

# MTG LI System commissioning: geometric performance assessment

9<sup>th</sup> LI-MAG

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# outlines

- LI navigation requirement
- INR process
- On-ground performance assessment
- In-flight performance assessment
  - Satellite commissioning
  - System commissioning

# LI navigation requirement

- [EURD] LI-06140:

The absolute value of the LI absolute sample position knowledge error (ASPKE) evaluated over the complete Full Disc Coverage (FDC) shall be less than 4 km (112  $\mu$ rad) at SSP, at a 99.73% confidence level.

- Applies to the worst-case day/time
- 3-sigma statistic is calculated over the full FOV
- Level-1b requirement

# INR: Image Navigation and Registration

- Process of assigning lat/lon coordinates to the events and the background pixels during the Level-0 to Level-1b processing.
- TAS-F have developed an algorithm relying on a Kalman filter.
- It estimates, for each background image, the LI State Vector:
  - Orbit
  - Platform pointing
  - Four OCs pointing (including alignment and TED: thermo-elastic deformations)
  - Other geometric parameters
- On the basis of the observables:
  - AOCS
  - Satellite ranging
  - LI Landmarks (daytime only)
  - Inter-OC registration (daytime only)
  - FCI Landmarks and FCI stars
- In addition, a geometric calibration profile is applied to capture the night-time TED

# On-ground performance assessment

- The LI ASPKE performance is established in the frame of MTG-I CDR on the basis of
  - Platform Fine Pointing Mode model
  - Platform and LI TED simulations
  - Micro-vibrations models
  - LI optical model
  - INR ground processing emulator (INR tool)All models are correlated with equipment HW test results
- The final on-ground estimate is not yet available as the re-design of the LI structure is being fed back into the assessment.
- We expect the night-time compliance to be very hard to achieve in the current setup.
  - Reason: lack of landmark observations as the Sun enters/leaves eclipse (high thermal load)
  - Mitigation: the tuning of the geometric calibration profile using stars is being explored with ESA/TAS

# In-flight performance assessment: space segment

- During Satellite commissioning: ESA/TAS will establish the performance of the satellite + IQT (Level-1 prototype processor).
- Approach: use landmarks not ingested in the INR as observables (day-time only)
- Use of stars during commissioning for INR performance assessment is under discussion

# In-flight performance assessment: System

- During System commissioning: EUM will establish the performance of the satellite + IDPF-I (Level-1 operational processor).
- Approach:
  - Use of landmarks (with both IDPF-I and EUM independent geometry monitoring tool PIQMICS): day-time only
  - LI-to-FCI co-registration: day-time only (LI-STAR)
  - Match-ups with lightning ground networks: day and night, accuracy? (LI-STAR)
  - Night-time star acquisitions: if agreed with ESA/TAS (Reference Processor)
  - Monitoring of INR observables (PIQMICS), breadboarding of the Kalman filter for tuning (Reference Processor)...