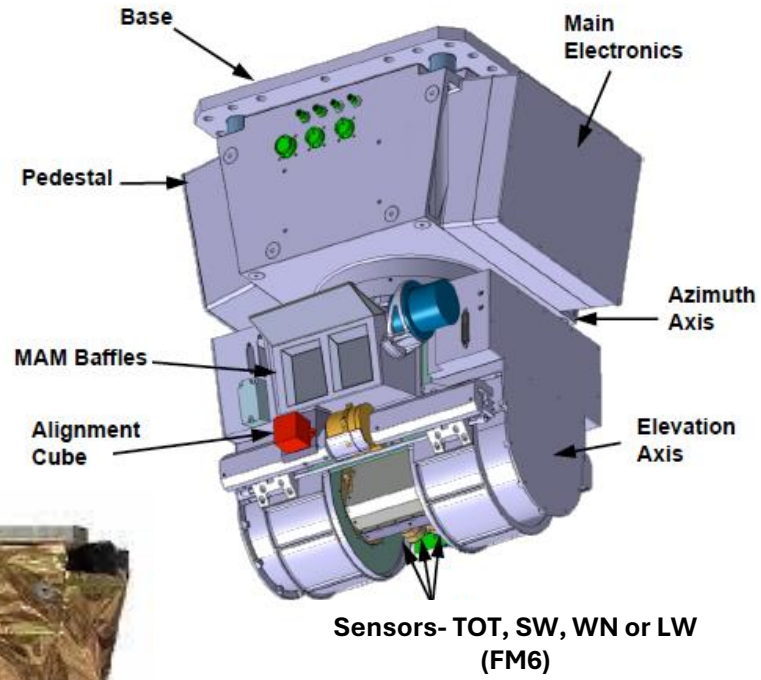
**This talk will focus on the CERES FM6 instrument aboard the NOAA-20 spacecraft*

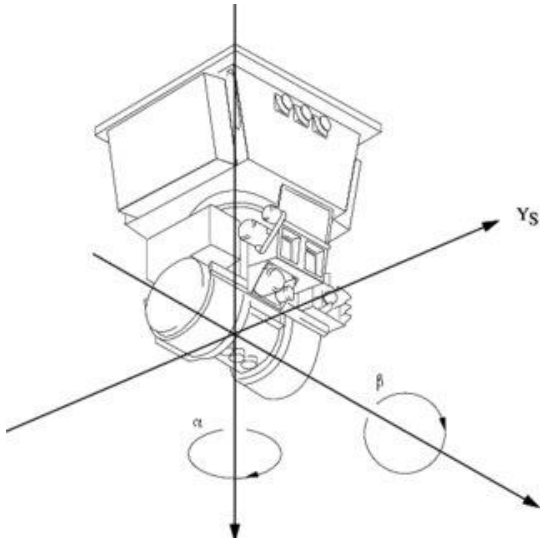
CERES Instrument (FM6)

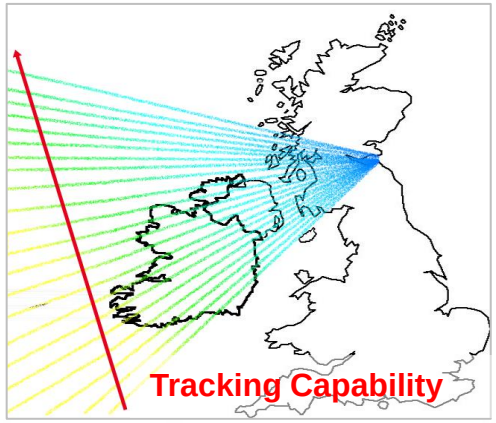
- 3-Channel Scanning Broadband Radiometer
  - Total Channel [0.3 – 200 μm]
  - Longwave Channel [5 – 35 μm]
  - Shortwave Channel [0.3 – 5 μm]
- Footprint Size: 1.3° x 2.6° hexagon
  - 24 km FOV at nadir
- 6.6s Scan Rate
  - Space Look
  - Earth Limb
  - Scan Across Earth to opposite Space Look
  - Internal Calibration
  - Repeat Back to Original Position
- 824 km orbital altitude
- 13:30 MLT equatorial crossing time

