MTG LI procurement status, expected performances, & commissioning plan

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12th MTG LI Mission Advisory Group

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LI Development Status

Development models

- *OC VM (Verification Model) → test campaign successfully completed, TRB held on August 20th*
  - FPA/FEE mechanical qualification vs. shock successfully achieved last July
  - Thermal cycles after shock + final electrical and functional health checks → ok
  - OC VM sequence completed.
  - Cold start-up to be completed at LI level

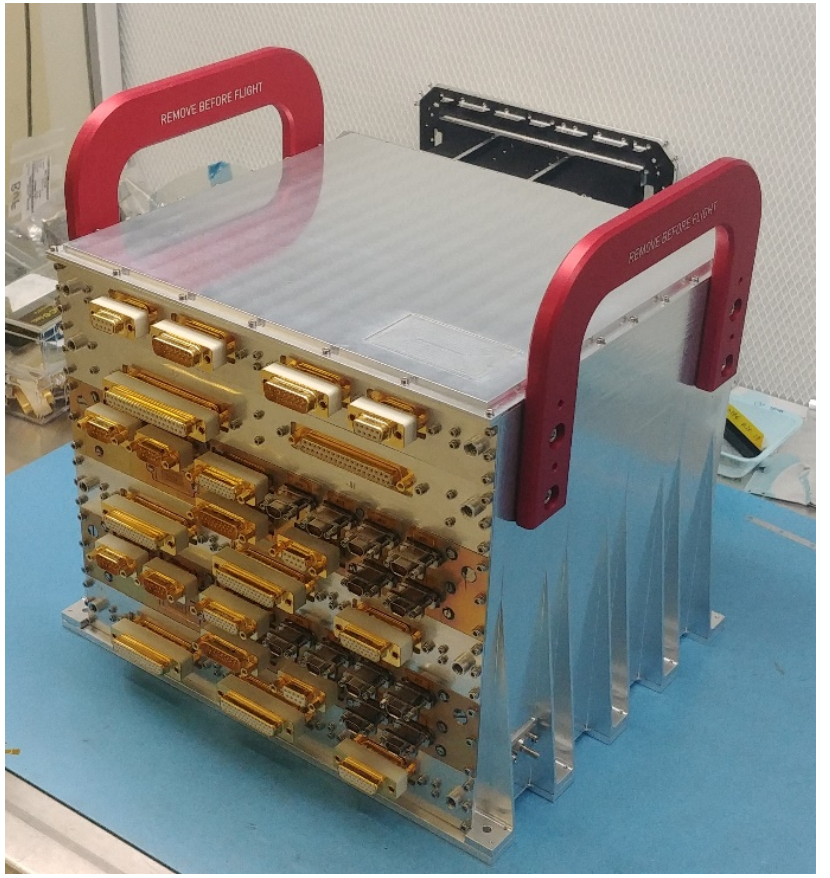
- *EM → investigations on LOH functional issues + FCV + ESD*
  - EM used for investigations vs. ASIC-FPGA IF errors
  - FCV (part on EM) completion planned in Nov. (TBC due to planned ASW modifications)
  - ESD on LME EM and FPA/FEE EM planned at the end of FCV i.e. likely in Dec.
  - EM remains available for ASW development

LI Development Status

LME

- *LME PFM*
  - Delivered to TAS for the hybrid satellite testing
  - Returned to LDO in July
  - Being used by LDO for completion of LI PFM testing
    - ✓ EMC, FCV, TVAC
  - To be refurbished for LI FM2

- *LME FM2*
  - Delivered to TAS early August
  - Integrated on MTG-I PFM platform

