

La mission Inspire-Sat Un mois en orbite

Un deuxième satellite d'observation de la Terre



13 mai 2023



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1 – Timeline and objectives



UVSQ-SAT

Utilisation des données

4

Fin de vie

24/01/2024 ?

Exploitation

13/03/2021

24/01/2021

Tests

Etudes + Réalisations

2018

1

2

3



Utilisation des données

4

Fin de vie

15/04/2026 ?

Exploitation

30/05/2023

15/04/2023

Tests

Etudes + Réalisations

2020

1

2

3



Utilisation des données

4

Fin de vie

Exploitation

22/06/2025

Tests

Etudes + Réalisations

2021

1

2

3

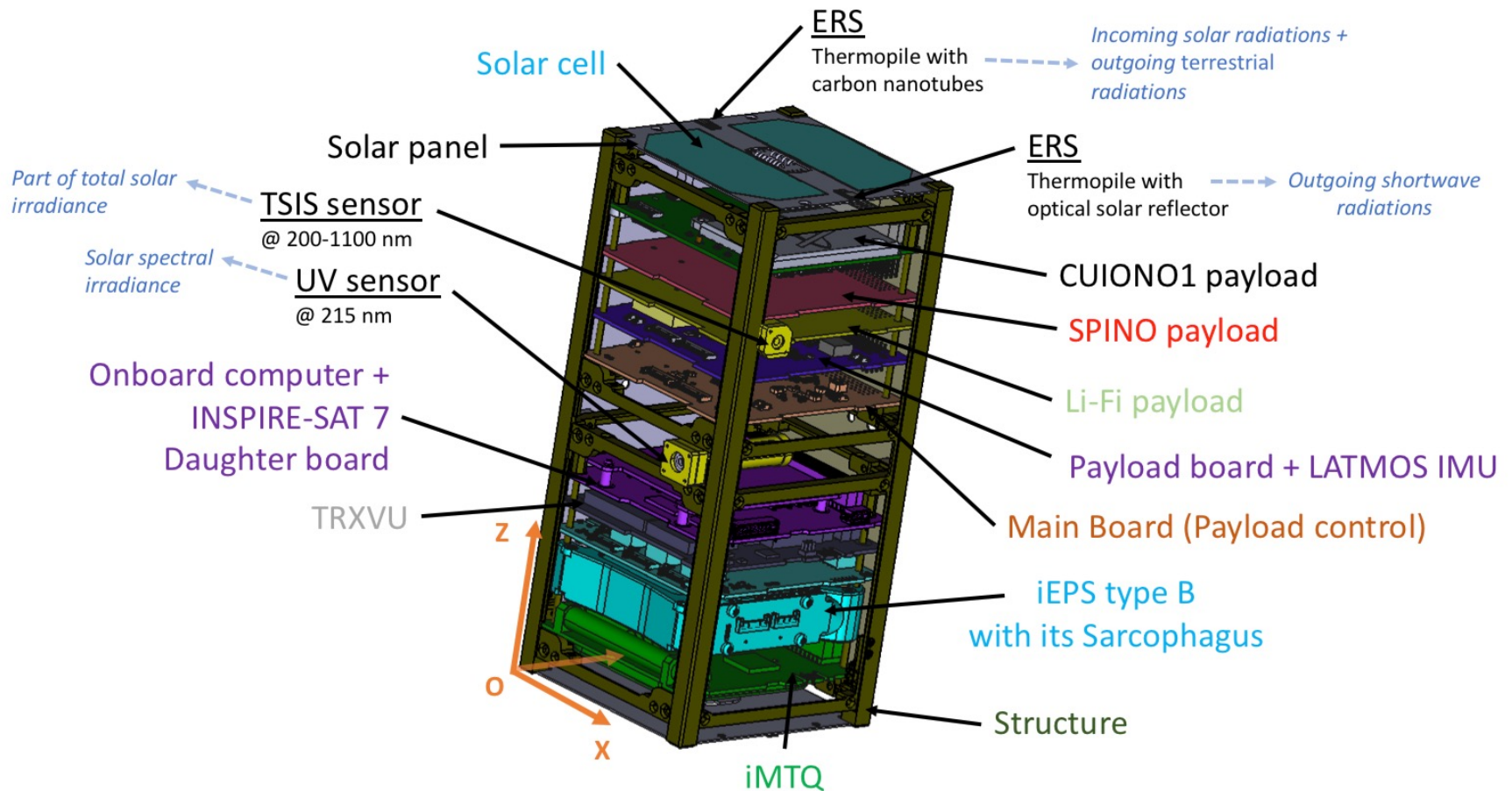
1 – Timeline and objectives

Three main objectives in:

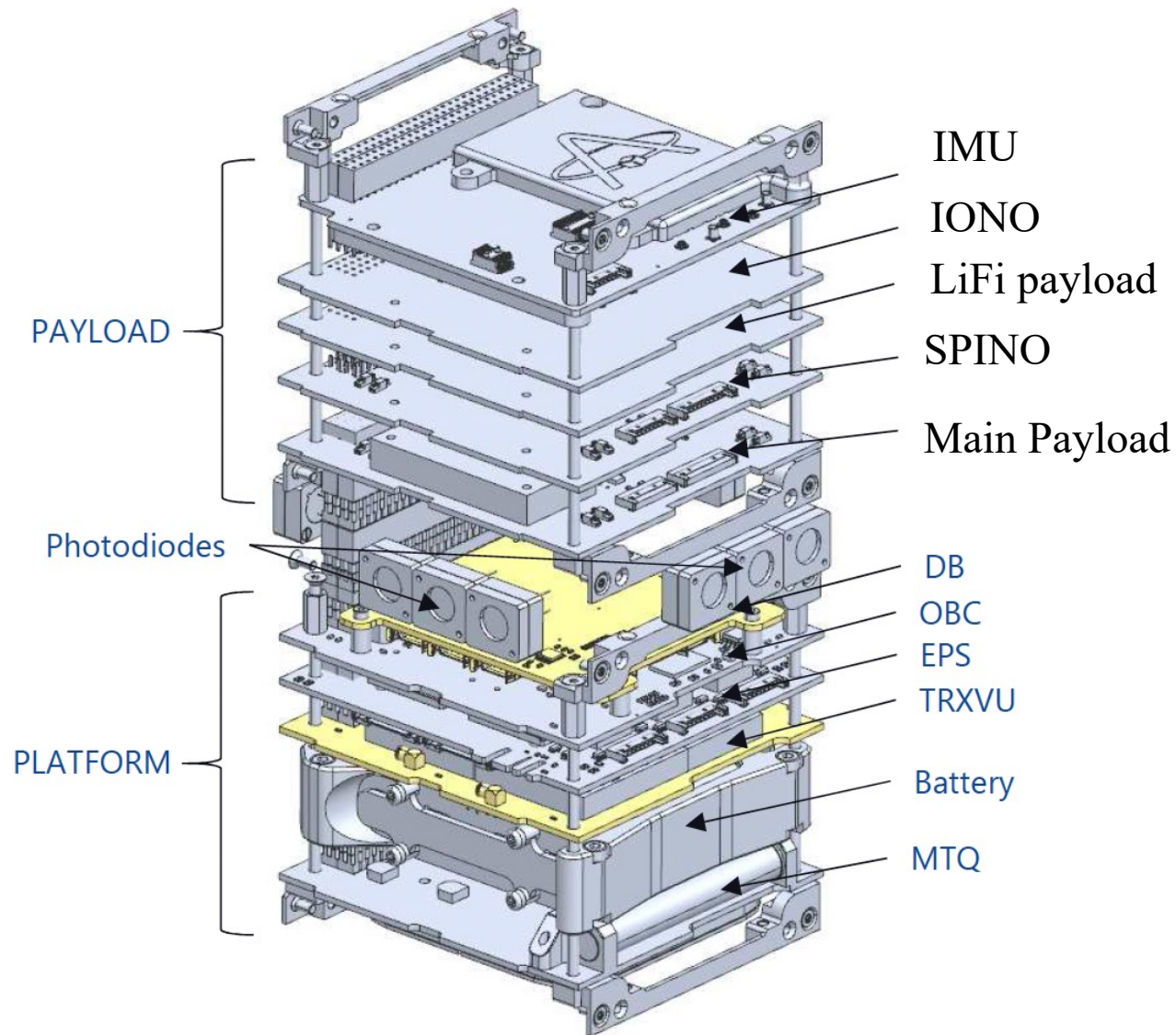
- **Science** : Earth observation (EO), Solar physics
- **Technology demonstration** : Instruments miniaturization for solar physics, Instruments validation & satellites constellation validation for Earth observations, UV sensors technology, Validation of an inertial measurements unit, **Validation of the Totem electronic board, Validation of the SPINO radio-amateur payload**, Validation of a Li-FI system, ...
- **Education & outreach** : Satellite development, Payload development, Software development, Training material



2 – Inspire-Sat

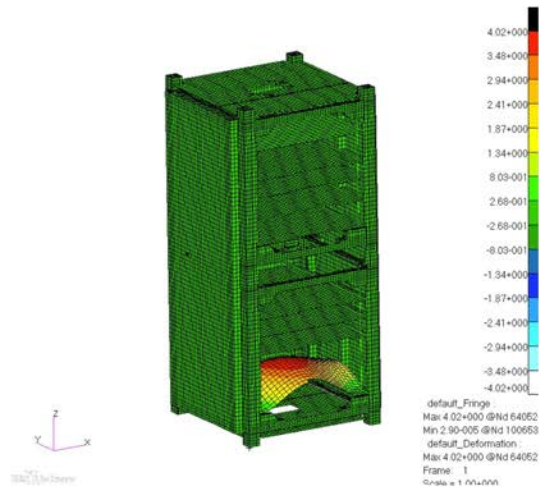


2 – Inspire-Sat

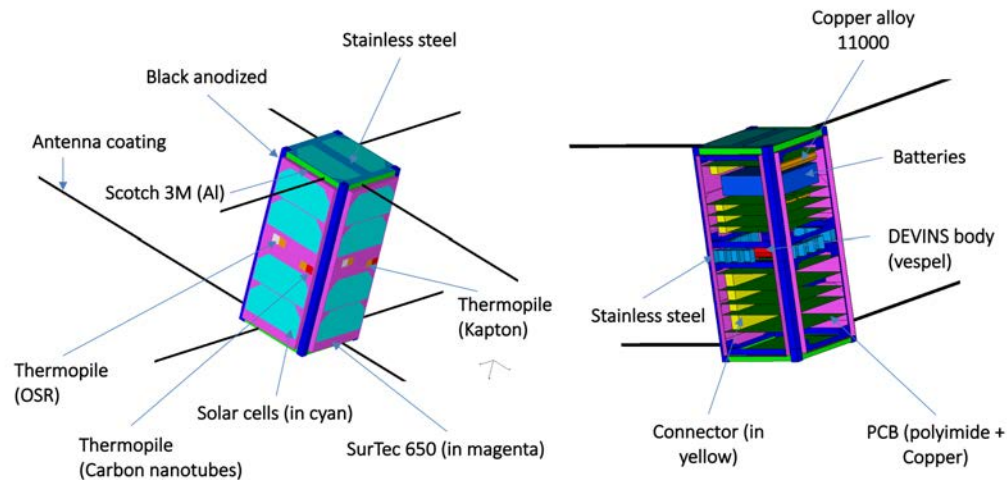
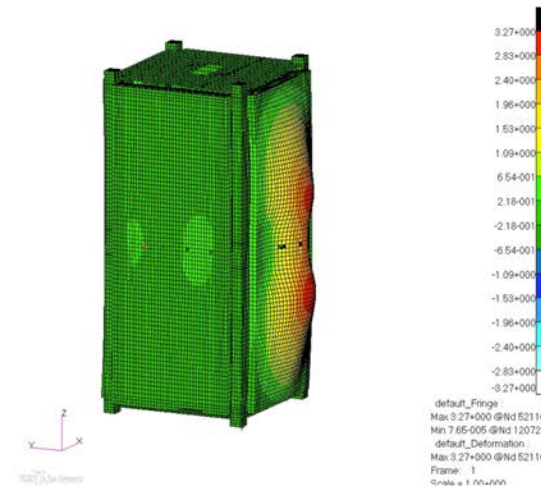