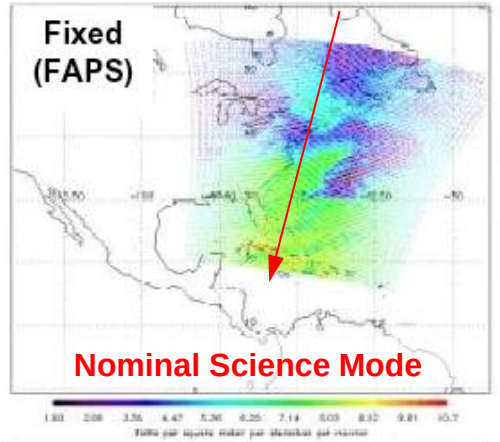


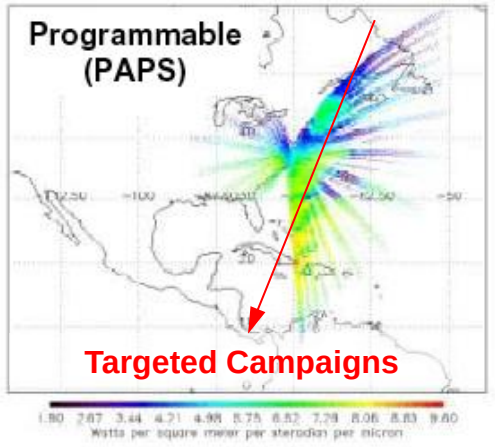
CERES Operations

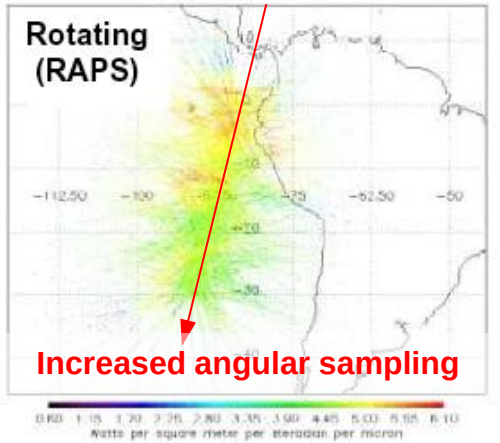
- Three Scan Modes:
- Crosstrack – Elevation scan perpendicular to flight path
- Biaxial – Elevation and azimuth scan simultaneously
- Targeted – Set azimuth and elevation angles to scan targets





