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TAKING THE PULSE OF OUR PLANET FROM SPACE

Meteosat Third Generation (MTG) Space Segment Development Status

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MTG Space Segment current development Status

- **Introduction**
  - After more than a decade in development the dream of the MTG Programme is finally coming to fruition with the first launch of the MTG-I1 satellite scheduled for Q4/2022
  - This presentation provides a brief overview of the ESA MTG Space segment programme and development status of both the MTG-I and MTG-S satellites and their state of the art instruments
  - This presentation is complemented by three others which summarise the predicted and measured performances for the key MTG instruments, as follows;
    - FCI Development Status and Performance expectations *(D Aminou)*
    - LI Development Status and Performance expectations *(P Kokou)*
    - IRS Development Status and Performance expectations *(F Carbó, OHB)*
  - Eumetsat will present the status of their System and Ground segment developments, including Satellite(s) command and control, data reception, processing and dissemination to Users
  - From these you will see that the MTG Programme will ensure state of the art Operational Meteorology, from Geostationary Orbit, for more than 20 years to come

MTG Space Segment current development Status

The overall MTG Programme is undertaken in the frame of a cooperation agreement between ESA and EUMETSAT

The ESA MTG Programme relates to;

- *the design, development and procurement of the MTG Space segment upto and including Level 1 Prototype Processors*
- *a single ESA procurement for all **6 satellites** (4x MTG-I, 2x MTG-S), (recurrent satellites implementation and storage funded by EUMETSAT).*

The EUMETSAT MTG Programme includes;

- *the compilation of User Needs and definition of Mission Requirements*
- *the design, development and procurement of the MTG System and Ground Infrastructure required for:*
  - *Satellites in-orbit operation and monitoring*
  - *Meteorological data reception, data processing and dissemination to users*
  - *Routine operations of the MTG system for >20 years*
- *procurement of Launcher and LEOP services*

Evolution of the Meteosat family

1977 — MOP/MTP

Observation mission:
- MVIRI: 3 channels

Spinning satellite
Class 800 kg
Data rate; ~850 Kb/s

2002 — MSG

Observation missions:
- SEVIRI: 12 channels
- GERB

Spinning satellite
Class 2 tonnes
Data rate; ~2Mb/s

2022 and 2024 — MTG-I, MTG-S

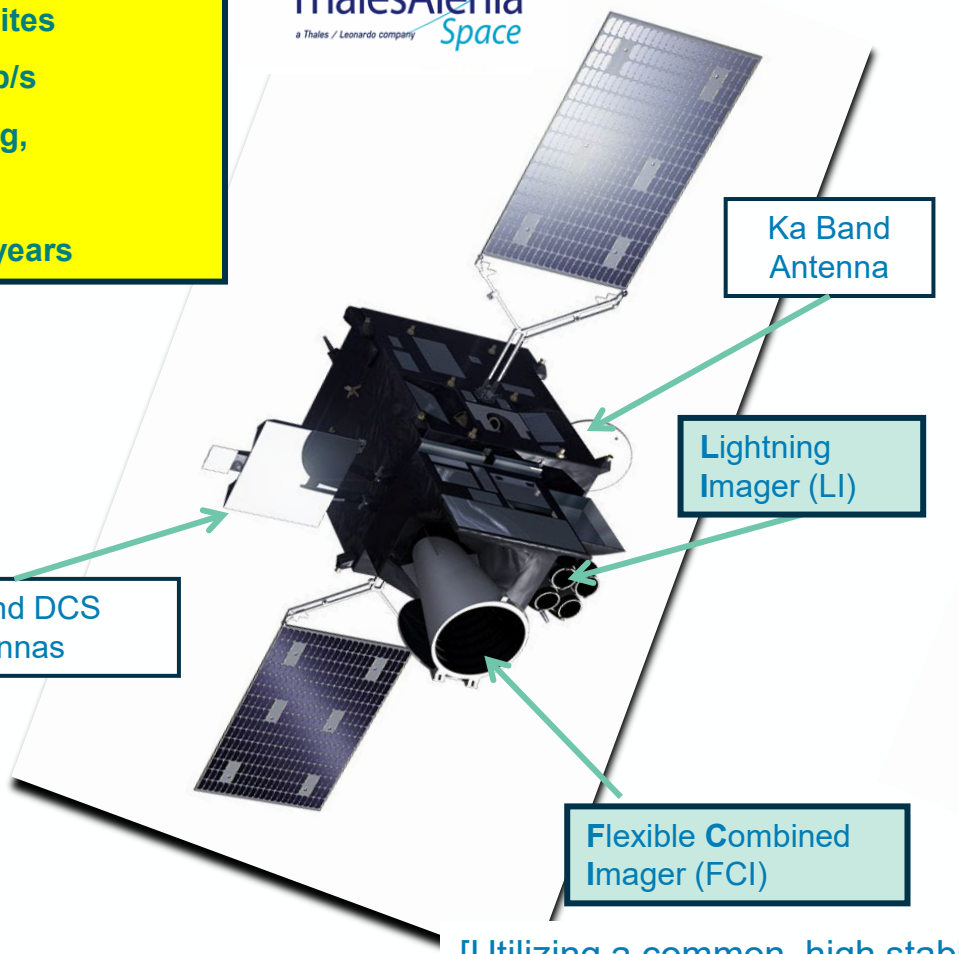
Observation missions:
- FCI: 16 channels
- IRS: >1700 channels
- LI: 1 channel at 777.4 nm
- S4/UVN (via Copernicus)