2 – Inspire-Sat

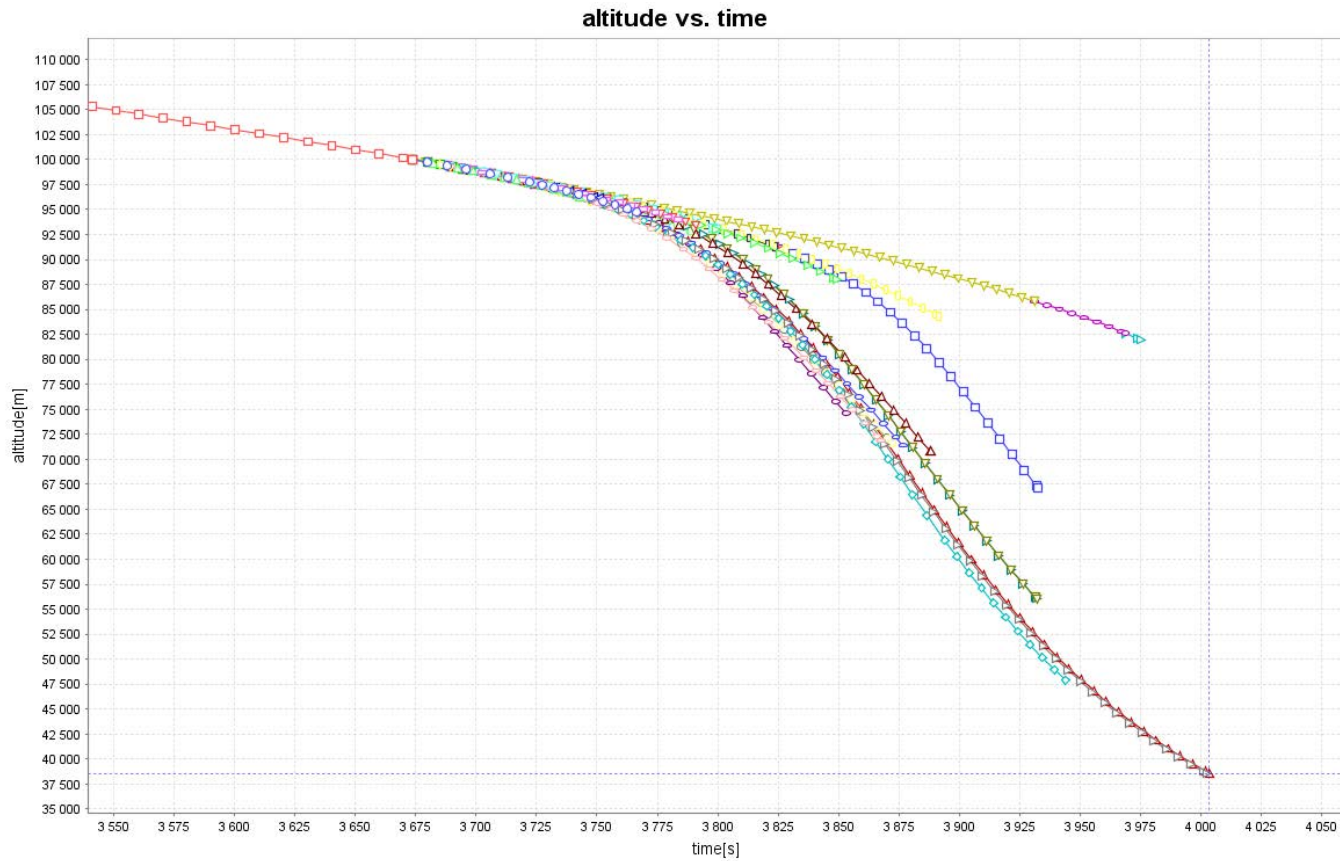
Mode 1: 264 Hz



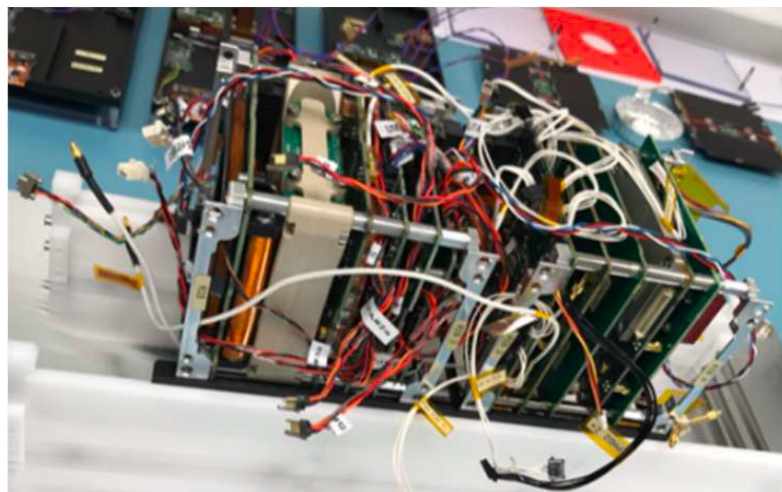
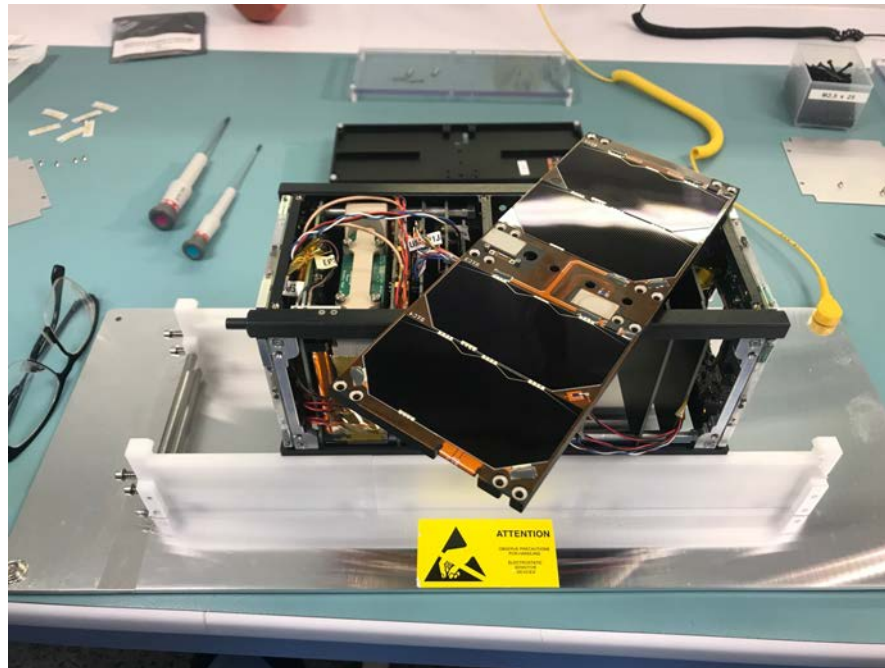
Mode 2: 325 Hz



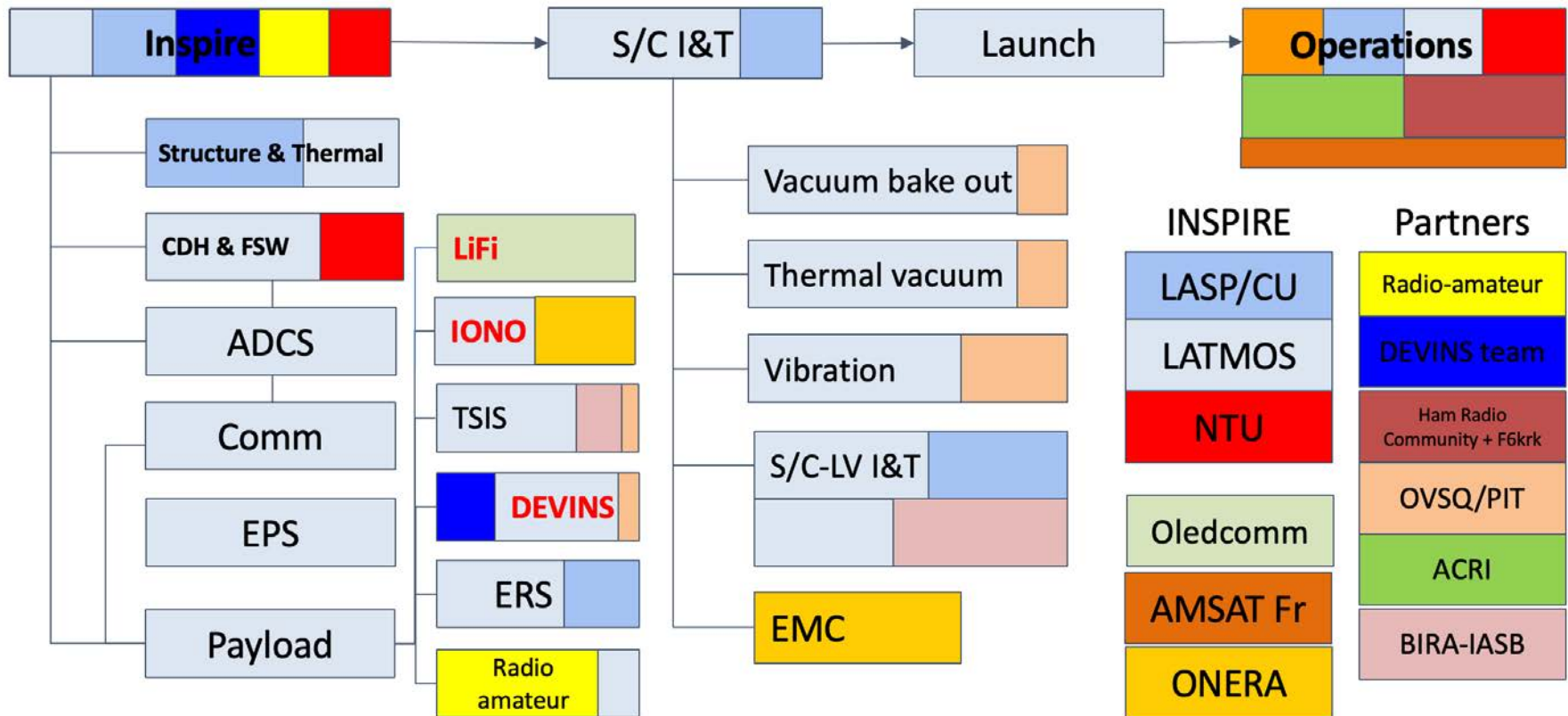
2 – Inspire-Sat



2 – Inspire-Sat



2 – Inspire-Sat

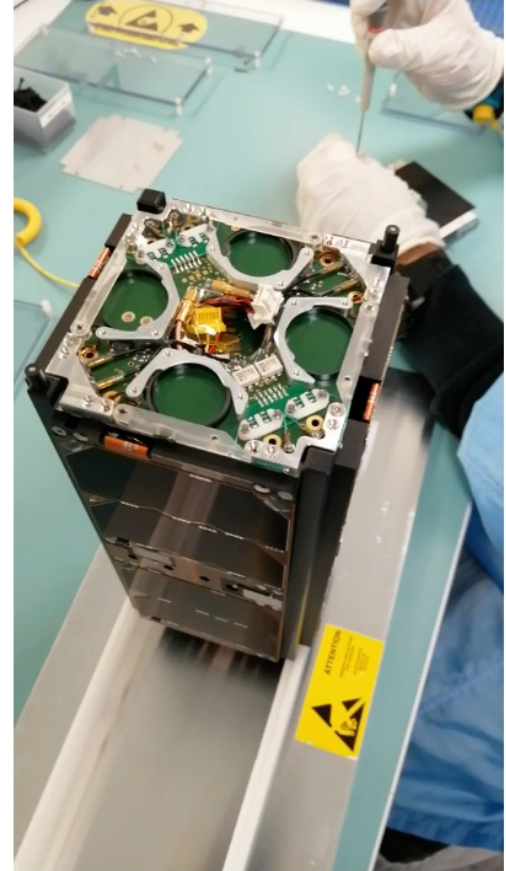
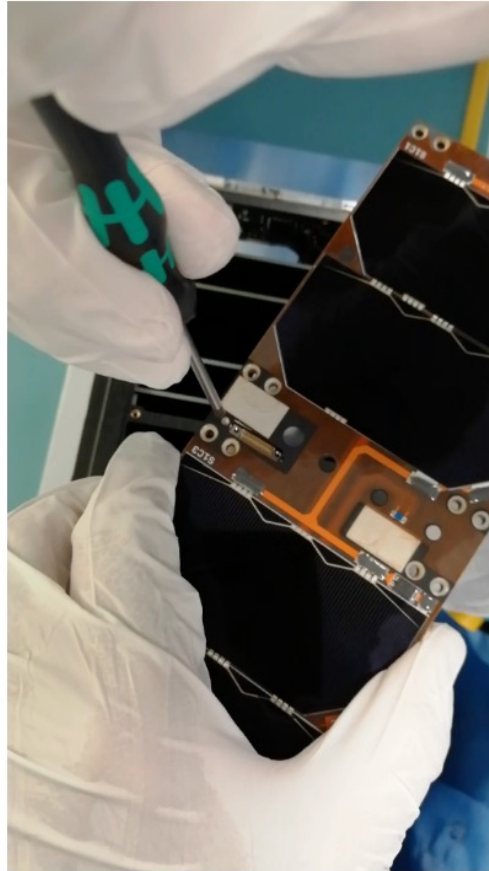


2 – Inspire-Sat

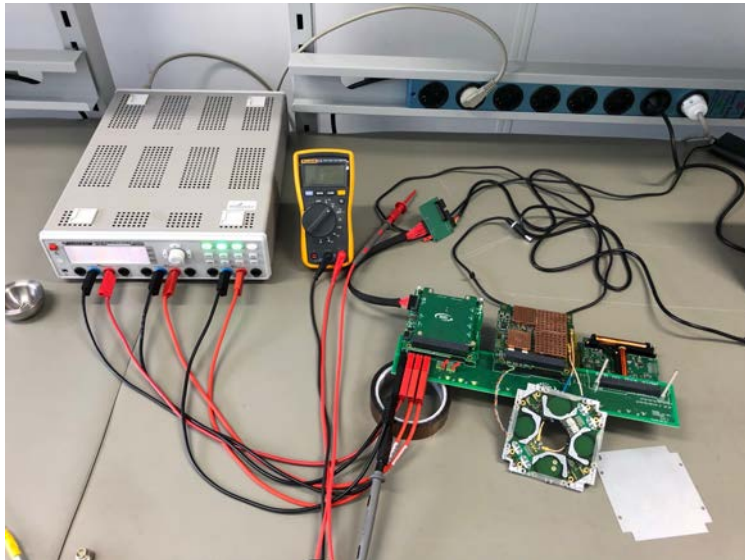
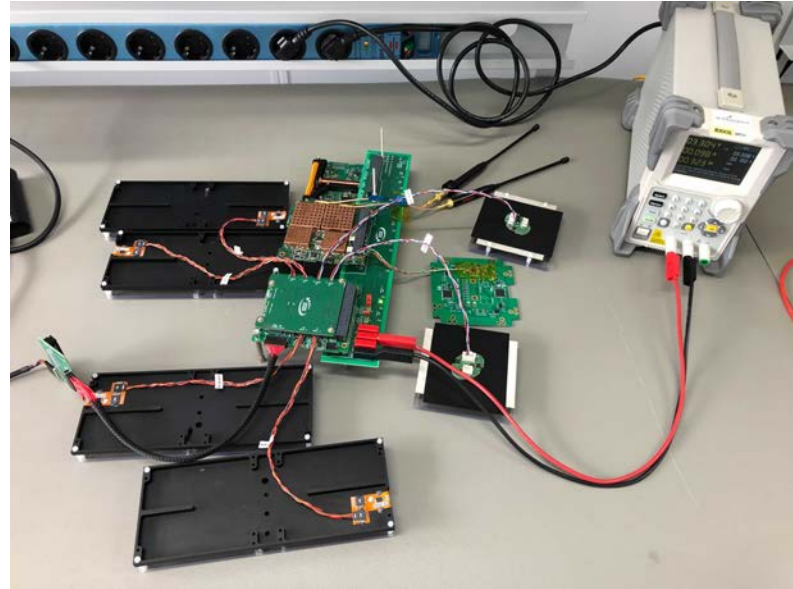
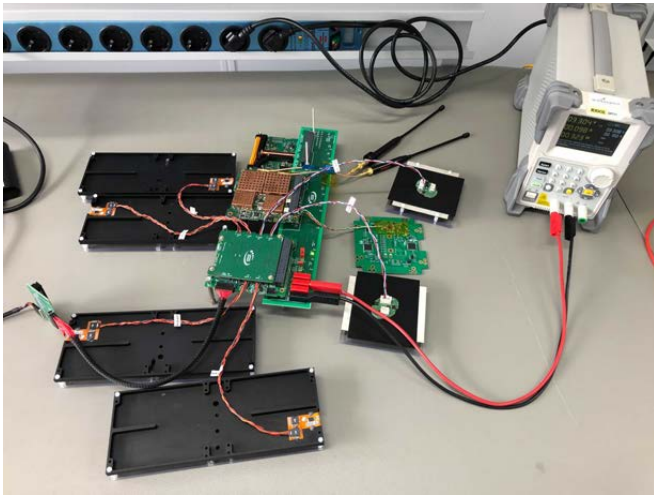
Main LATMOS/OVSQ facilities for INSPIRE-SAT 7

- **270 m² of ISO5, ISO7 and ISO8 clean rooms**, equipped with permanent temperature and hygrometry monitoring, daily particles counting measurements. Several tools to facilitate the integration phases are available: space electrical components storage and packing, 3D and 2D mechanical metrology, clean soldering and gluing stations, trinocular visual inspection etc.
- **A 40 kN shaker installed under an ISO5 laminar flux**. This equipment is used for all prototypes mechanical validation as well as qualification and acceptance tests. Classical quasi-static, sine and random vibrations are achieved using this equipment.
- **A 3 m³ thermal and optical vacuum chamber, installed in an ISO8 clean room**. This chamber is able to simulate the Martian environment (regulated pressure steps between 5 and 20 mbar under CO₂ atmosphere), as well as nominal space thermal vacuum environment below 10⁻⁵ mbar. Instruments up to 600x600x1600mm (50kg, 100W) fit into this chamber, also equipped with a cryogenic decontamination finger, a 300 amu mass spectrometer and a high spectral resolution McPherson type 225 monochromator allowing optical calibration within the 30-1200 nm range.
- ...