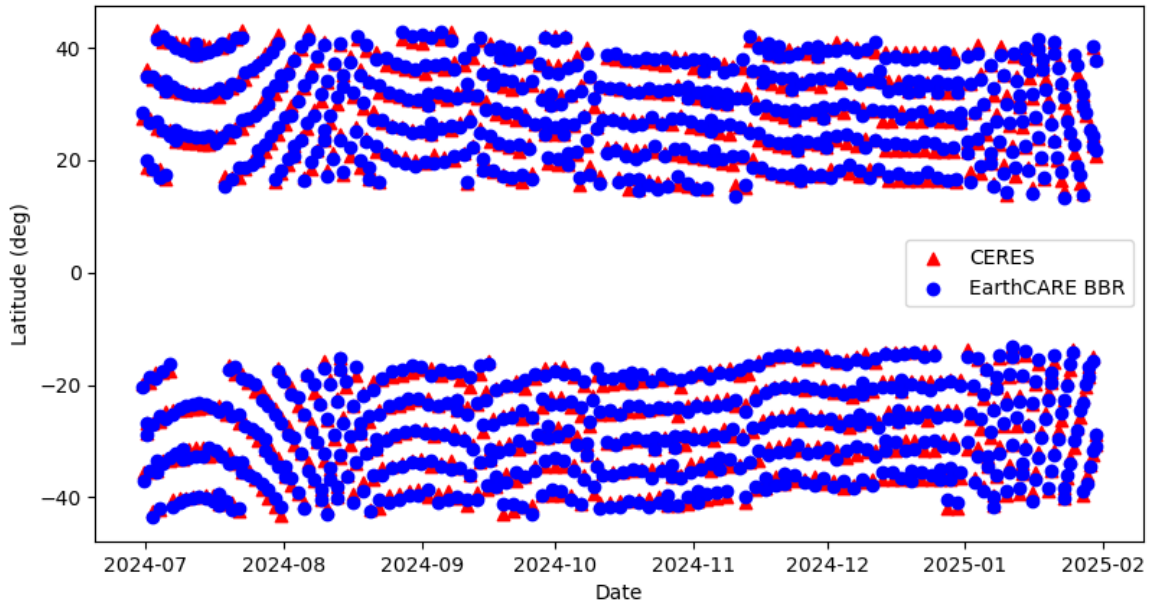


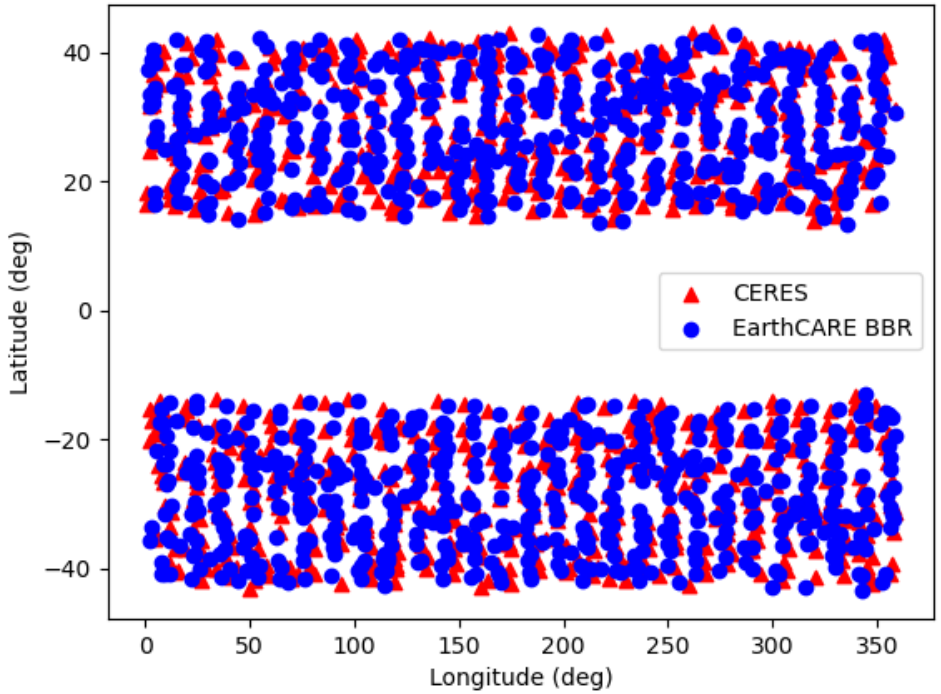




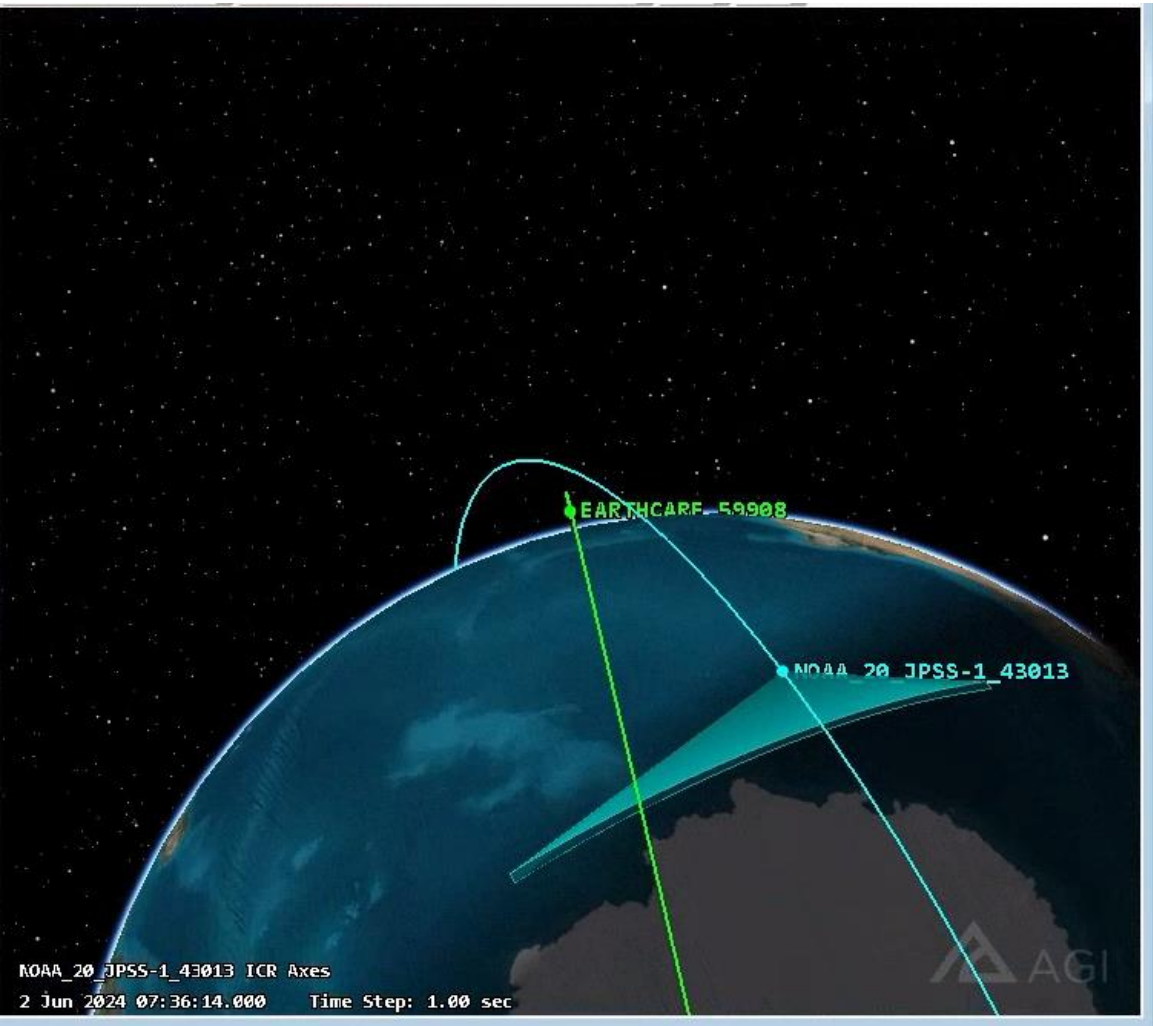
CERES/EarthCARE BBR Overlaps

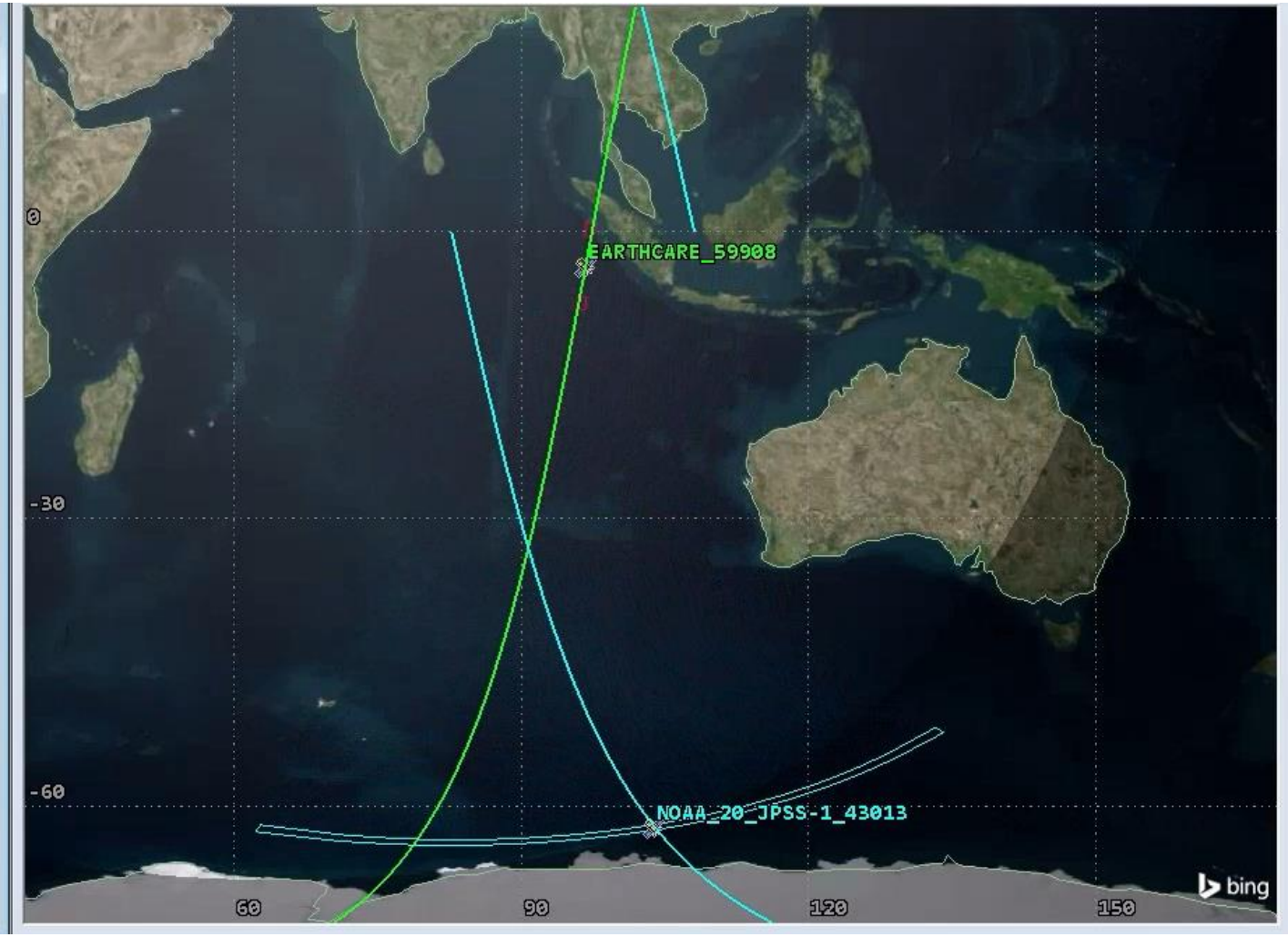
- EarthCARE and CERES have frequent orbital crossings between +/- 12 – 43° latitude
- Footprint matches show excellent longitudinal coverage
- Current matching criteria:
  - <1° ΔLatitude
  - <5° ΔLongitude