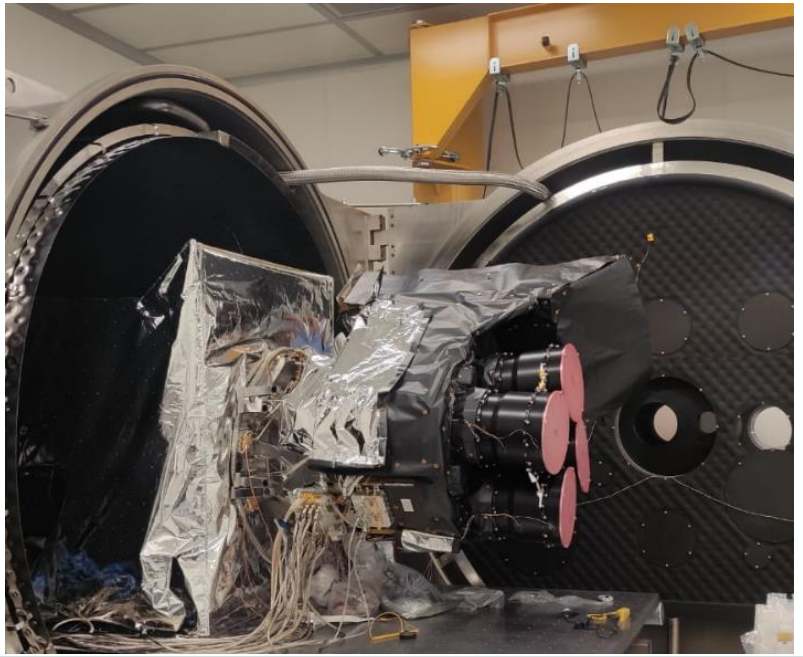


LME FM2integrated and electrical test completed - courtesy Leonardo

LI Development Status

LOH PFM

- *Delivery planned late November 2021 – in time for TAS needs (re-ordered AIT sequence at MTG-I level)*
  - Assembly/Alignment completed in 2020
  - Mechanical tests completed January 2021
  - Thermal balance completed April 2021
  - Characterisation/calibration tests almost complete (see later slides)
  - Significant effort investigating anomalies



LOH PFM mounted in the calibration set-up - courtesy Leonardo

LI Development Status

LI PFM

- Remaining tasks
  - Completion of EMC
    - ✓ Most EMC completed in August
    - ✓ Minimal essential testing remains
  - Thermal vacuum testing
    - ✓ Thermal plus functional (end to end)
  - Testing with OGSE-S
    - ✓ Reference test for satellite level LI functional test
  - ASW update!
  - Delivery of LOH
    - ✓ Late November 2021