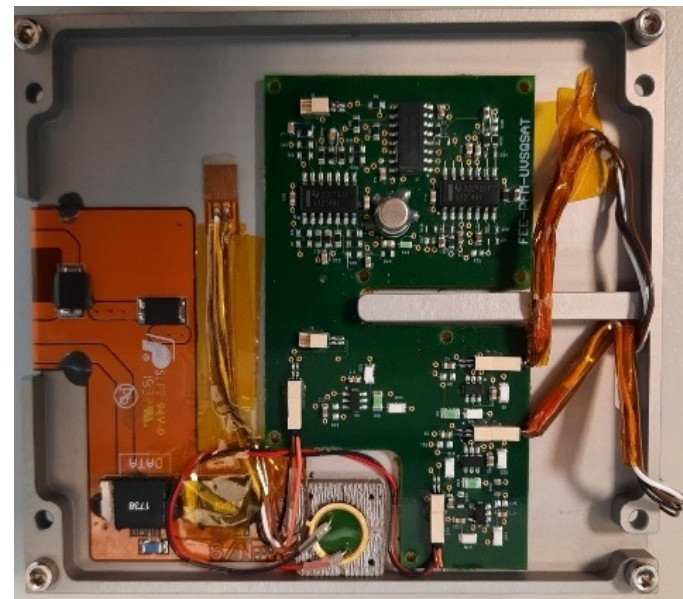
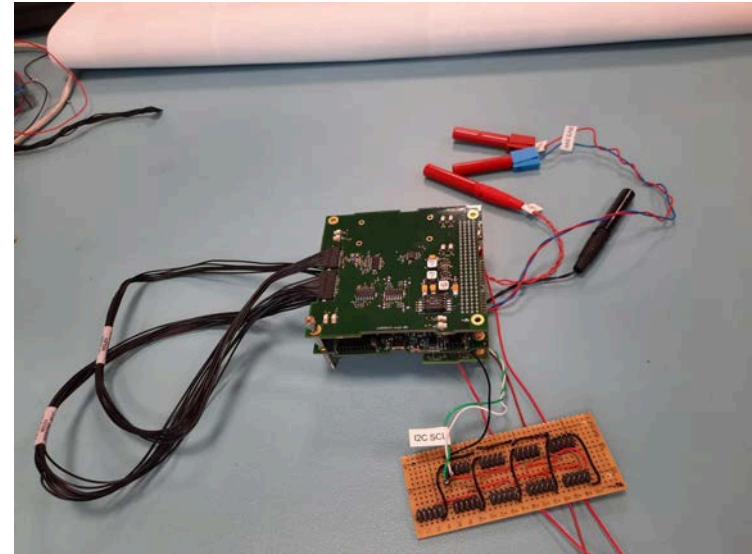
2 – Inspire-Sat



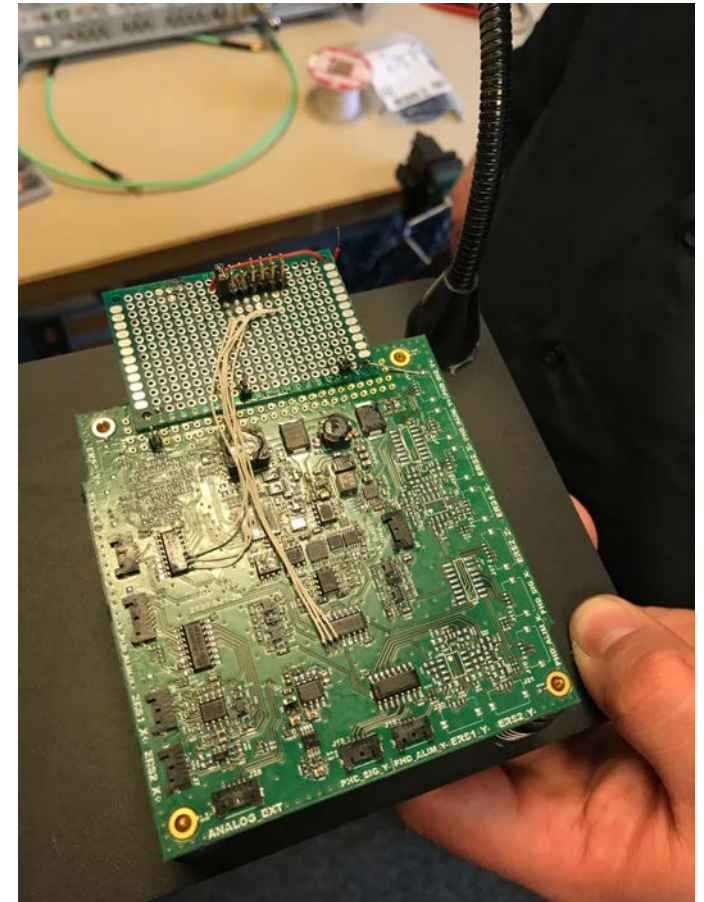
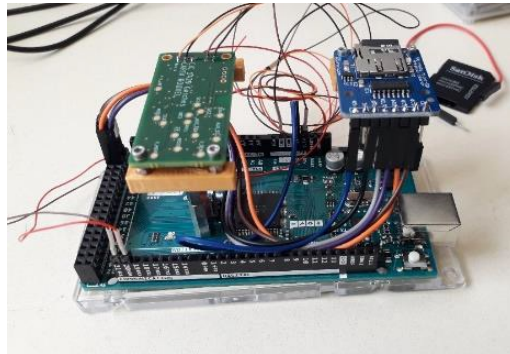
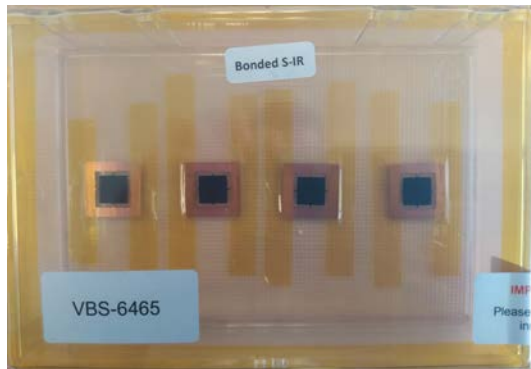
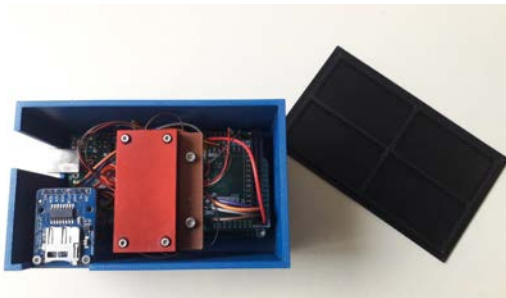
2 – Inspire-Sat