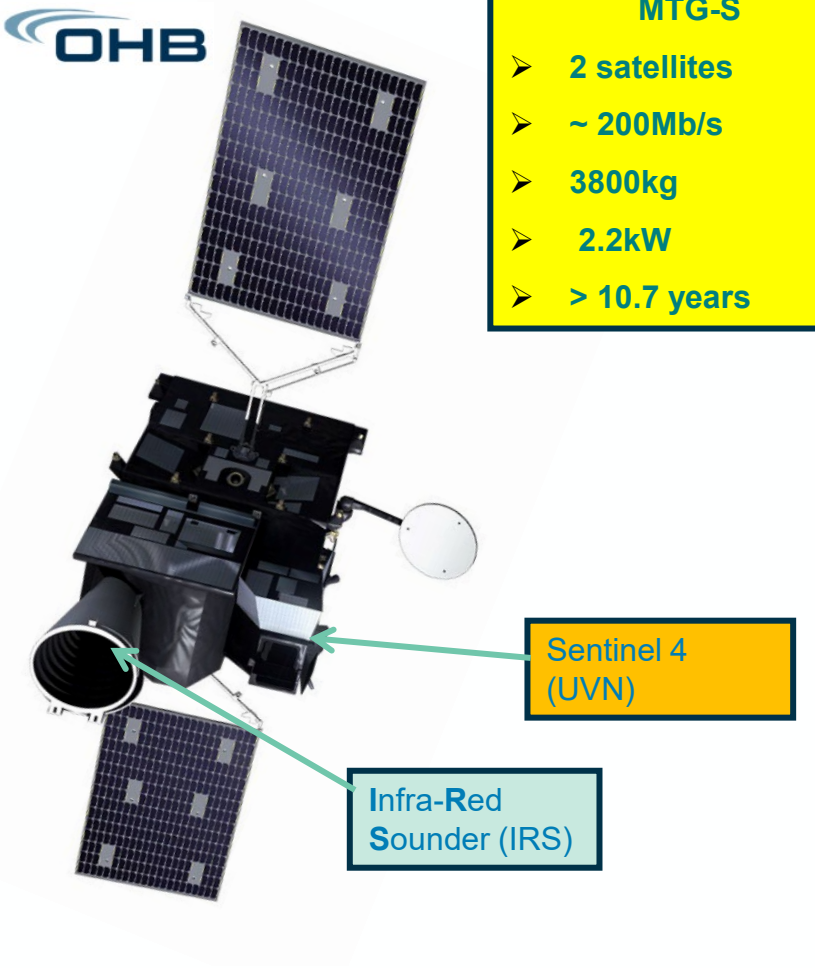
3-axis stabilised satellites
Twin Sat configuration
Class 3.6 – 3.8 tonnes
Data rate; upto 200Mb/s