CERES/EarthCARE BBR Overlaps





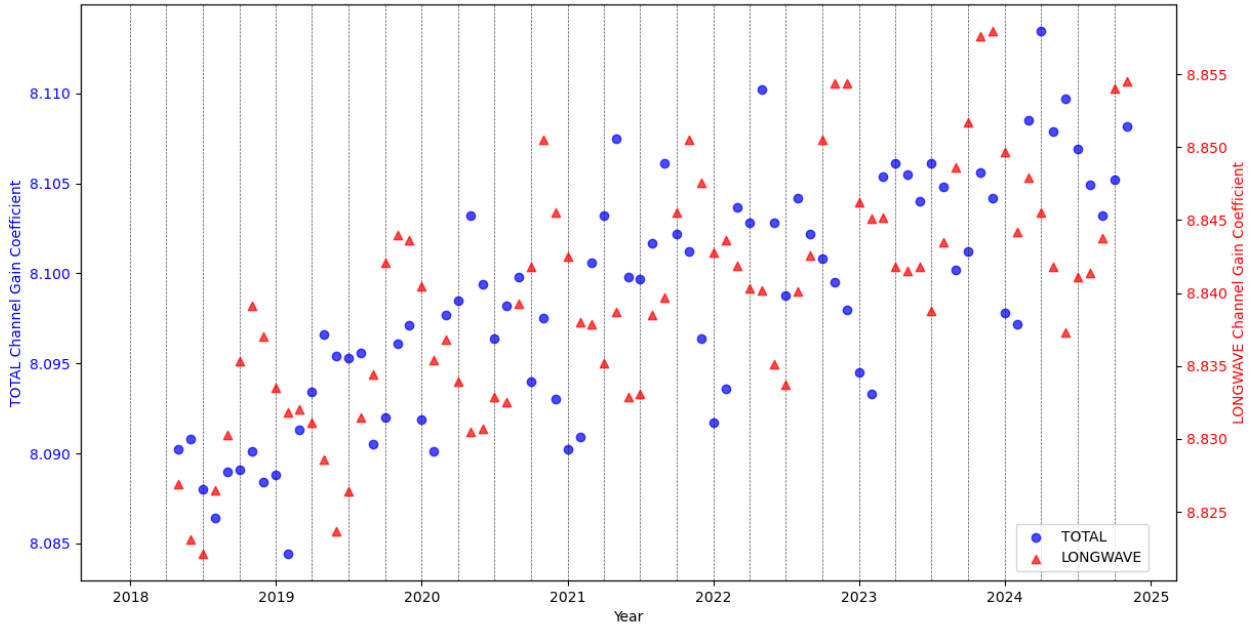
CERES FlashFlux Data Product

- CERES instrument calibration coefficients are updated monthly and used in the SSF product
- FlashFlux team is given radiometric gains and spectral response functions (SRFs) by instrument working group every quarter
- FlashFlux data may not be representative of the most up-to-date gains when using NOAA-20 data but will have accurate SRFs

$$I_f = \int_{\lambda=0}^{\infty} S_\lambda I_\lambda d\lambda = \frac{\text{Counts}}{G}$$

CERES Unfiltering Equation

Monthly gain coefficients for CERES FM6 (NOAA-20)