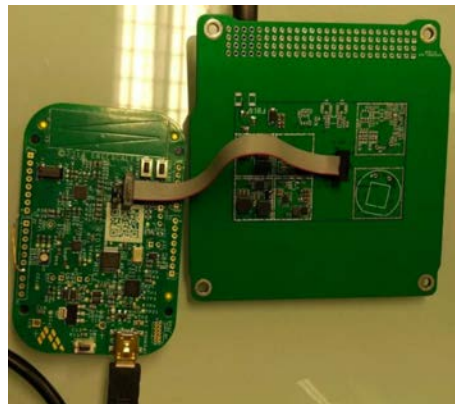
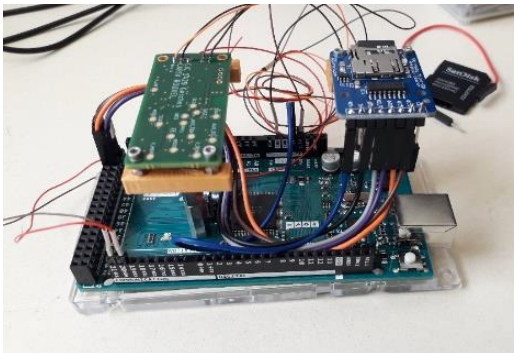
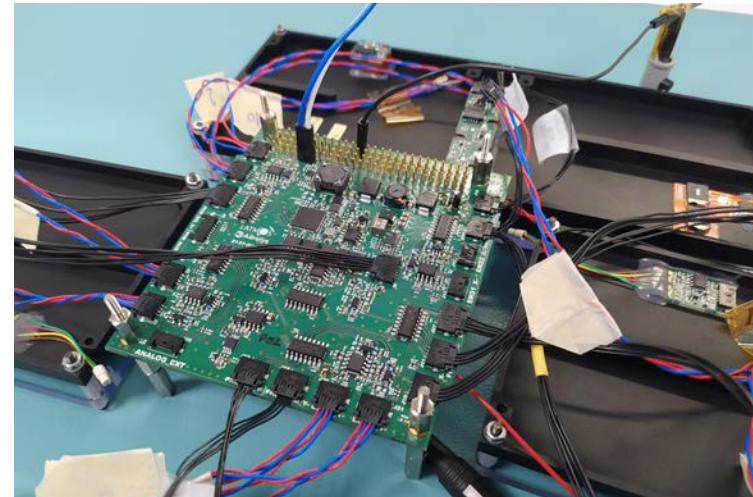
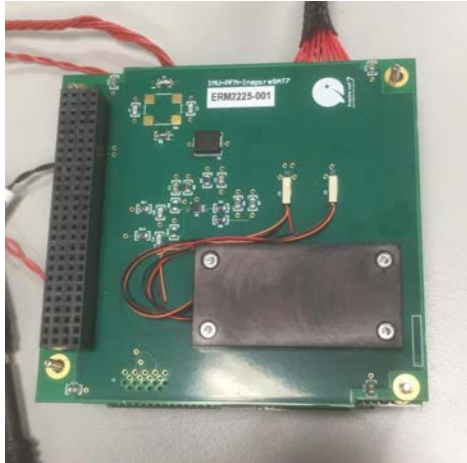
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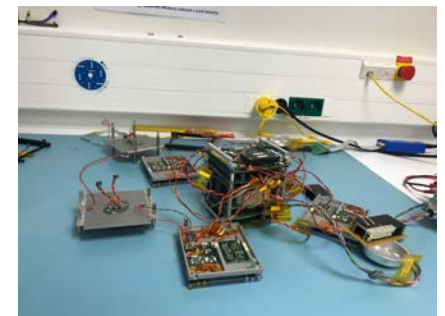
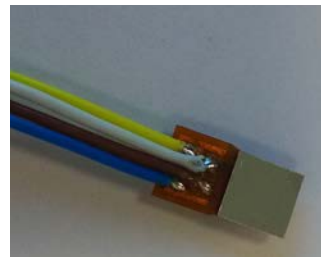
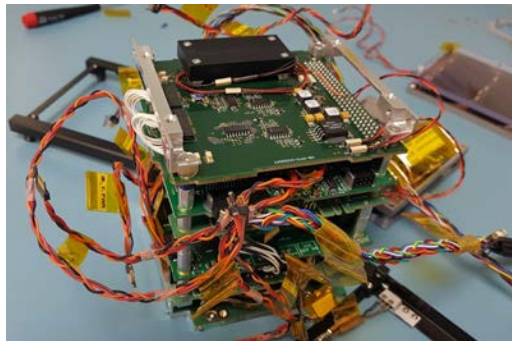
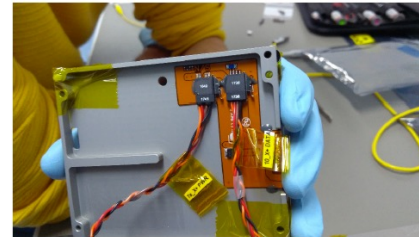
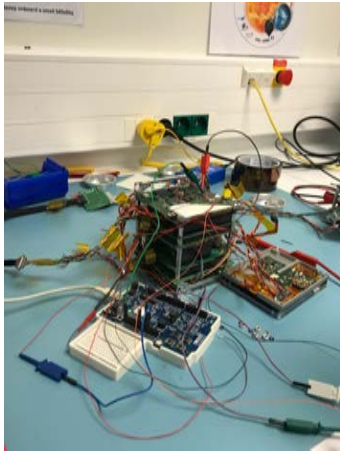
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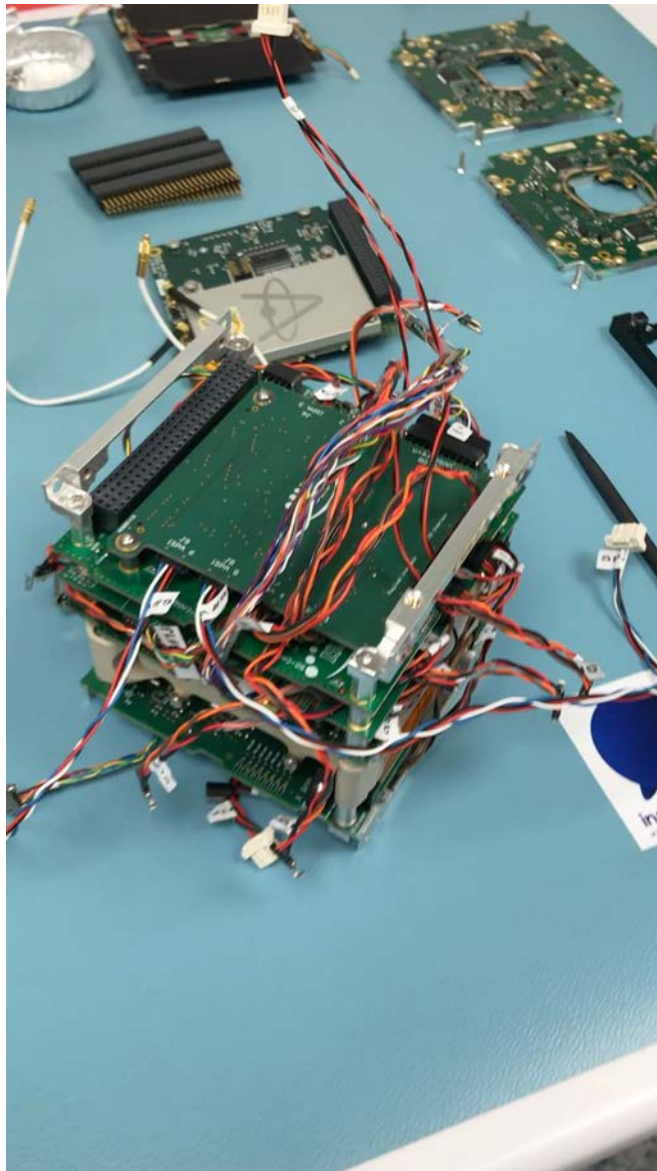
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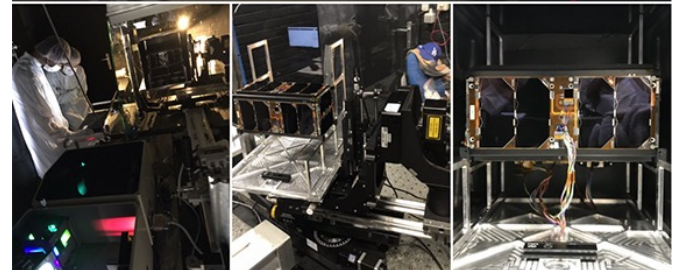
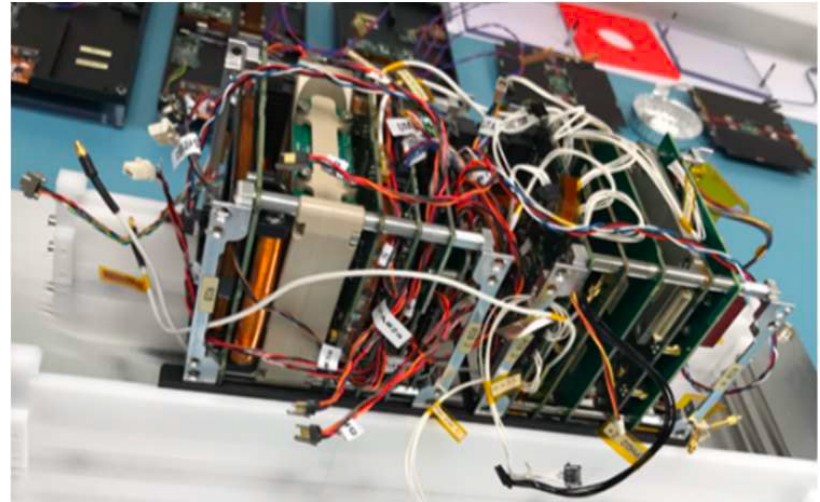
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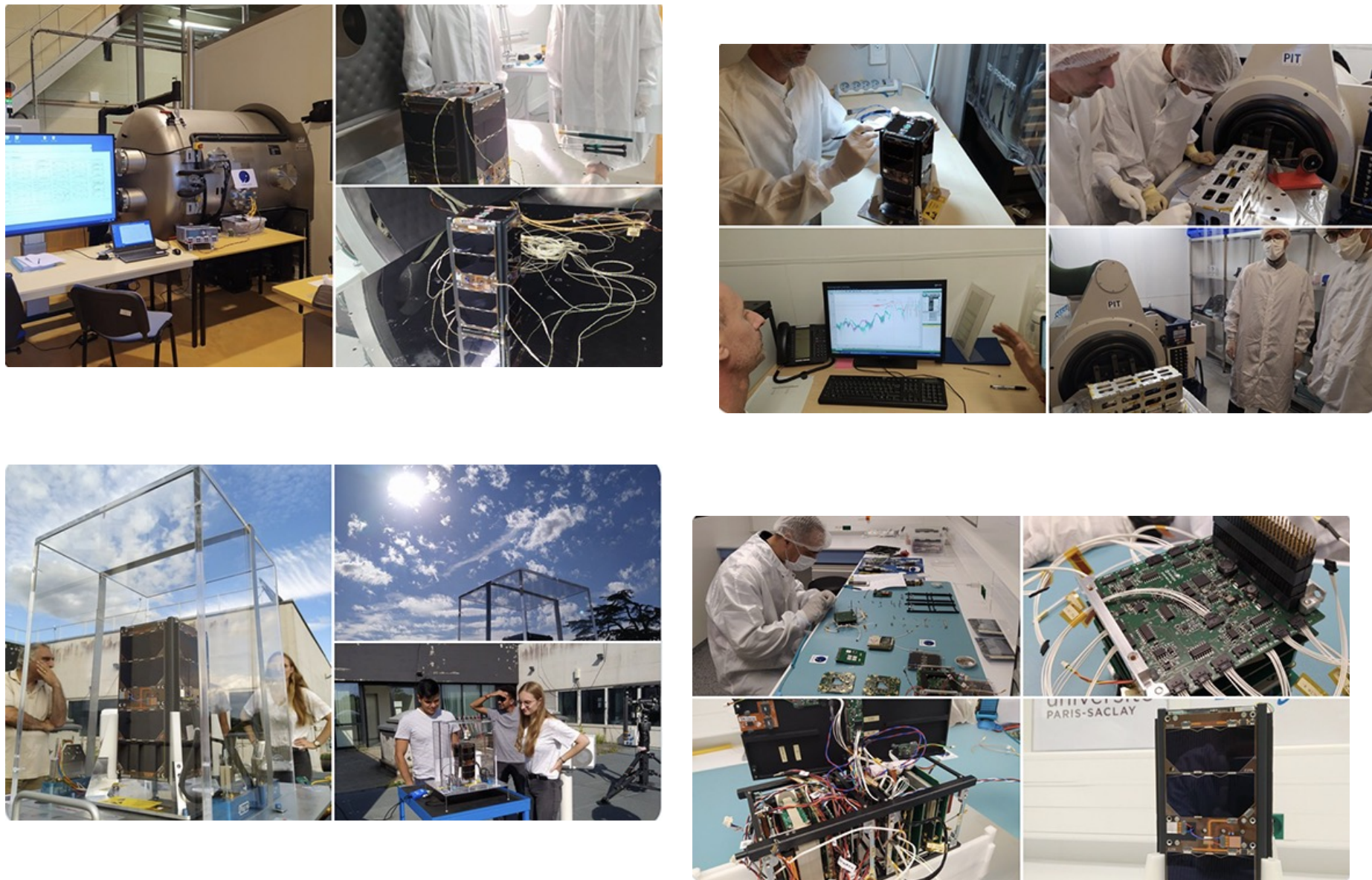
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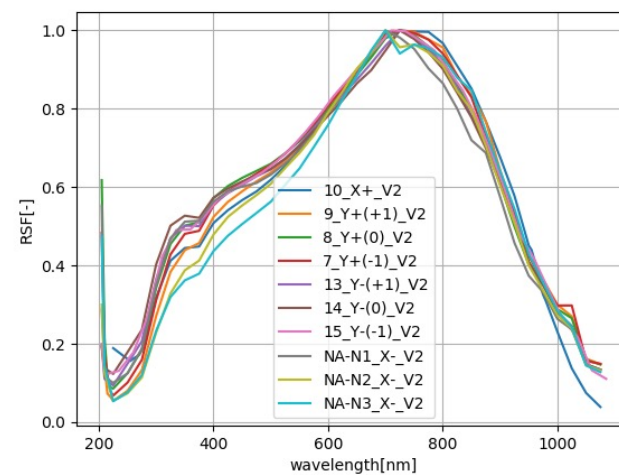
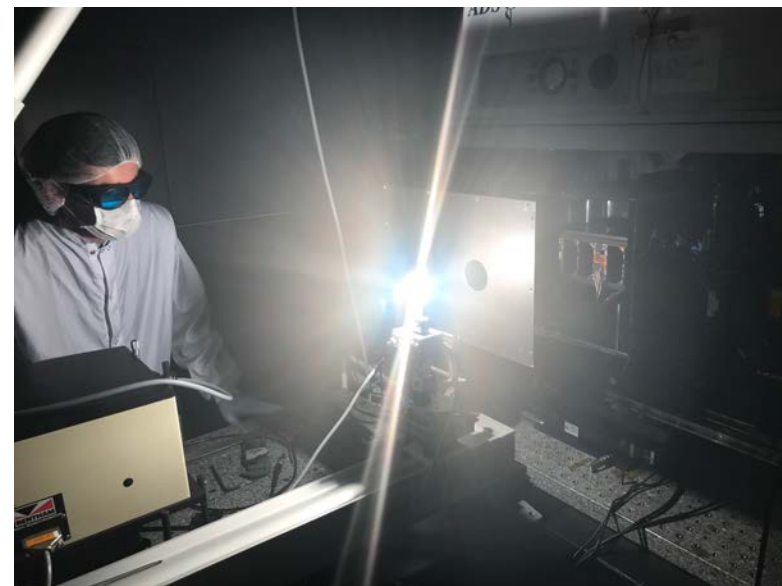


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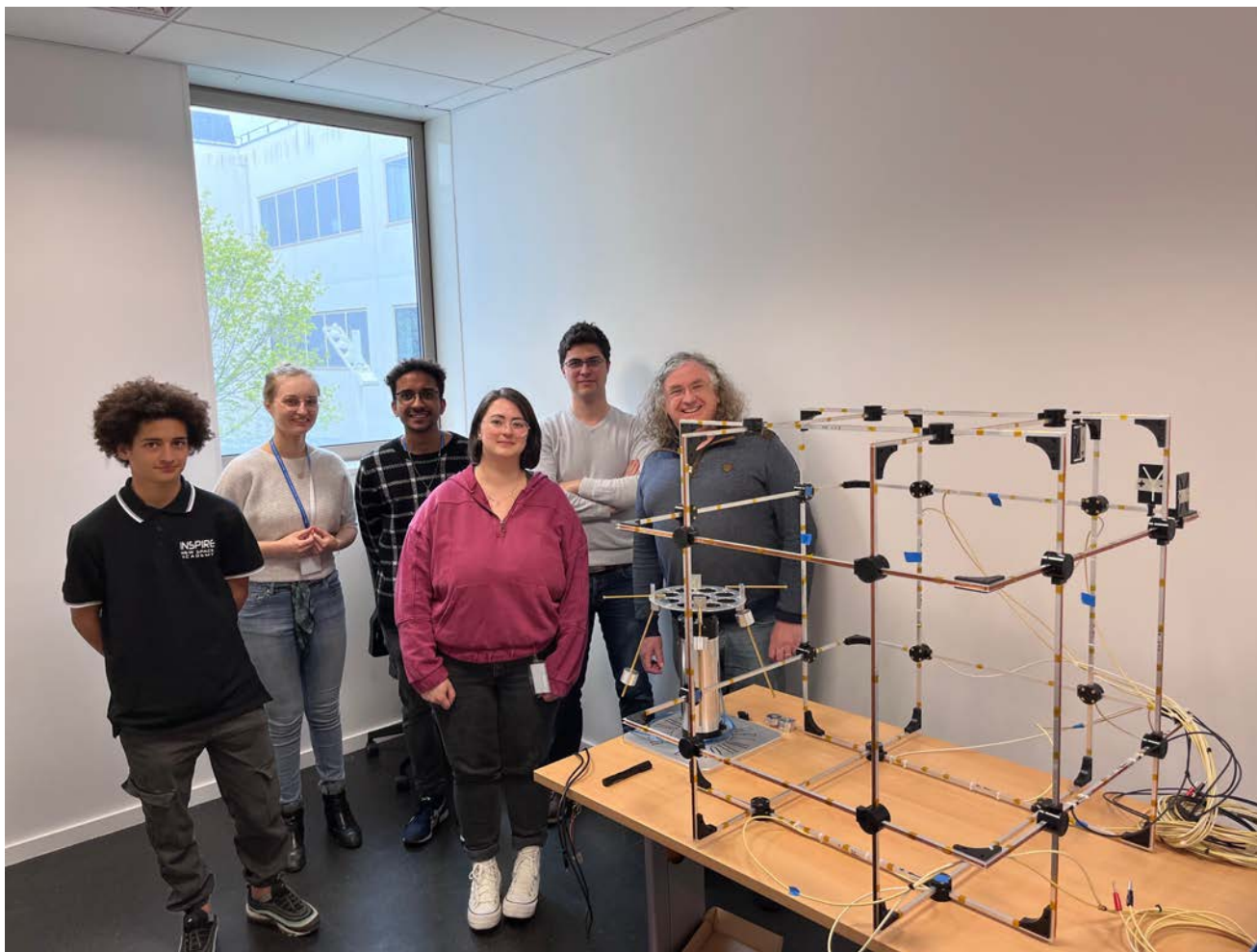