The Meteosat Third Generation Satellites

MTG-I

- 4 satellites
- ~200Mb/s
- ~3600kg,
- 2.2kW
- > 10.7 years



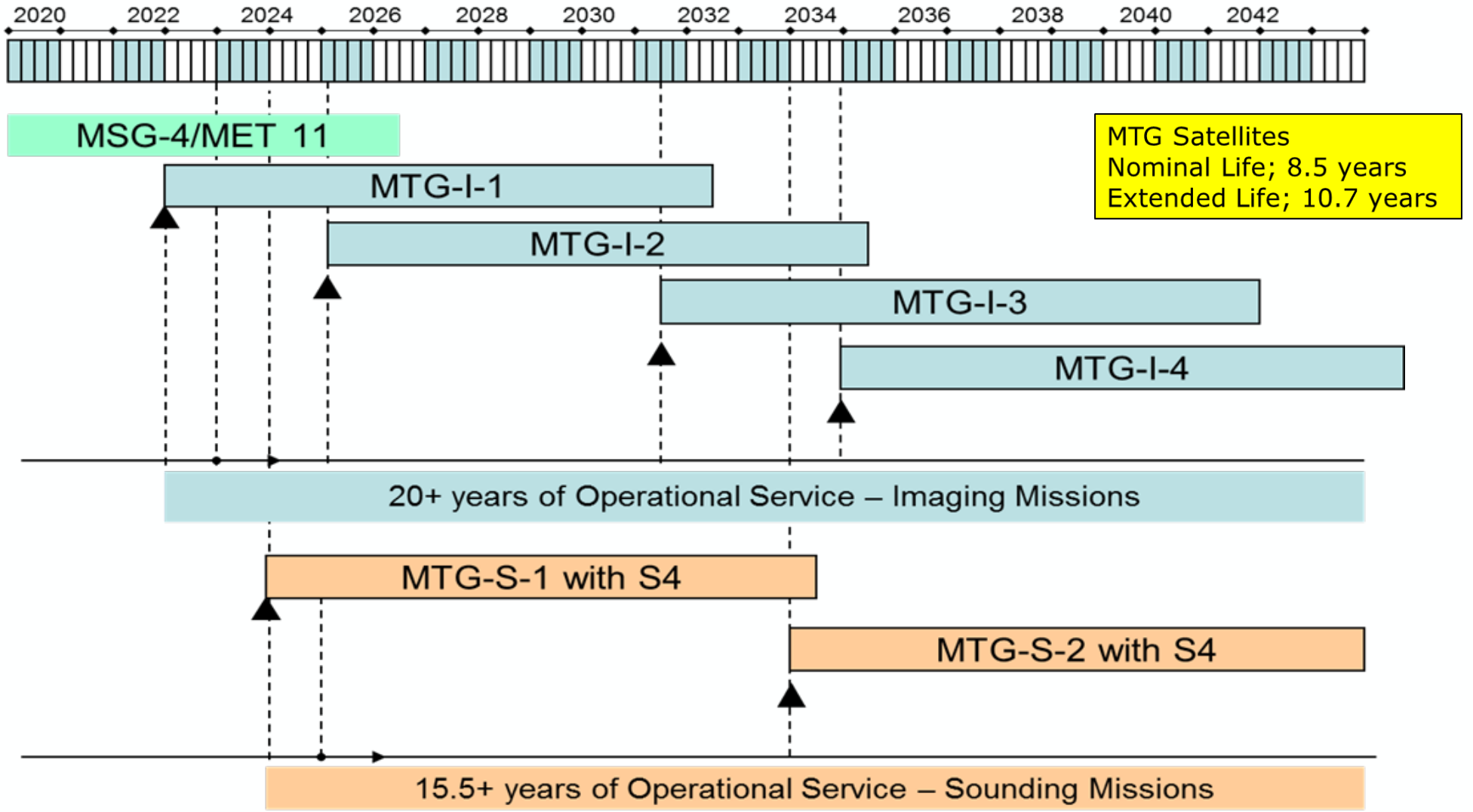


MTG-S

- 2 satellites
- ~ 200Mb/s
- 3800kg
- 2.2kW
- > 10.7 years

[Utilizing a common, high stability GEO Platform]

MTG Space Segment Deployment sequence (typical)



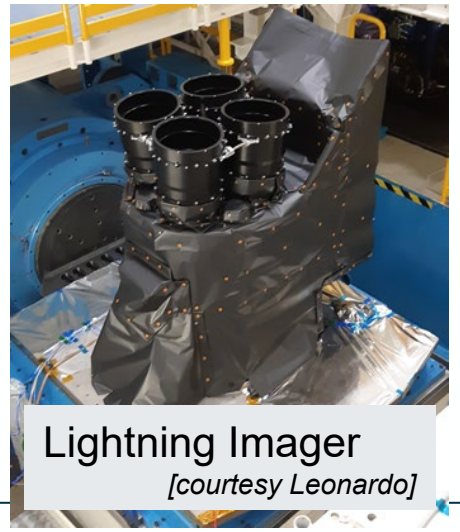
MTG Space Segment current development Status

- **MTG-I-1 Protoflight satellite;** on track for launch in late 2022
  - ✓ **Common Platform** (including satellite control software); available for satellite integration
    - ✓ complete including devolved instrument electronics integration and system functional testing
    - ✓ System Validation Testing (SVT) with EUMETSAT and Telespazio control centres well advanced
  - ✓ **Flexible Combined Imager (FCI);** integrated on the MTG-I1 satellite
    - ✓ Instrument level testing including functional, performance and environmental successfully completed
  - **Lightning Imager (LI);** Integrated on the satellite final functional testing on-going
    - Main electronics (LME) delivered to TAS-F and integrated into the platform
  - **Satellite; residual activities** FCI and LI now mounted on PFM Platform; next steps
    - *March – July 2022;* Final Satellite Functional Testing (including final SVT)
    - *August 2022;* EMC/CATR Testing
    - *July – September 2022;* MTG-I Qualification Acceptance Review
    - Late September shipment to Kourou
    - **Q4 2022; Launch Campaign, Launch and LEOP for MTG-I-1 Satellite**
    - Space segment Commissioning then will take ~ 11 months

Less than 6 months to MTG-I-1 completion and readiness for launch

MTG-I-1 Protoflight Hardware

Flexible Combined Imager
[courtesy TAS-F]