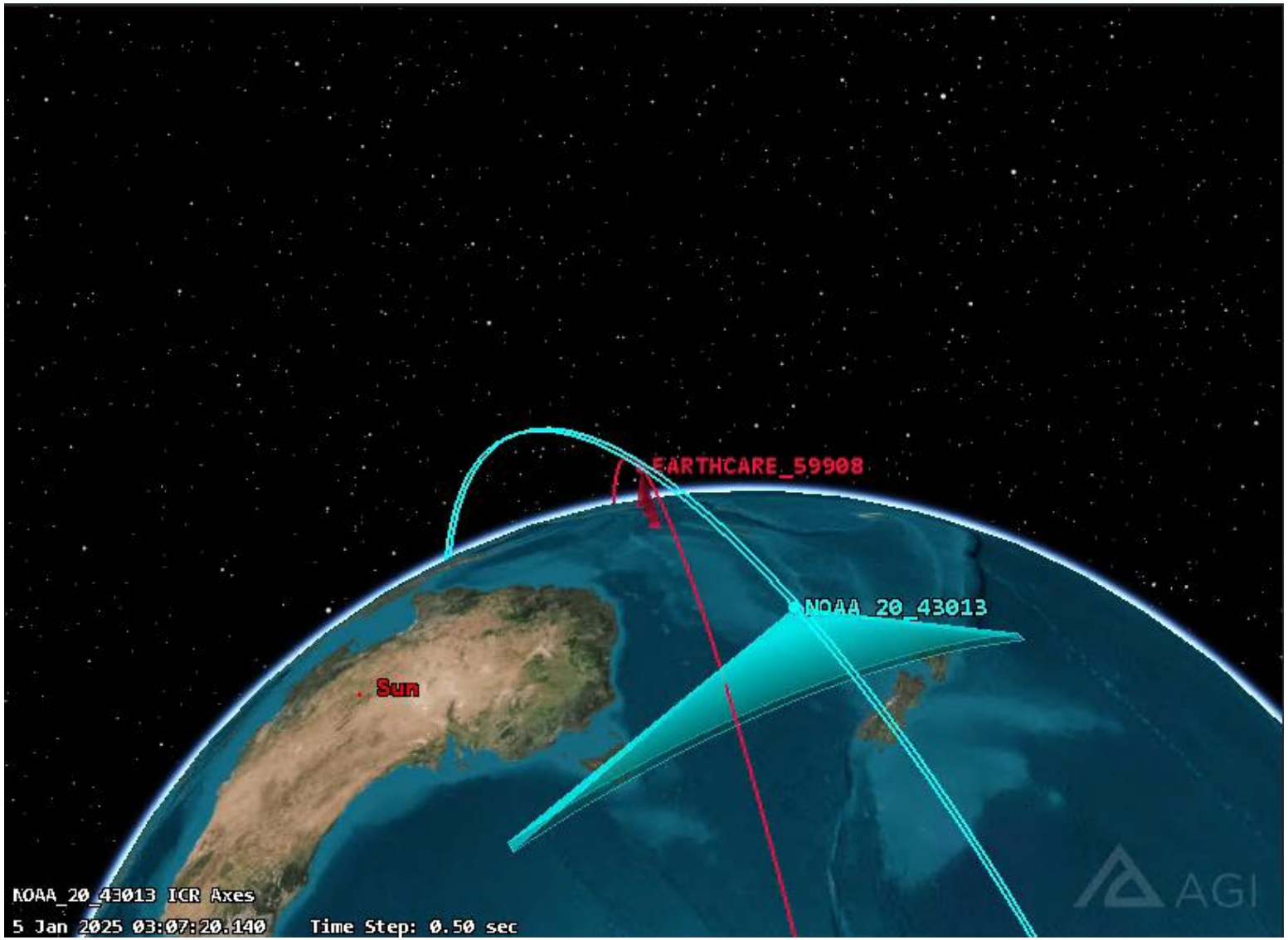


Summary

- CERES FM6 and EarthCARE BBR have ample opportunities for crossover and intercomparison
- CERES FM6 can gimbal in azimuth to match EarthCare BBR scan angle for better footprint and angular matching
- Currently working on better matching criteria for best footprint overlap
- CERES FlashFlux product is fine to use, but SSF product will have MOST accurate data