2 – Inspire-Sat

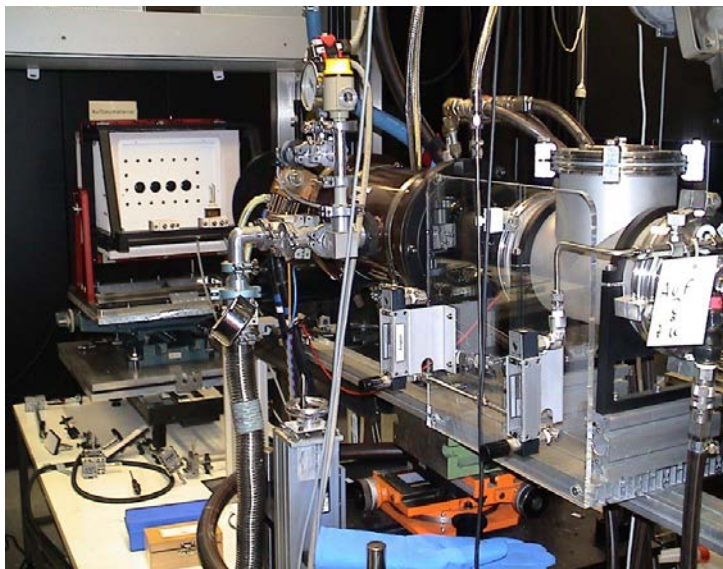




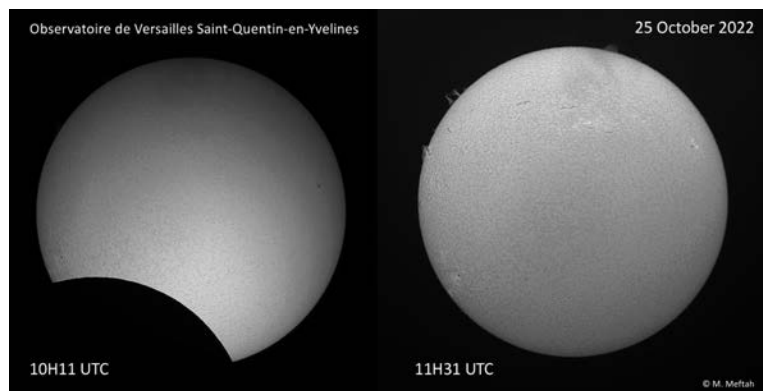
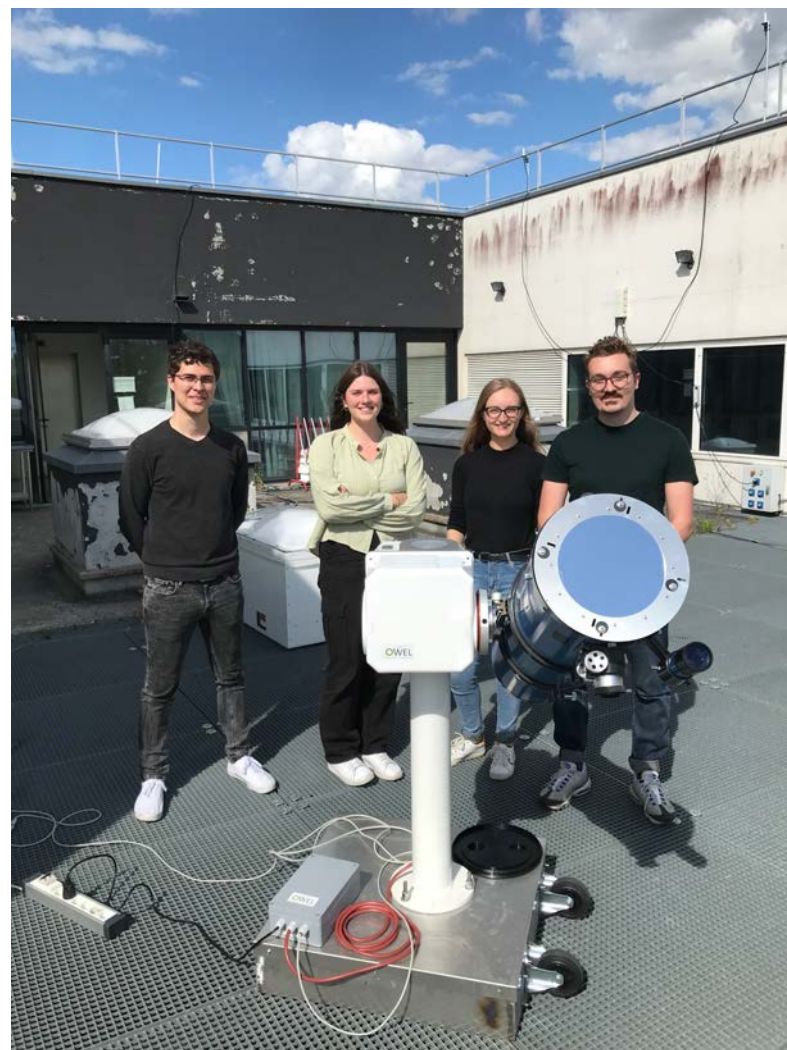
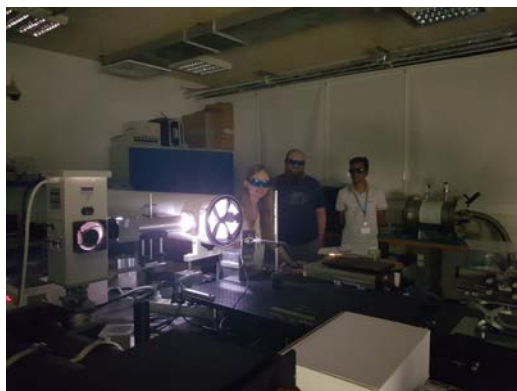
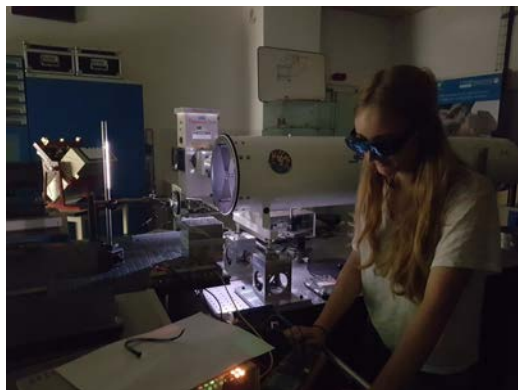
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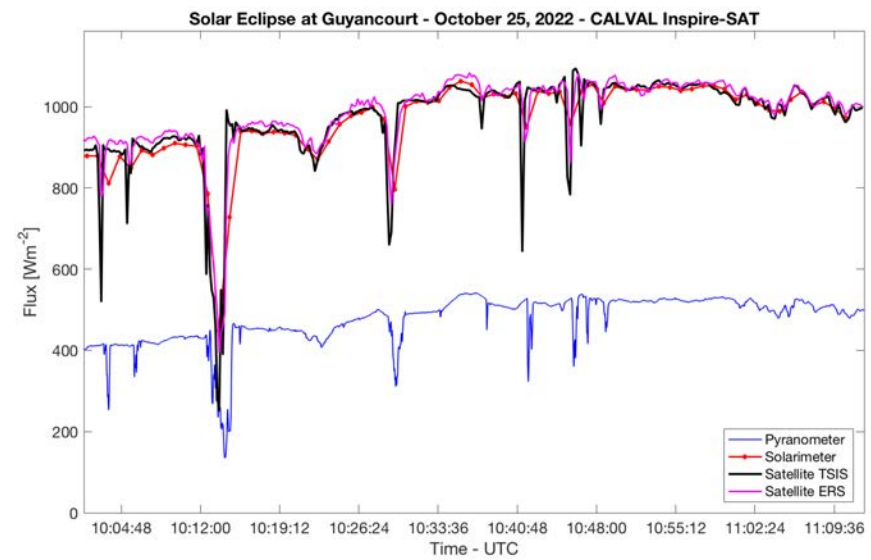
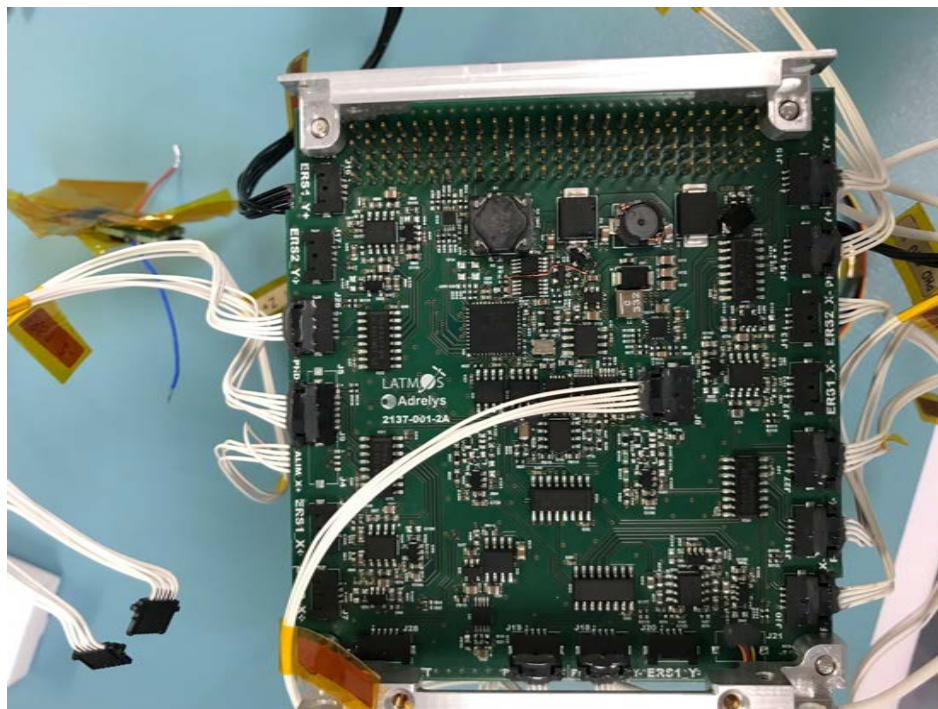
2 – Inspire-Sat



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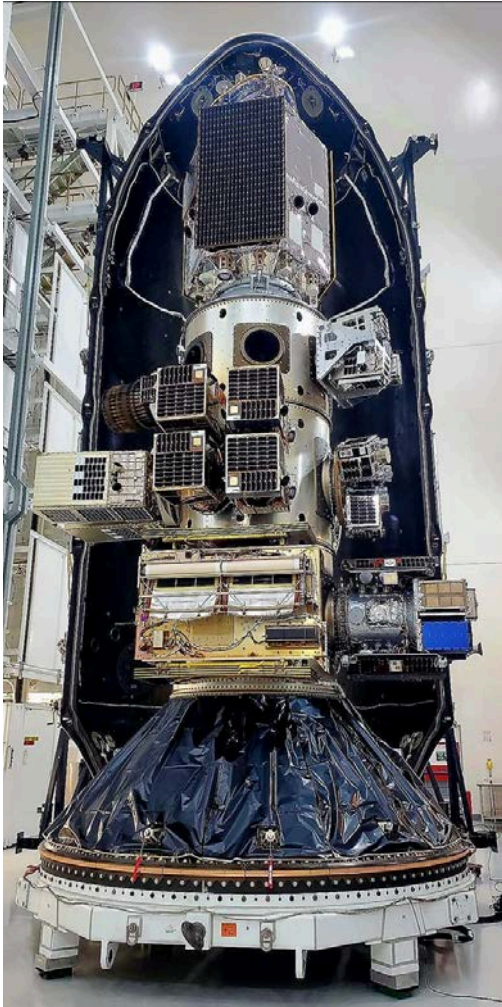


2 – Inspire-Sat



3 – Launch & commissioning phase

❑ Launch with Transporter 7 – 15 April 2023



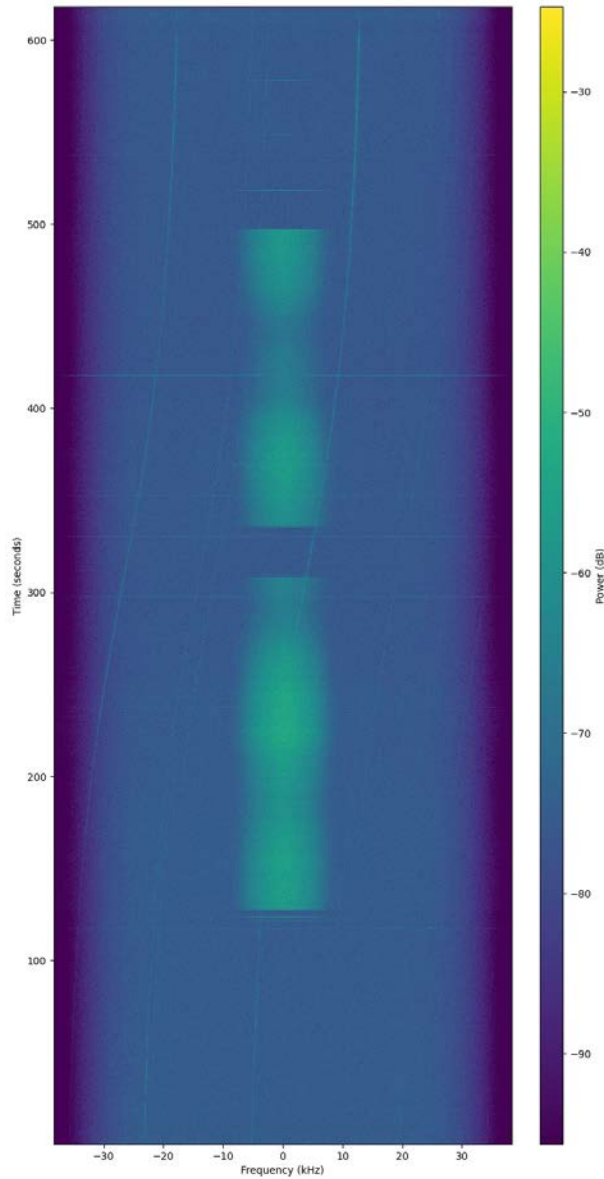
3 – Launch & commissioning phase



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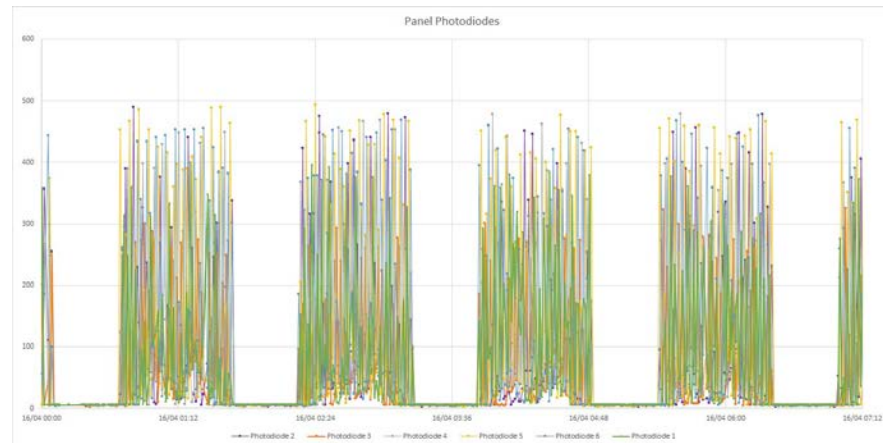
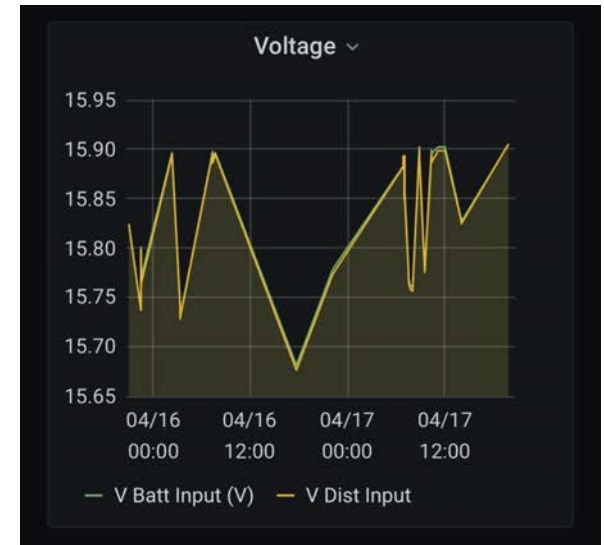
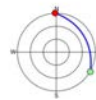