LI Development Status

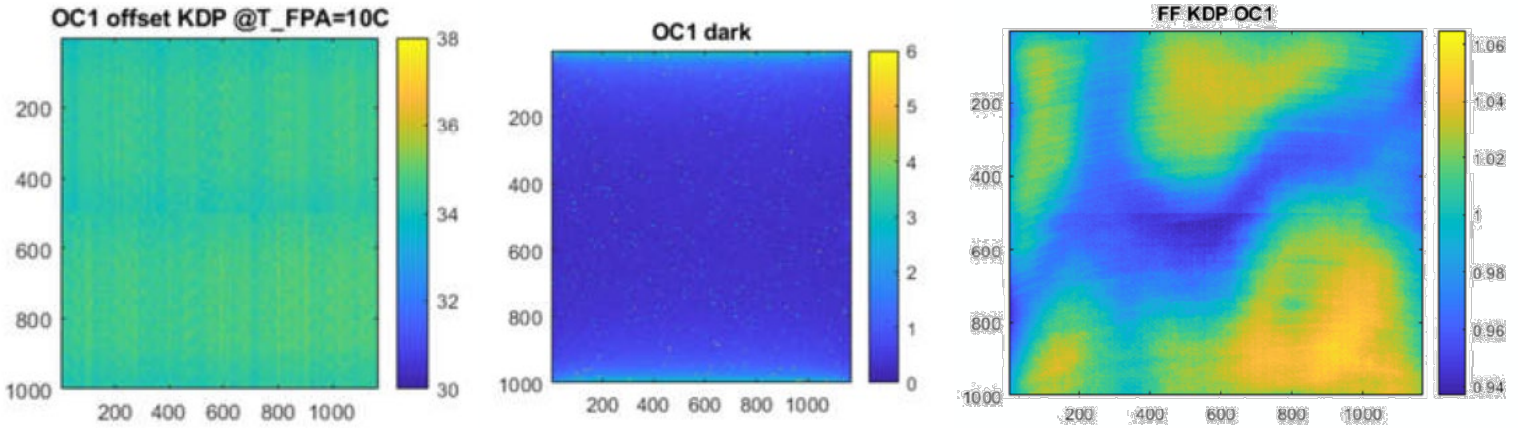
LI FM2

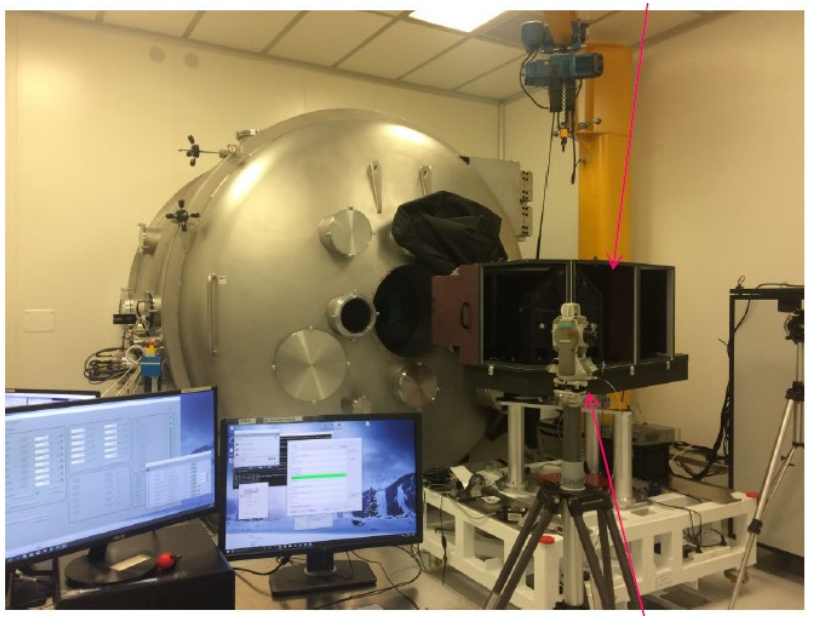
- LIPP#2 ASIC for LI FM2
  - Design progressing well
    - ✓ CDR completed
  - World semiconductor supply issues causing significant delay in procurement
    - ✓ New flight ASIC available July 2023
    - ✓ Significant delay to LI FM2
    - ✓ Currently not delaying MTG-I FM2

LI PFM on-ground C&C test campaign

LI PFM on-ground C&C test campaign almost finished; Test Review Board foreseen end October

- Pure radiometric tests occurred successfully in Jun/Jul21 => *measure parameters used for data processing*
  - Offset, dark current, geometry, absolute radiometry, flat-field
  - Straylight test:
    - ✓ In-field straylight is coherent but with lower scattering and ghost amplitude than predicted by straylight model





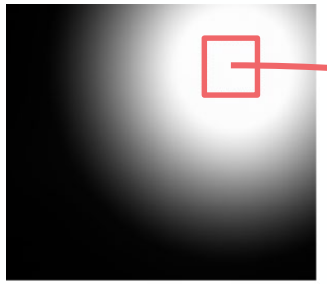
Geometric Test set-up

- ✓ Results are very similar to the measurements done at detector level and repeatable