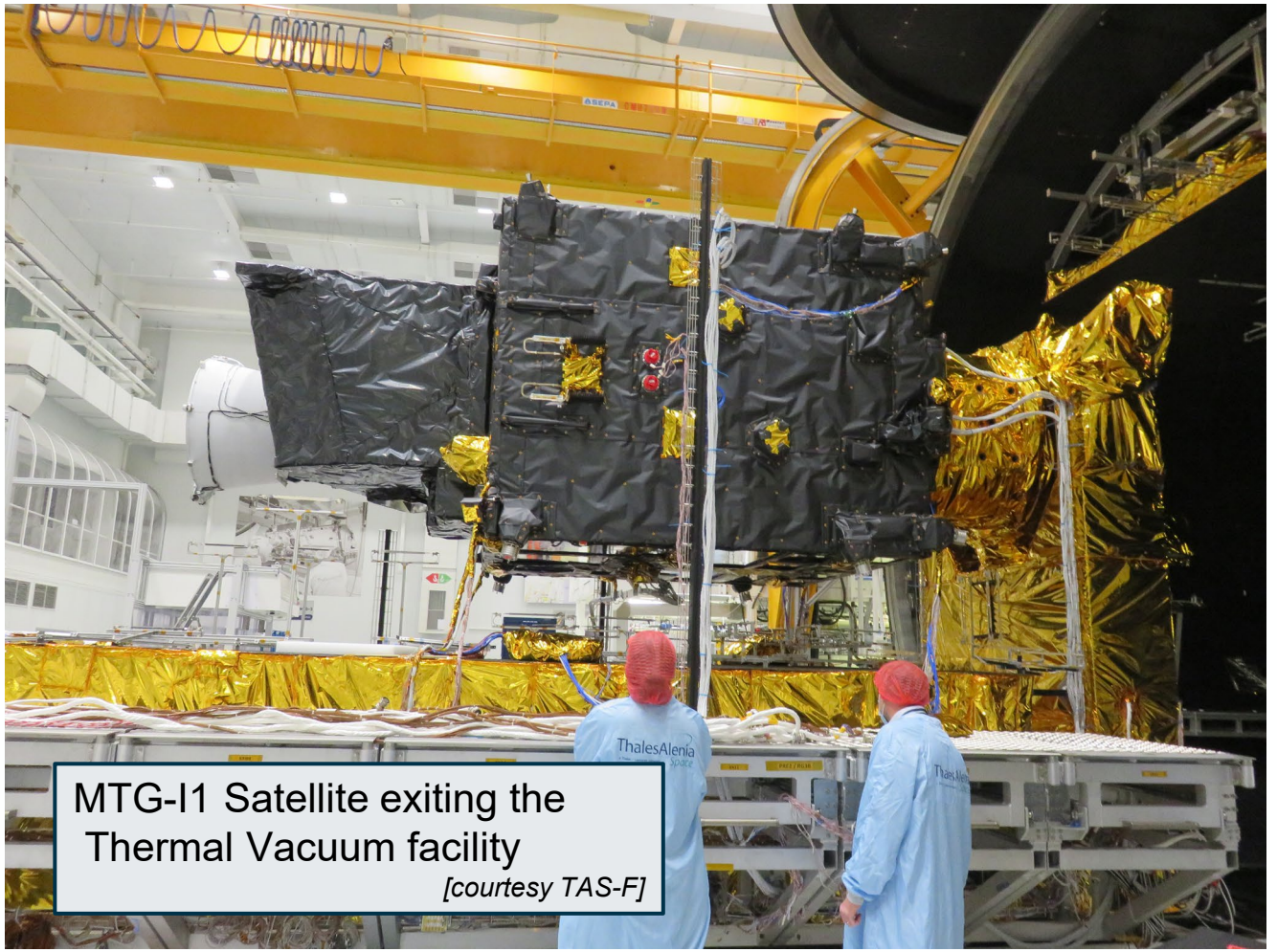


Lightning Imager
[courtesy Leonardo]