Observation #7421118

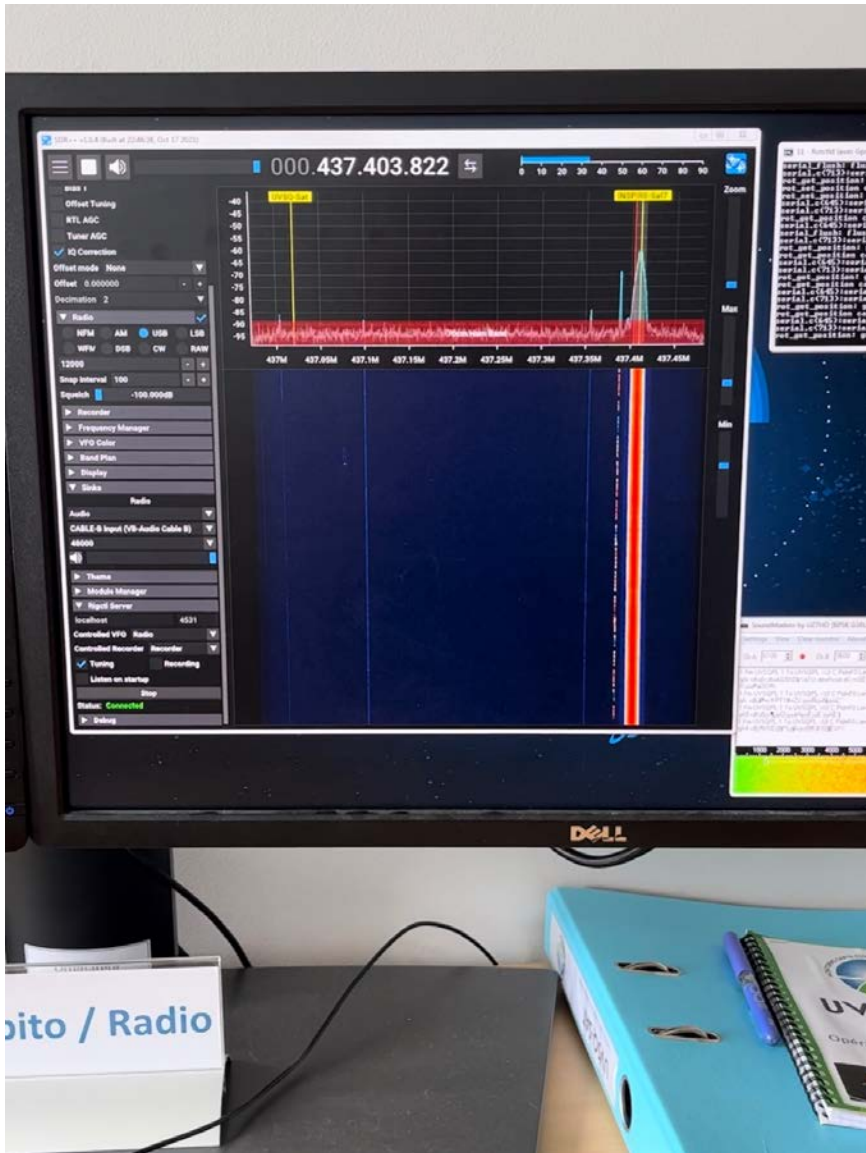
Timeframes are in UTC

Satellite	99245 - INSPIRE-SAT 7
Station	2271 - EIRSAT-1 GS - UCD Physics
Station Owner	davidmurphy
Observer	Fredy Damkalis
Status	Good
Transmitter	Mode U TLM - BPSK9k6 AX.25
Transmitter Status	Active
Transmitter Frequency	437.410 MHz
Observation Frequency	437.410 MHz
Transmitter Mode	BPSK 9600
Timeframe	2023-04-17 08:51:20 2023-04-17 09:01:42
Rise	120.0°
Max	16.0°
Set	358.0°
Client Version	1.8

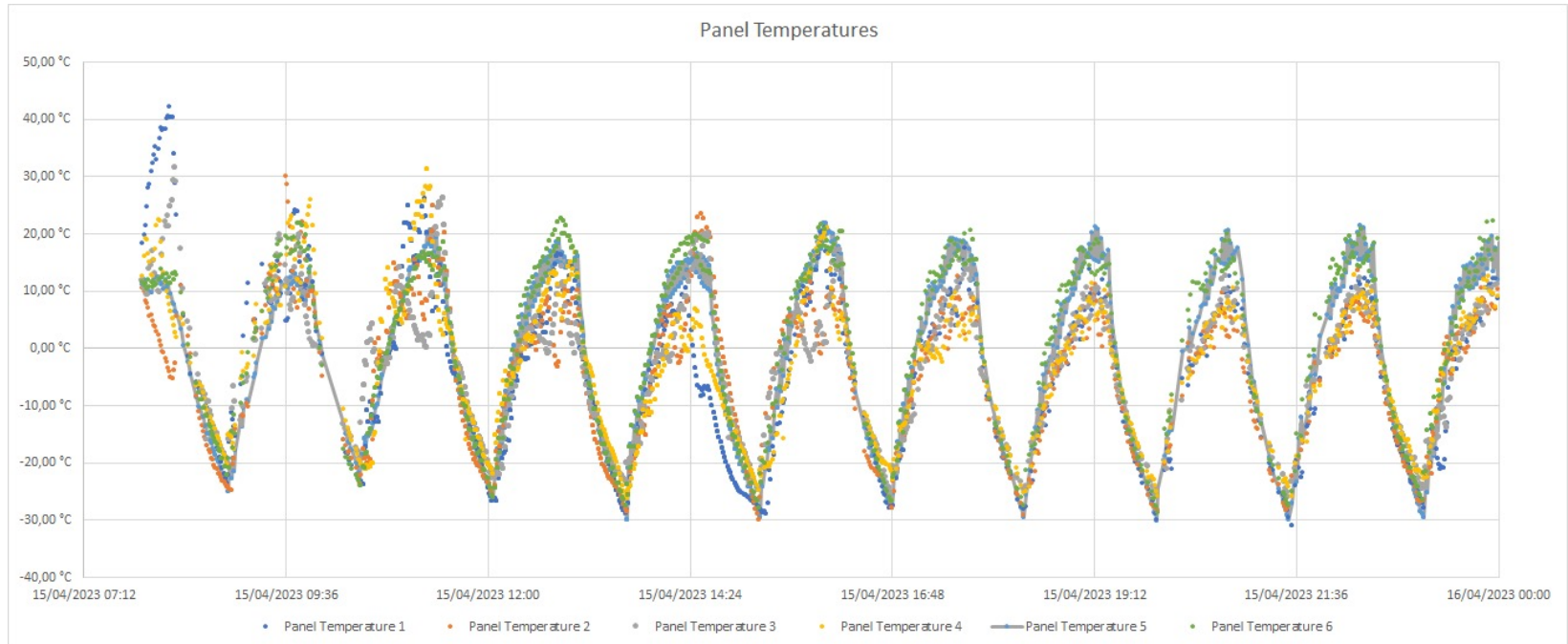
Polar Plot



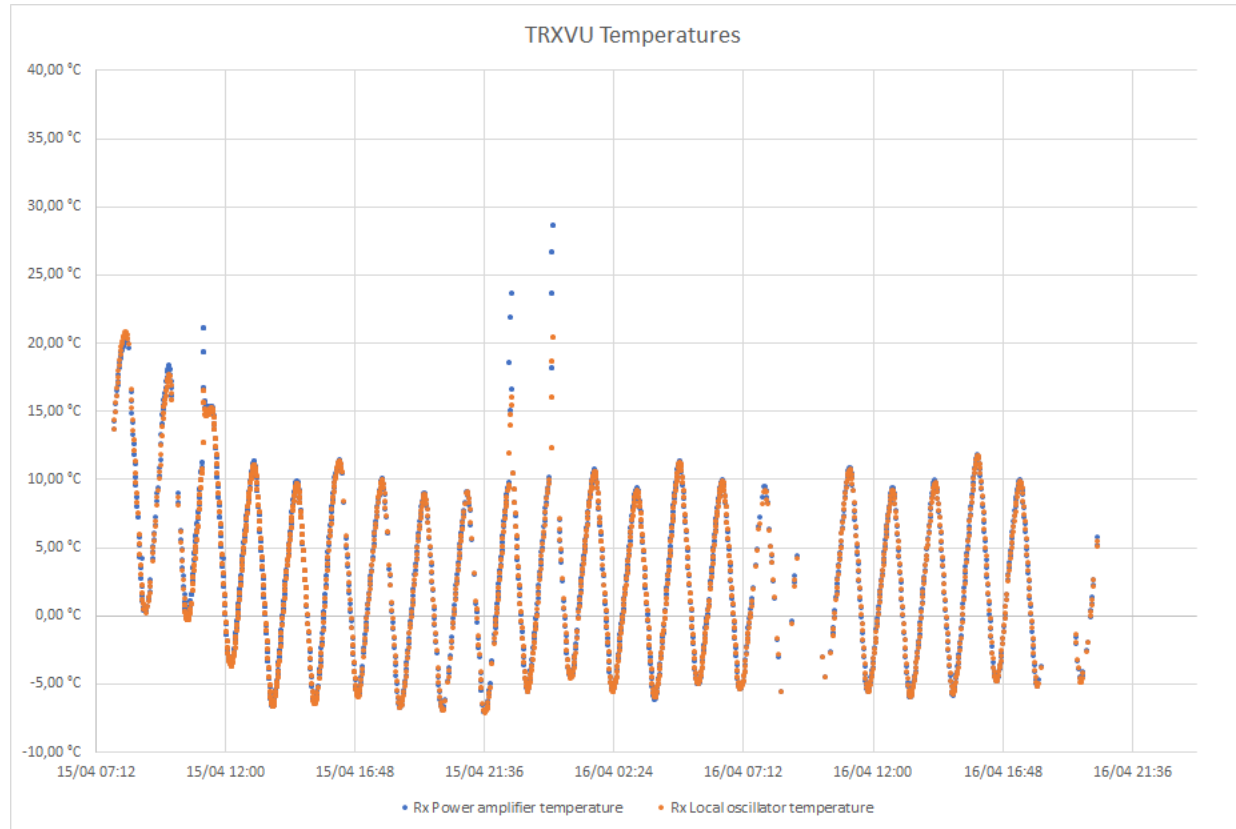
3 – Launch & commissioning phase



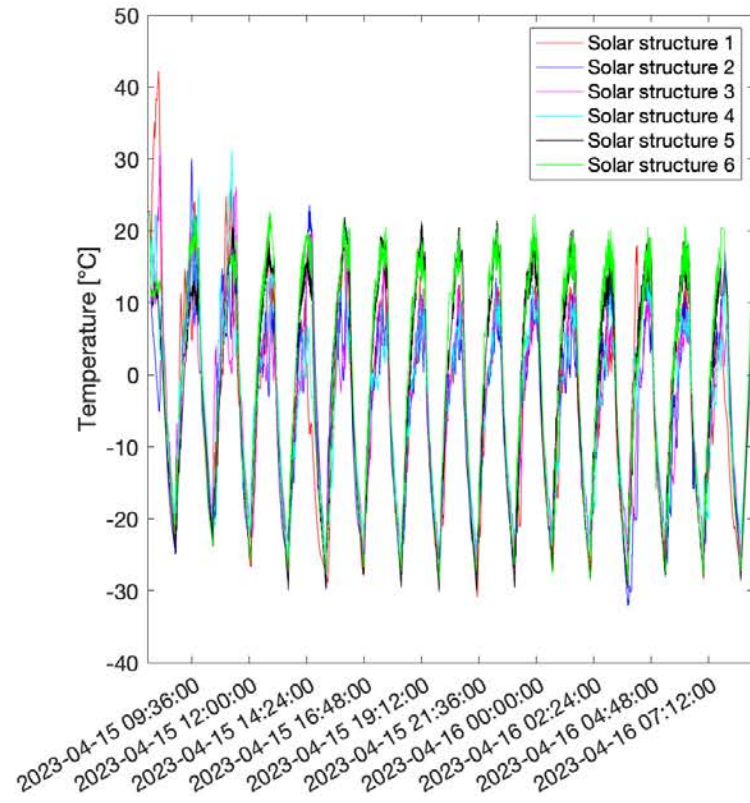
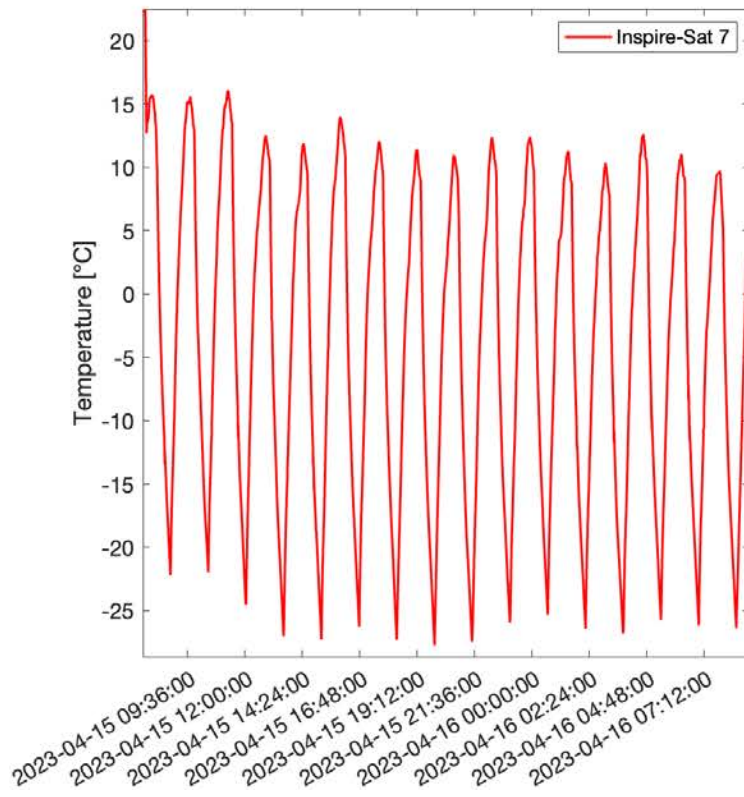
3 – Launch & commissioning phase