BACKUP SLIDES

BACKUP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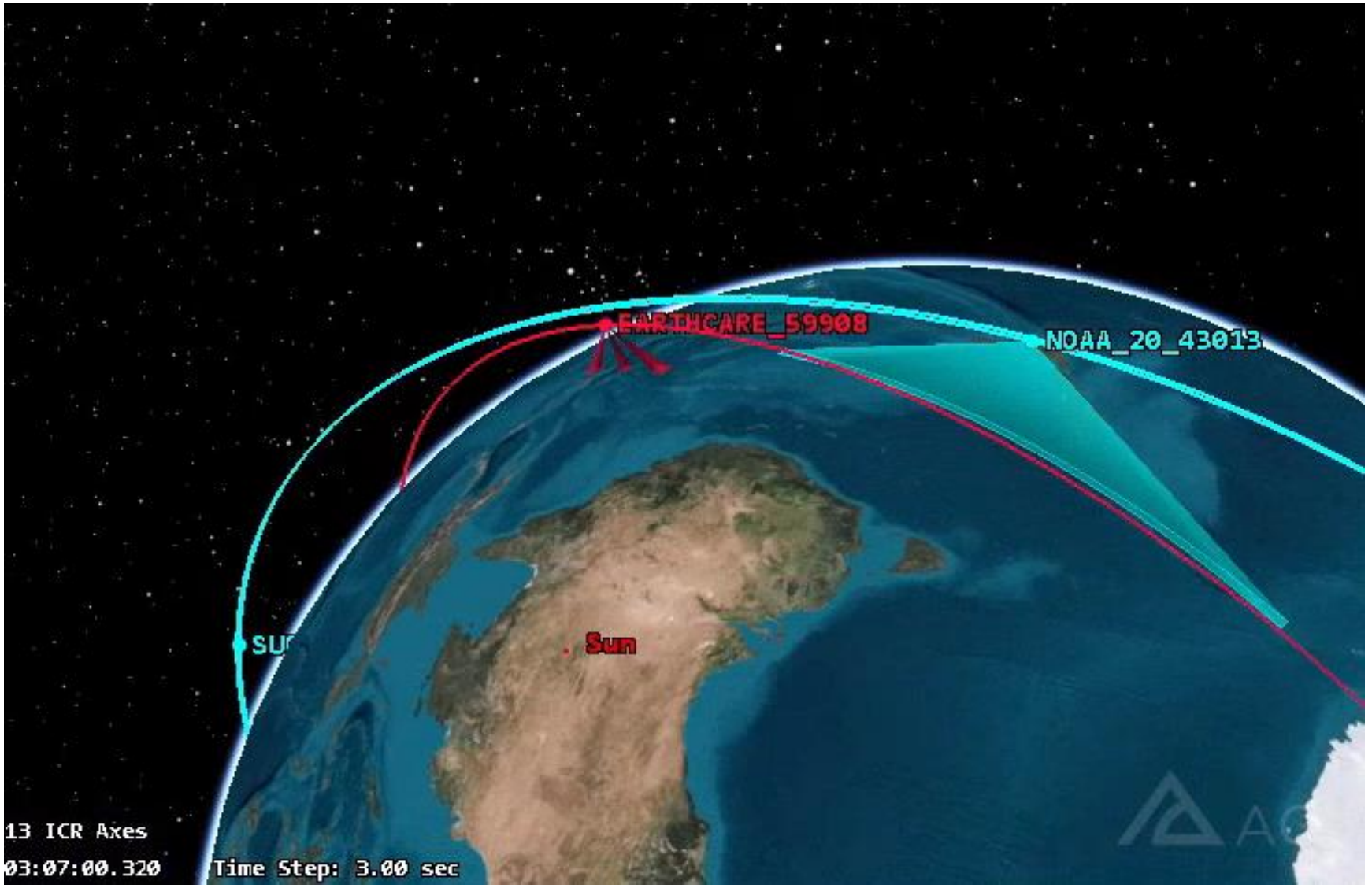
BACKUP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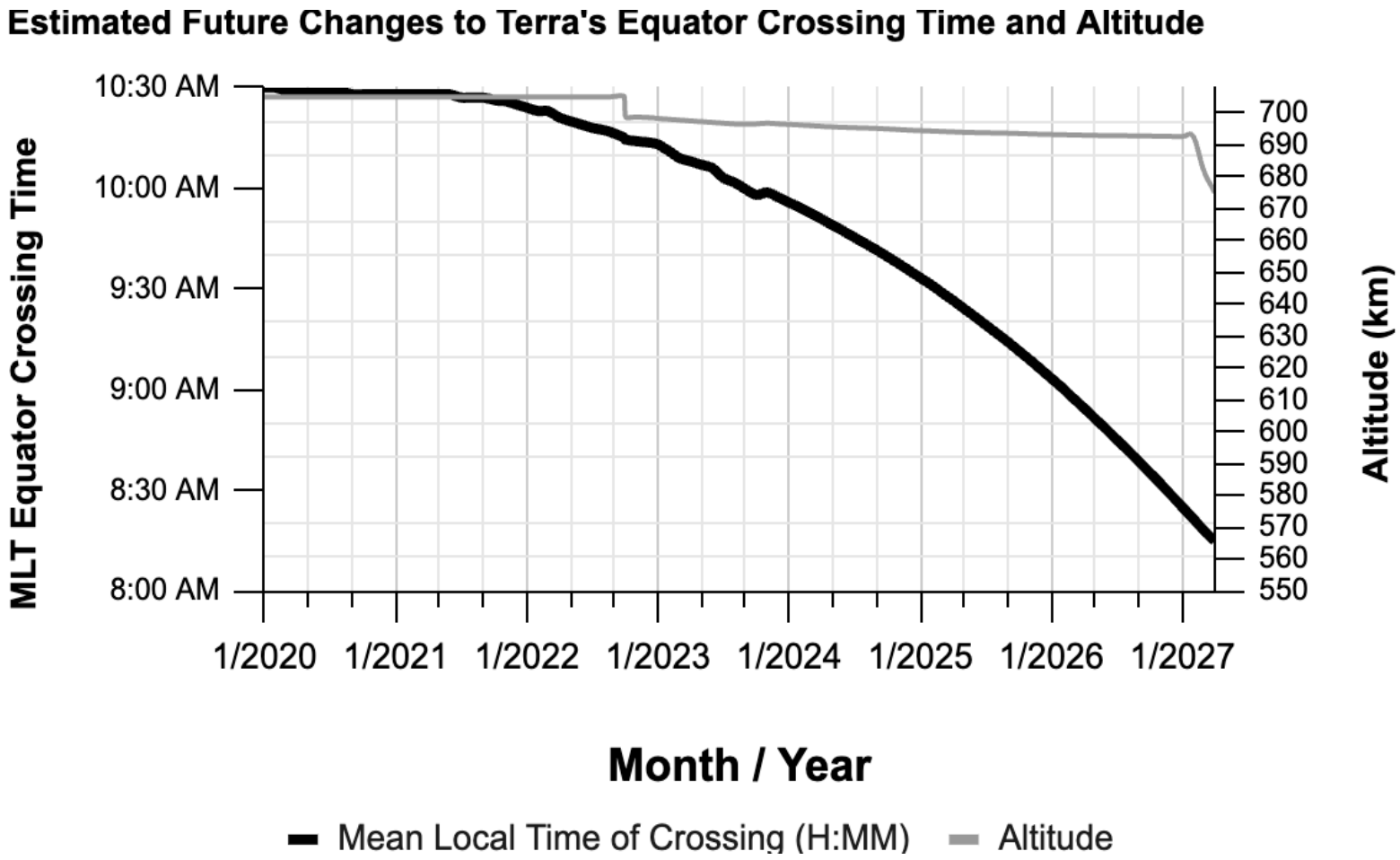
BACKUP