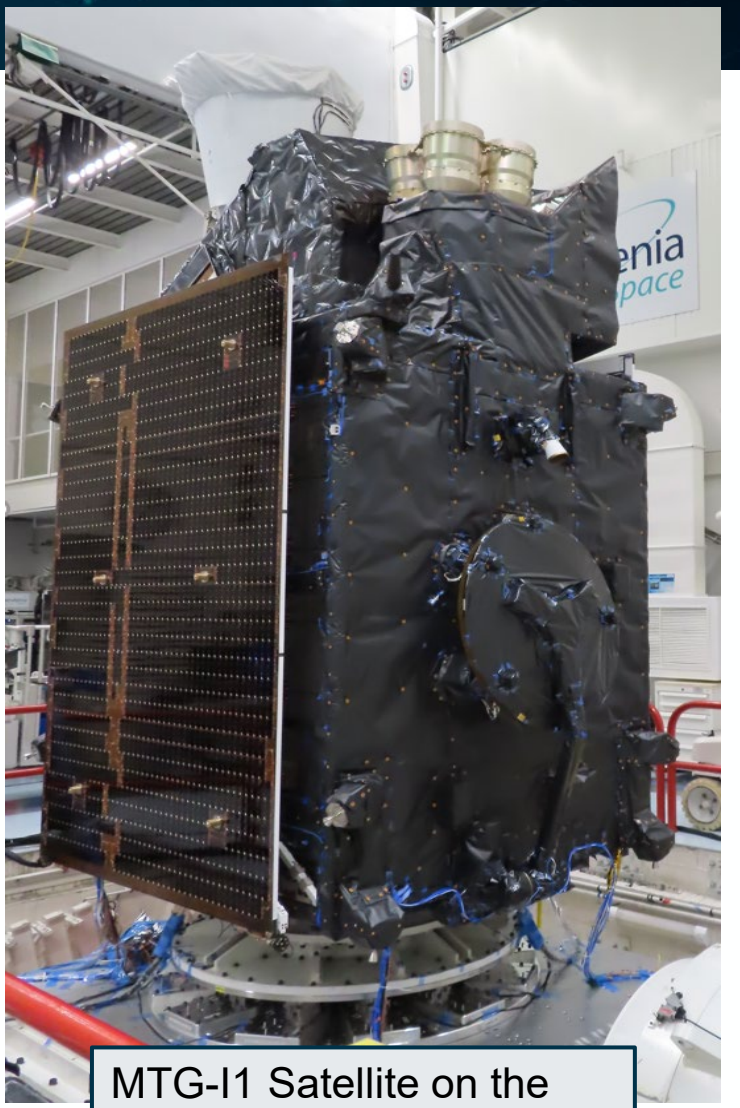
Common Platform
[courtesy OHB]

Mounting of LI onto Platform
'the MTG-I-1 satellite is born'
[courtesy TAS-F]

MTG-I-1 Protoflight Hardware



MTG-I1 Satellite exiting the Thermal Vacuum facility
[courtesy TAS-F]

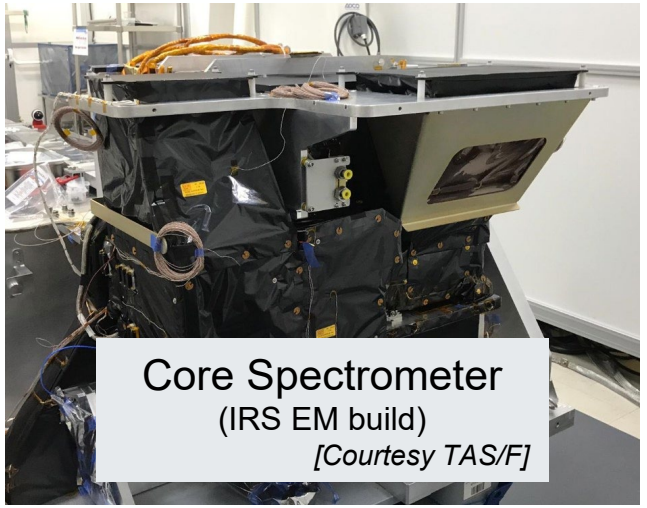


MTG-I1 Satellite on the Mechanical Shaker
[courtesy TAS-F]