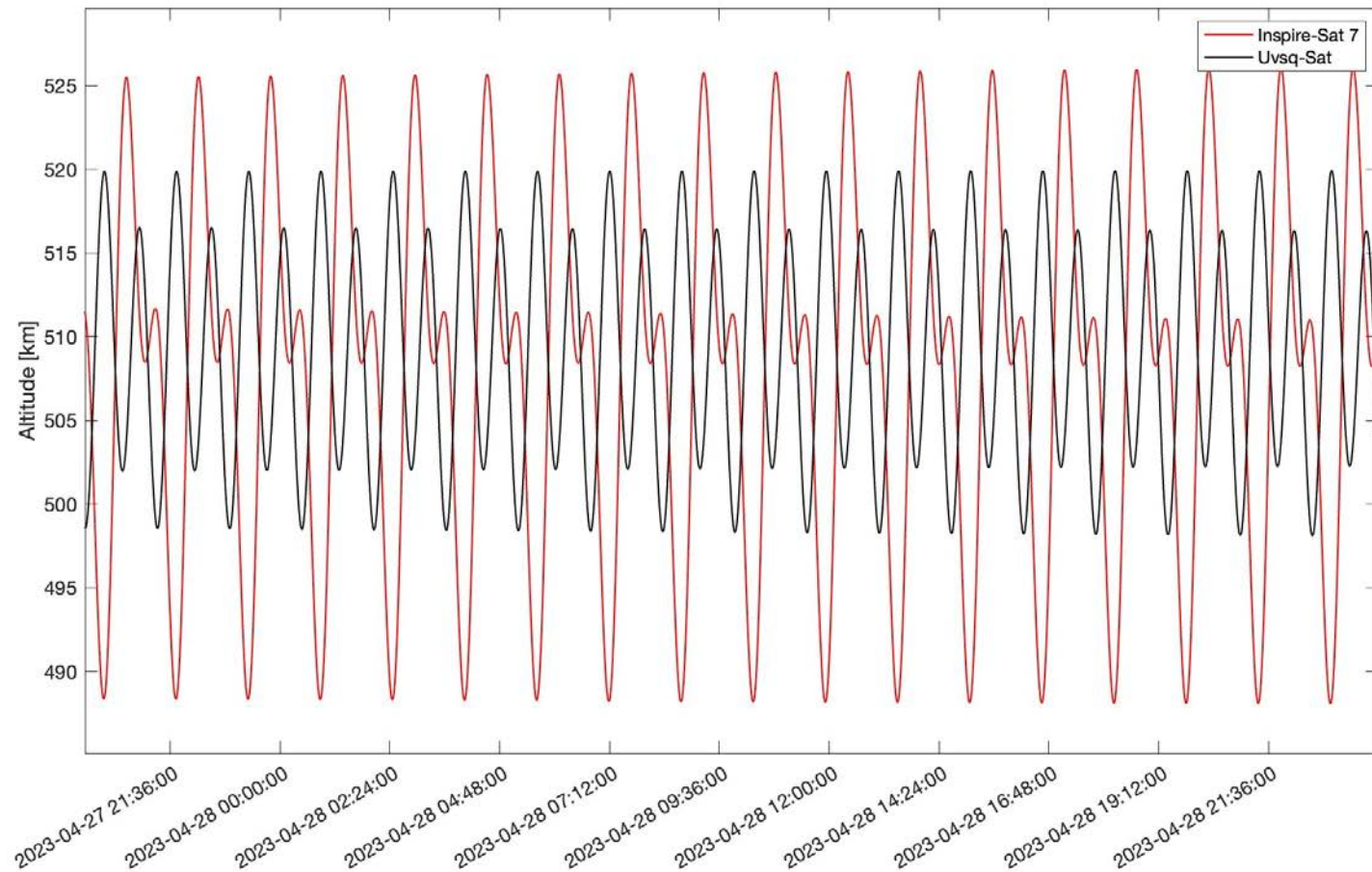
3 – Launch & commissioning phase



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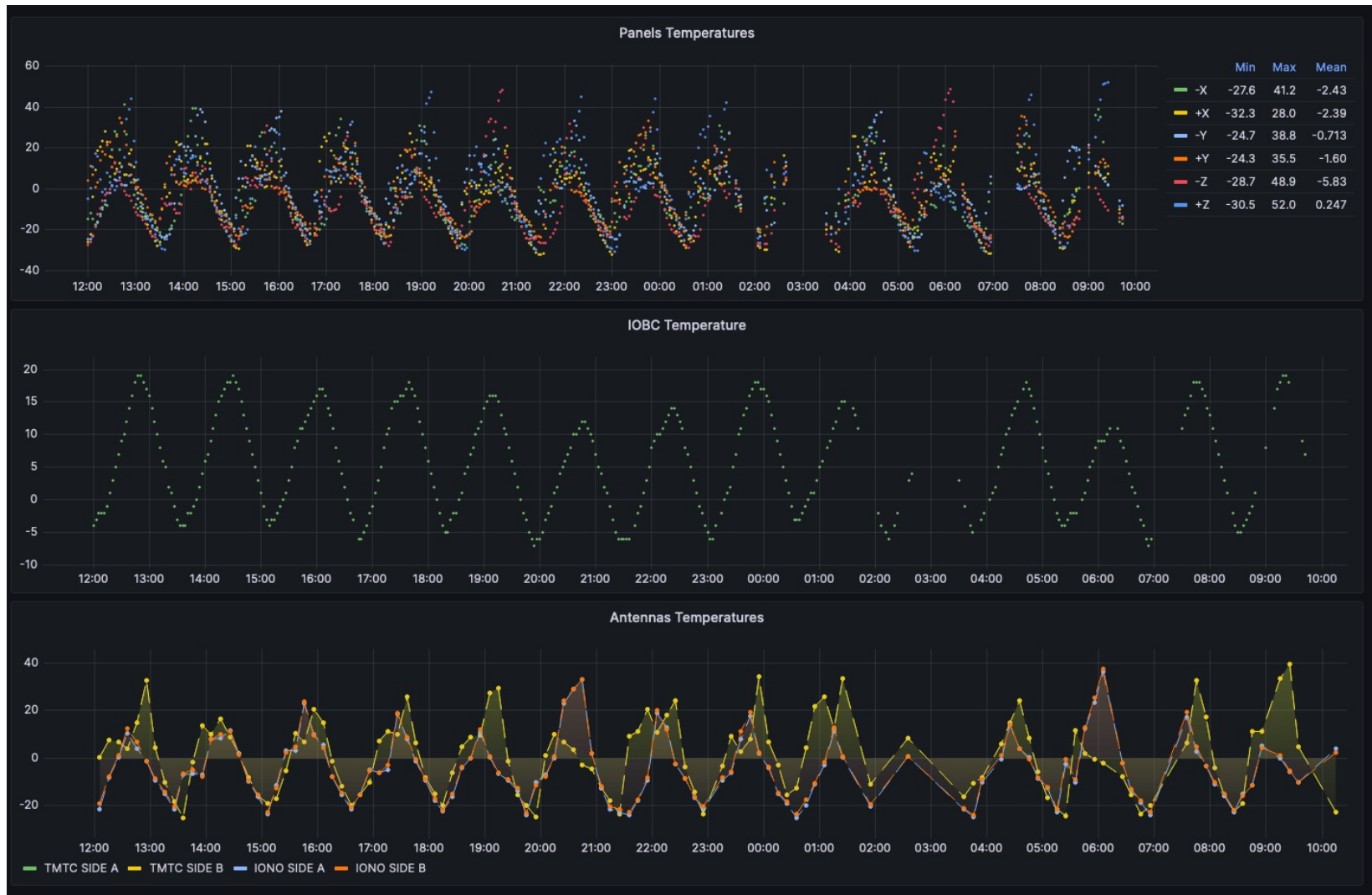


3 – Launch & commissioning phase



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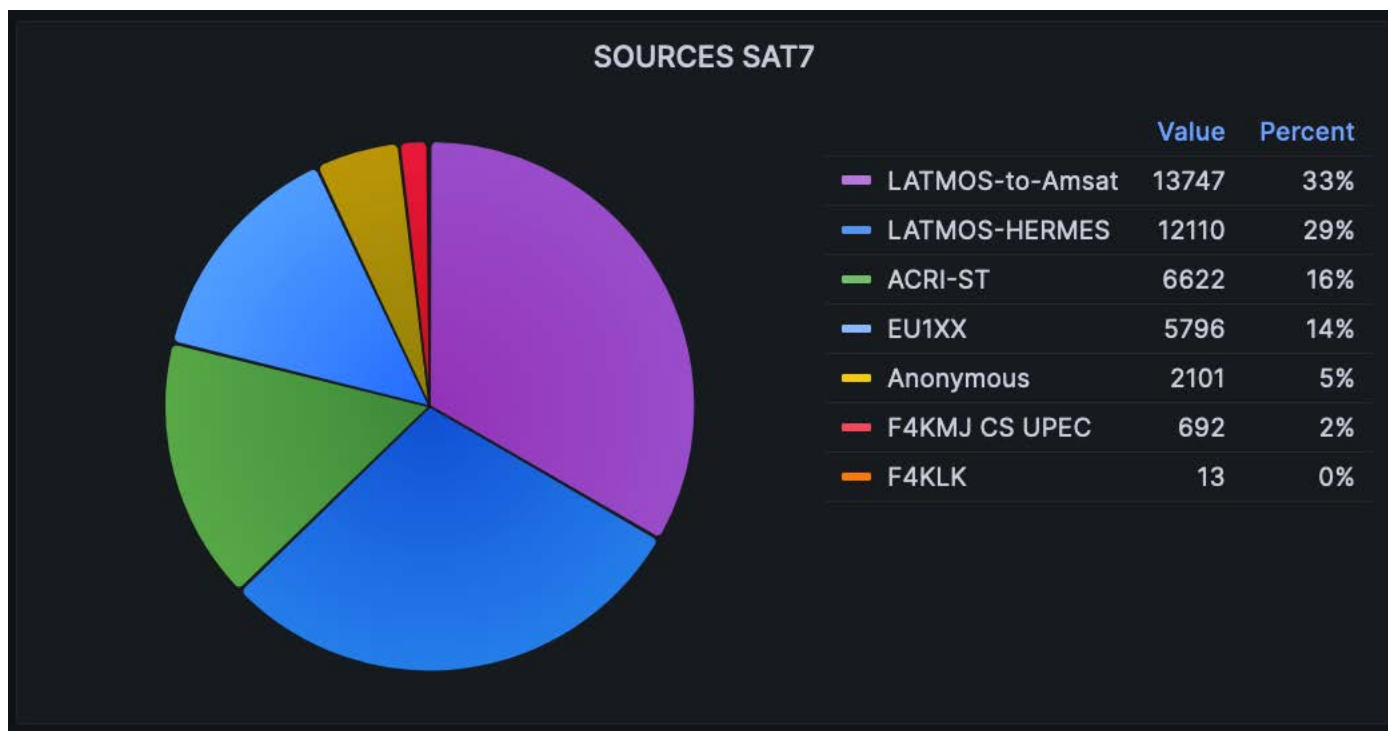
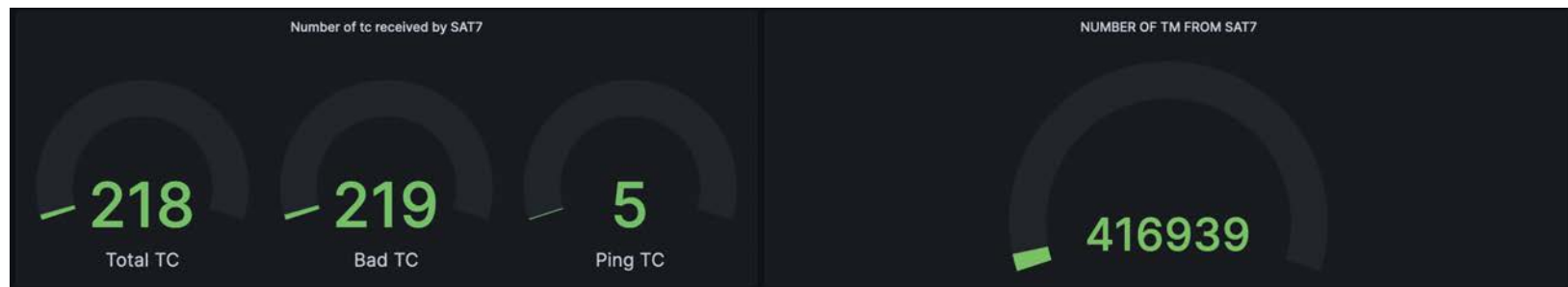
5 to 12 May 2023 – Inspire-Sat 7