- Terra Orbital Drift



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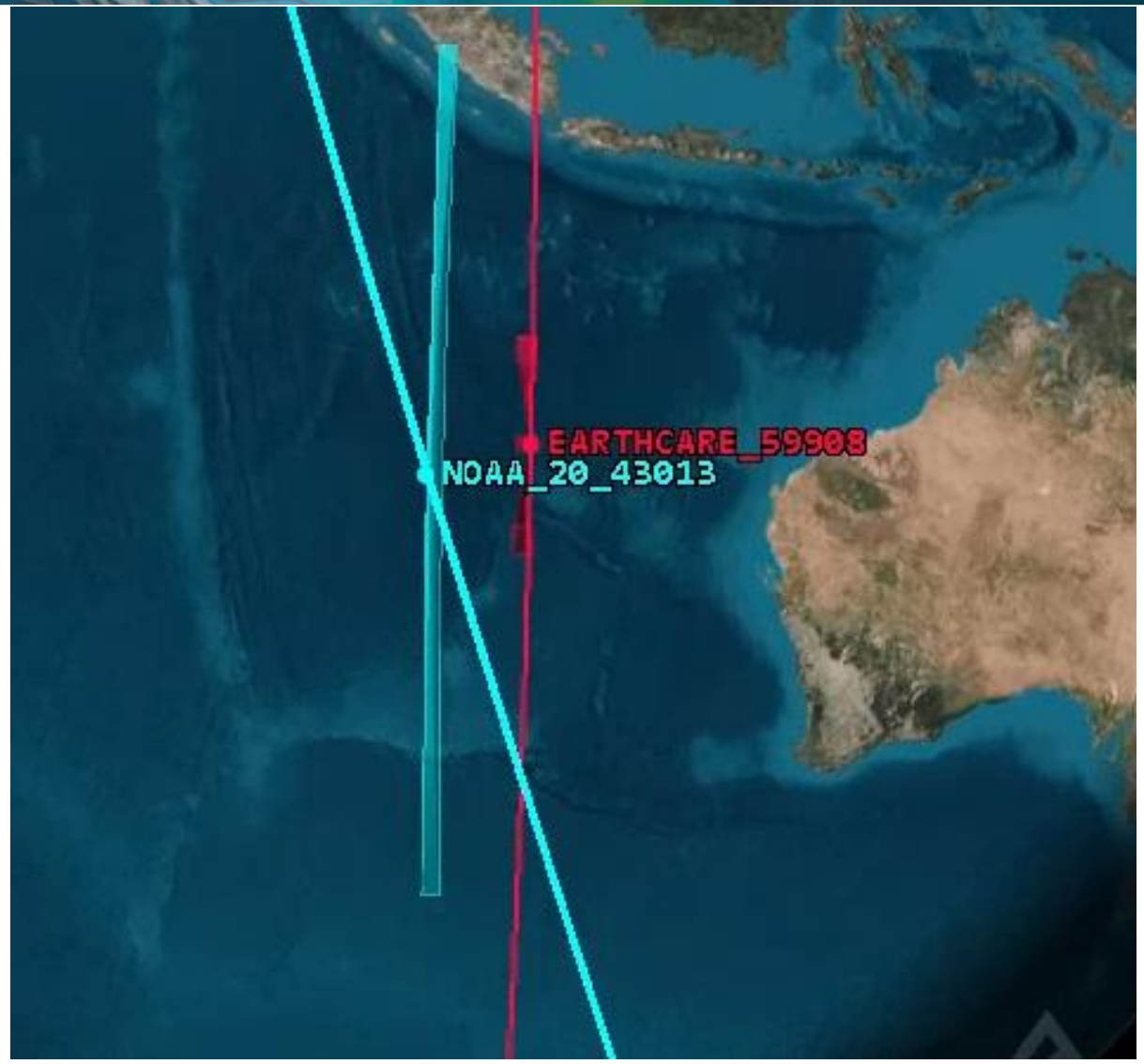
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