MTG Space Segment current development Status

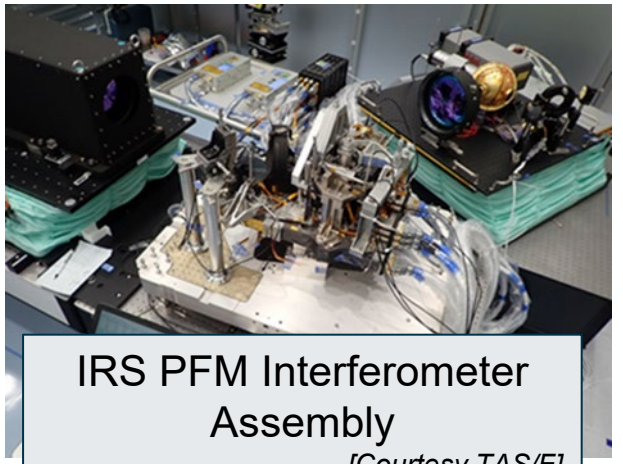
- **MTG-S1 Protoflight satellite;** on track for completion by late 2023
  - **Common Platform** (including satellite control software);
    - ✓ Fully integrated and tested at module level …awaits instrument availability
    - ✓ Final functional Chain validation of MTG-S SCSW well advanced (~95% common with MTG-I)
  - **Infra-Red Sounder (IRS);** PFM instrument fully integrated
    - Initial functional and reference performance test implemented
    - Full mechanical campaign successfully completed
    - Preparations ongoing for complex Optical Vacuum (performance) testing
  - **Sentinel 4/UVN** (contribution from Copernicus); PFM instrument fully integrated
    - Mechanical Qualification Testing successfully completed
    - Thermal Vacuum and final instrument characterisation on-going in RAL
    - Expected delivery to MTG-S satellite integration; September 2022.
  - **Satellite;** final satellite integration scheduled to start Q3/2022 with IRS integration;
    - *Q3/2023;* MTG-S Qualification Acceptance Review
    - **Q4 2023; MTG-S1 Readiness for Launch** (Ariane 64 from Kourou)

MTG-S-1/IRS Protoflight Hardware



Core Spectrometer
(IRS EM build)
[Courtesy TAS/F]

IRS PFM Detector &
Electronic Assembly
[Courtesy TAS/F]



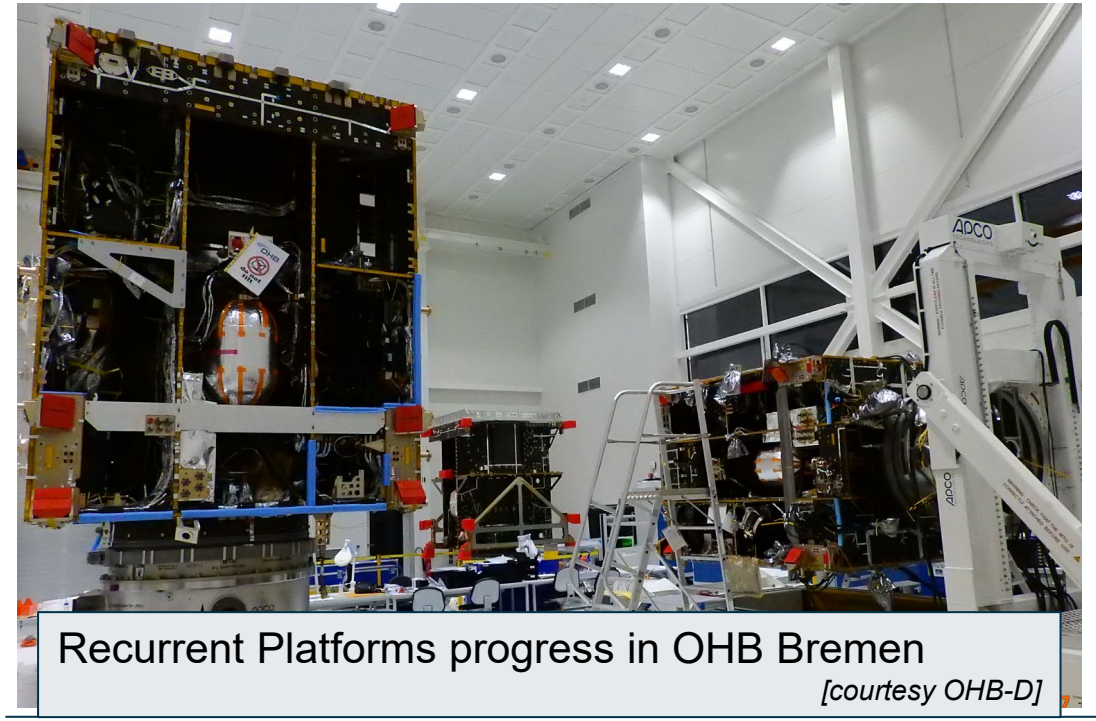
IRS PFM Interferometer
Assembly
[Courtesy TAS/F]