LI PFM on-ground C&C test campaign

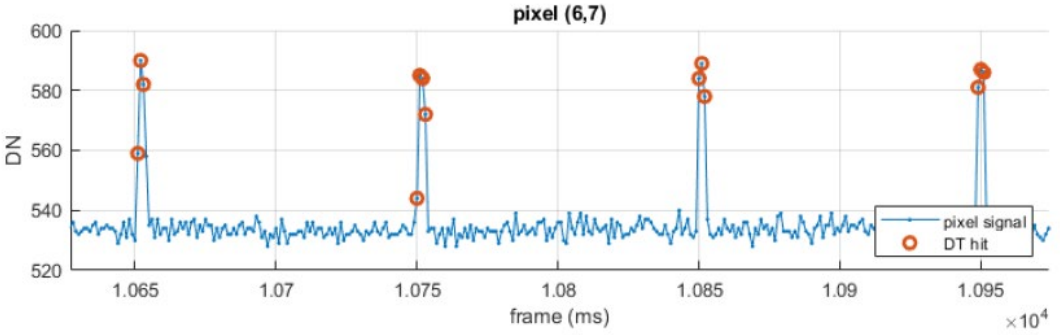
LI PFM on-ground C&C test campaign almost finished;

- Lightning-related tests (FT, DP, IADP) on-going => *generate data for E2E performance simulator correlation*
  - FT & DP (constant background; large blinking pulse superposed on constant background) done for all OCs



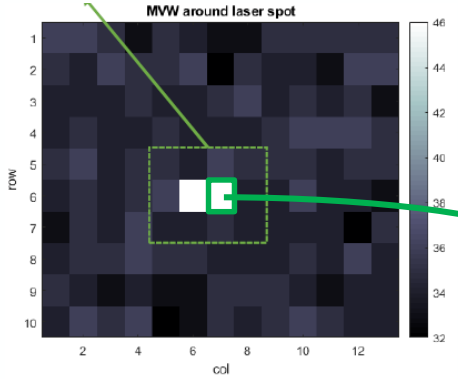
Constant uniform background in the red rectangle

In DP test, a blinking pulse is superposed on top of the red square

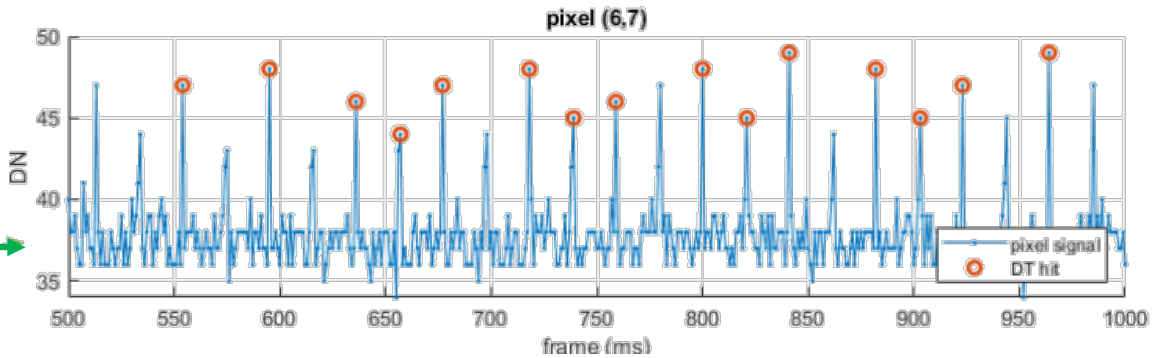


Laser blinking over time is measured by the LI pixel; LI trigger DTs (orange)

  - IADP (blinking laser simulating a small pulse) tests done on all OCs



Laser spot centred on two pixels



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LI performance

- No changes to the expected performance since last LI MAG
- LI E2E performance simulator will be correlated to the recent measurements from the LI PFM on-ground C&C test campaign in the coming weeks
- Correlated LI E2E performance simulator will then be used to predict final ‘before launch’ expected performance status

LI commissioning

- Foreseen activities can be divided into the following steps:
    1. First activation: switching on the instrument for the first time
    2. Tuning: correlate hypotheses taken in E2E performance simulator to in-flight conditions
    3. Calibration: measure radiometric parameters (in-flight status) and optimise geolocation (INR) parameters
    4. Performance verification: check that the LI meet the required performance
- Delivery of final L0-L1 ground processor (IQT) used for space segment commissioning purpose foreseen in Q1/2022 implementing the full LI processing (events, background image & calibration data)
- Discussions on scope and operational details of activities are ongoing between all parties to prepare the 6-month space segment LI commissioning.