IRS PFM Instrument
[Courtesy OHB]

MTG Space Segment current development Status

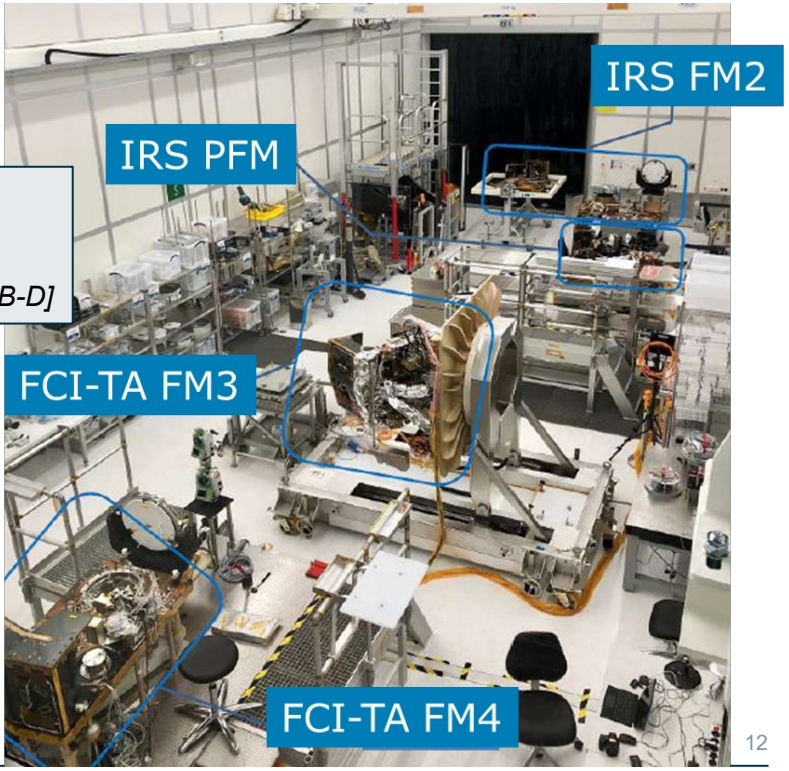
Recurrent Satellites

- ✓ All elements required to build 4 recurrent satellite (3 x MTG-I and 1x MTG-S) progressing well
- ✓ The majority of lower level sub-contractors are completing/have completed their deliveries, and the main assemblies, Platforms and Instruments are in process
- ✓ The MTG-I2 satellite will be completed for launch in late 2025; whilst the final 3 satellites will enter storage, at module level, when they become available (2022- 2025 time frame)



Recurrent Platforms progress in OHB Bremen
[courtesy OHB-D]

Recurrent instrument in OHB-Munich
[courtesy OHB-D]



Closing Remarks

- **Meteosat Third Generation is well on track for a first launch of the MTG-I1 in late 2022 to be followed by the MTG-S1 in first half 2024**
- **The 'Third Generation' will ensure continuity and substantial enhancement of the existing Imaging Mission** (currently being provided by MSG) **and add both a state-of-the-art Lightning Imager and a revolutionary new Sounding capability from Geostationary Orbit**
- This is only possible thanks to the continued dedication and skills of the MTG industrial Core Team led by TAS-F (Overall Prime contractor and responsible for the MTG-I satellites) and OHB-D (responsible for the MTG-S satellite and Common Platform development)
- Also, thanks to the ESA and EUMETSAT teams for their continued determination to make this Programme the success it is despite the many technical and programmatic challenges encountered

Thank you for your attention and prepare for the 'THIRD GENERATION'

Closing Remarks