3 – Launch & commissioning phase



4 – Current status



4 – Current status



INSPIRE-SAT 7

NORAD ID 56211

Success Rate 48.41%

Observations

886

429

101

345

11

Mode U TLM - BPSK9k6 AX.25

Total Observations: 882



Mode V/U - FM Transceiver - SPINO

Total Observations: 4



4 – Current status

ERS

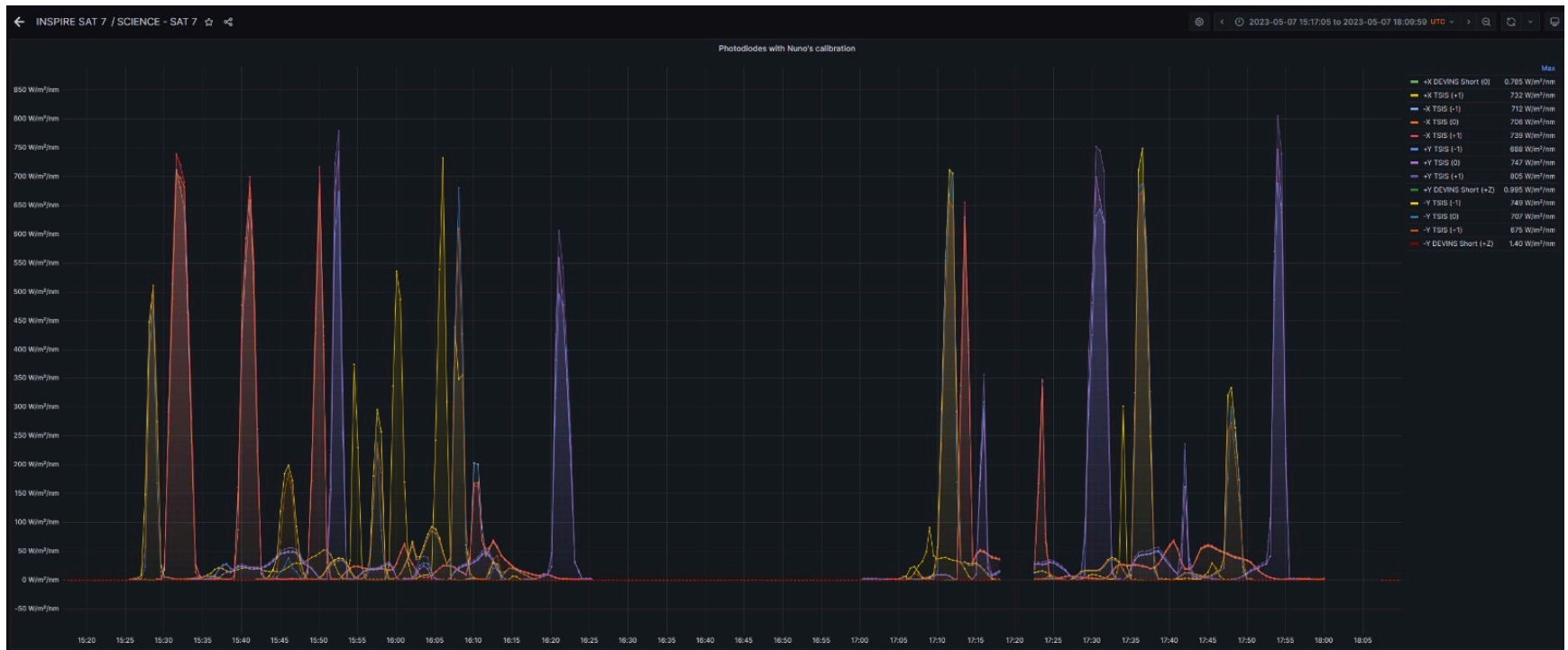


4 – Current status



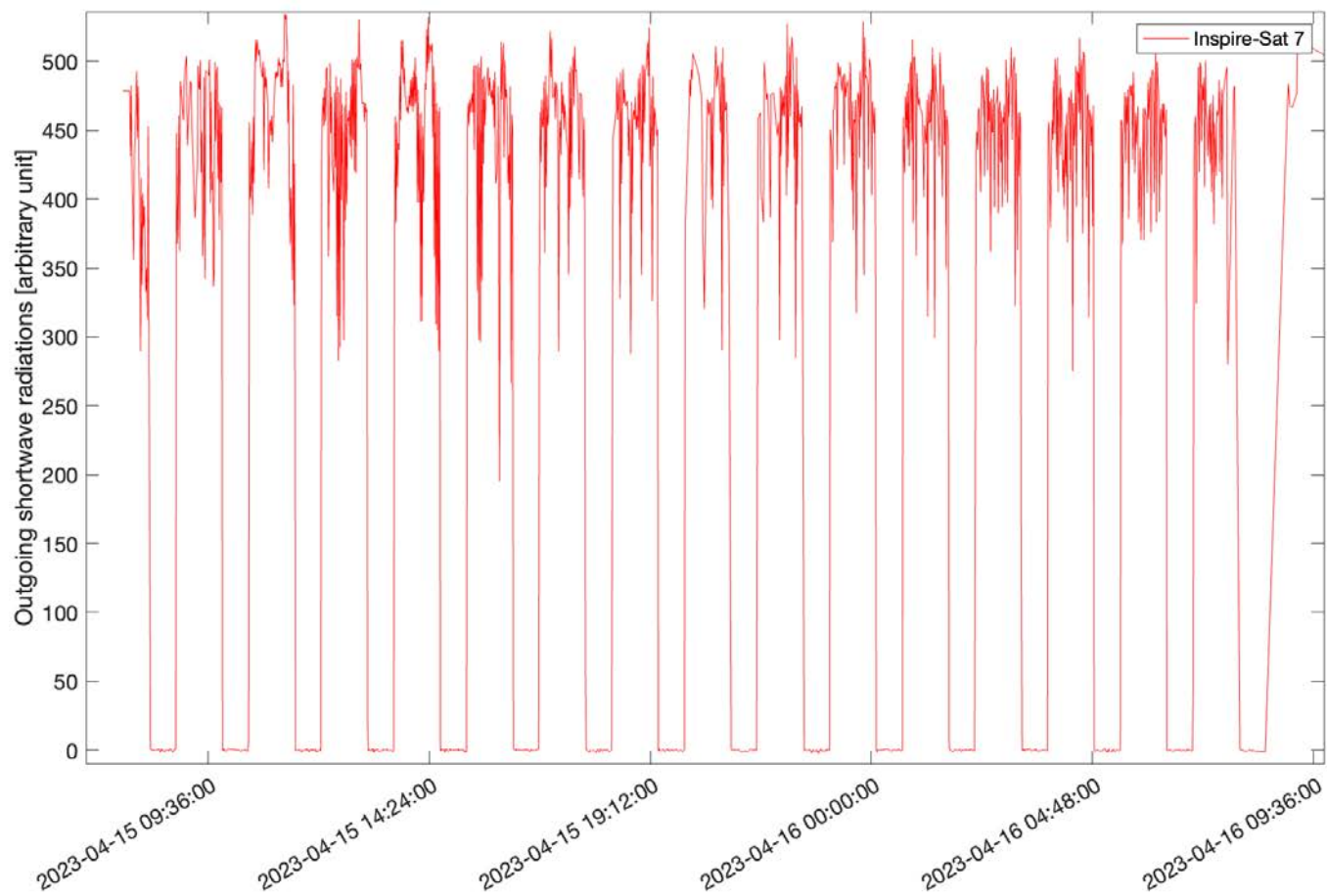
4 – Current status

□ TSIS & DEVINS



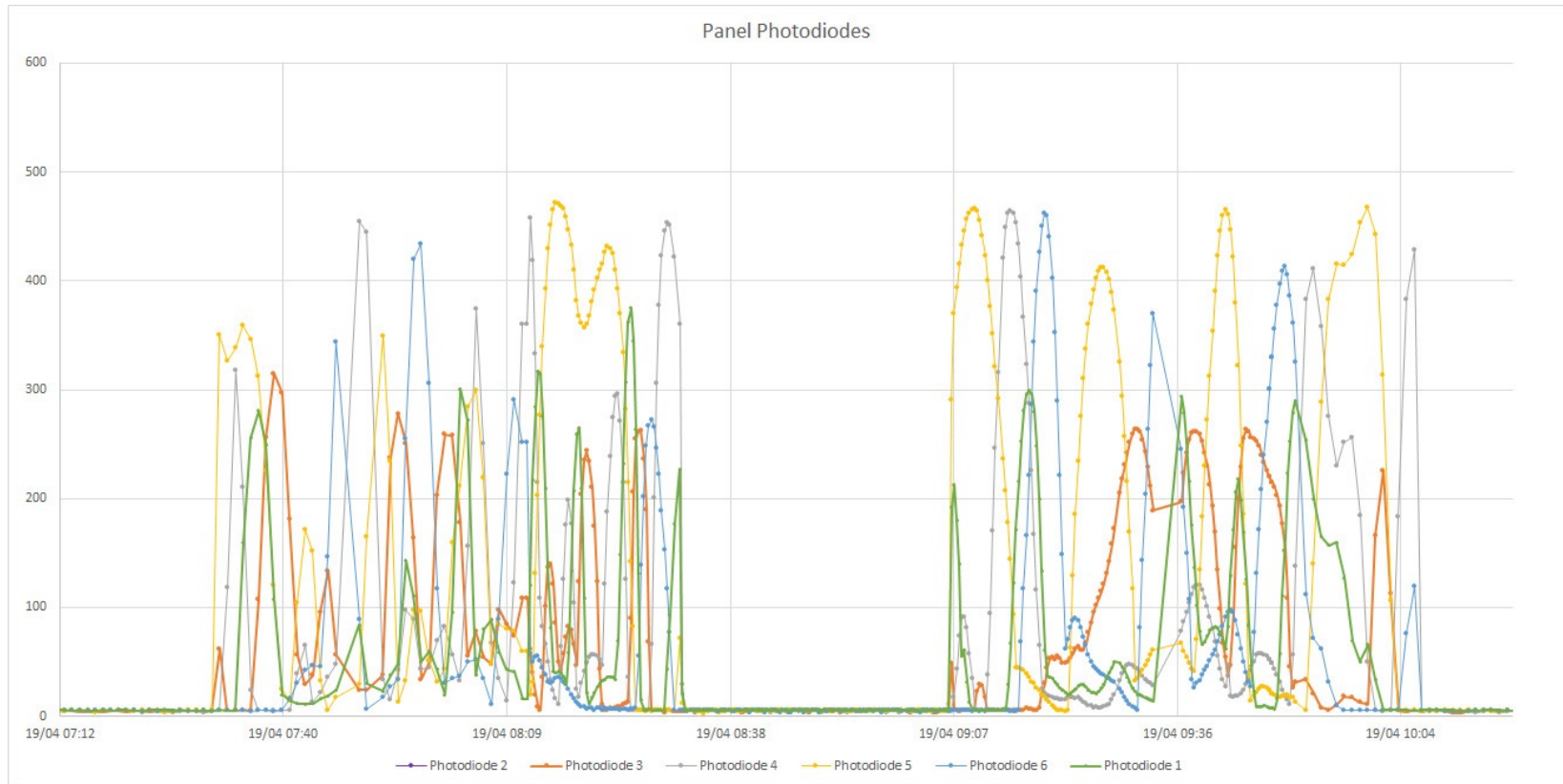
4 – Current status

□ OSR



3 – Launch & commissioning phase

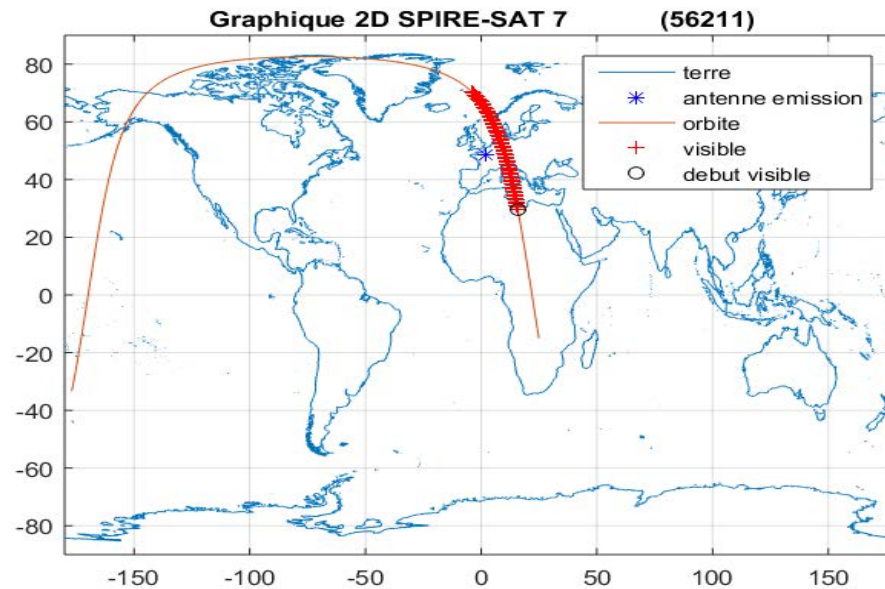
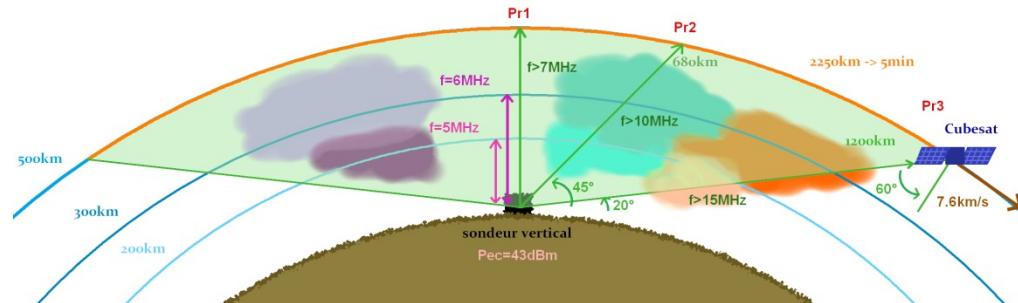
□ IMU – Before & after detumbling (Bdot algorithm)



Date	size of transferred data bits	speed in tps.	number of bit error	frames sent	frames received	latency in tens of ns	jitter in ns	mean digital voltage in mV	mean analog voltage in mV (N/A)	mean polarization voltage in mV (N/A)	mean current in mA (N/A)	peak current during transmission test in mA (N/A)	MCU temperature in °C	OLEDCOMM IC register 1 content	OLEDCOMM IC register 2 content	OLEDCOMM IC register 3 content	OLEDCOMM IC register 4 content	OLEDCOMM IC register 5 content	OLEDCOMM IC register 6 content	OLEDCOMM IC register 7 content	OLEDCOMM IC register 8 content
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11/05/2023 04:36:53	11000000000000000000	07000000	010000000000000000	0A000000	44a43820	fc	ff	110c	0000	0000	0000	Sda5	00	00	00	00	00	00	00	00	00
11/05/2023 04:37:53	00000000000000000000	07000000	010000000000000000	0A000000	44a43820	fc	ff	0000	0000	0000	0000	Sda5	00	00	00	00	00	00	00	00	00
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11/05/2023 04:41:53	00000000000000000000	07000000	010000000000000000	0A000000	44a43820	fc	ff	0000	0000	0000	0000	Sda5	00	00	00	00	00	00	00	00	00
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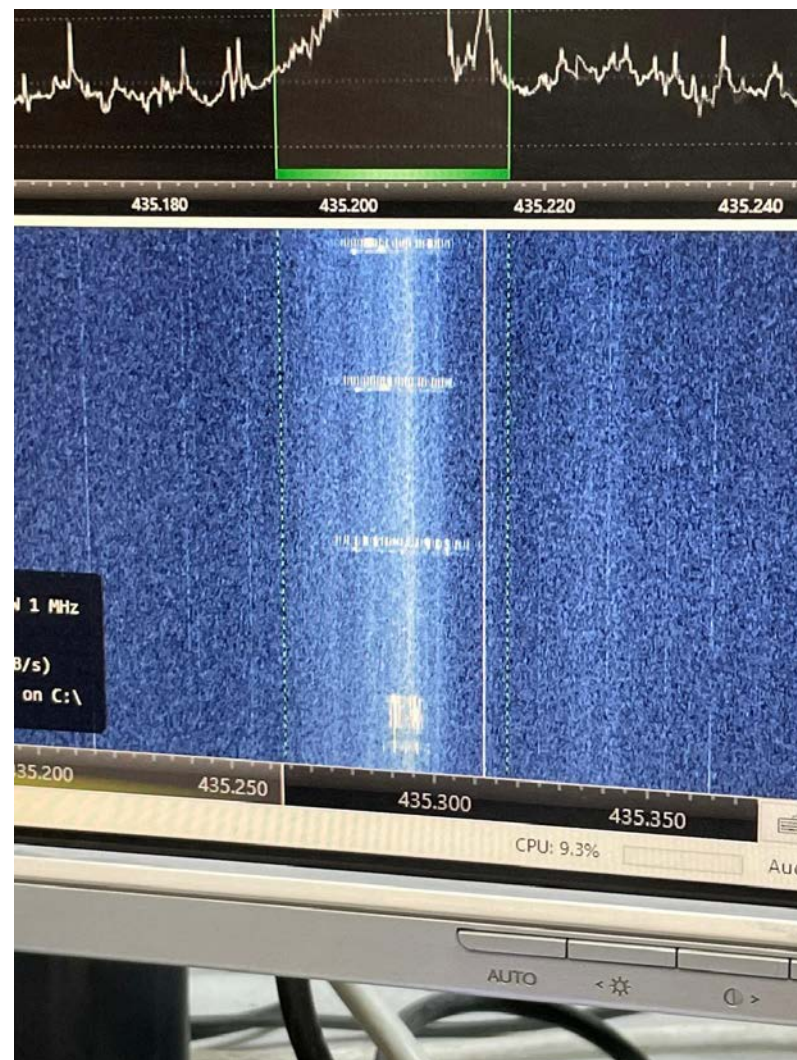
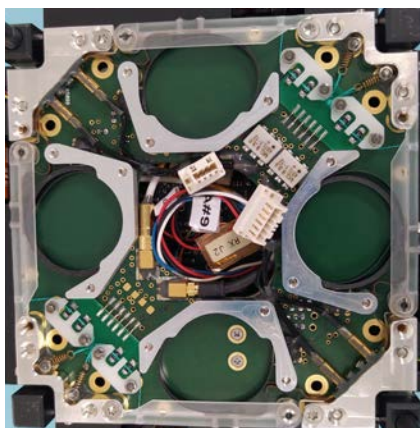
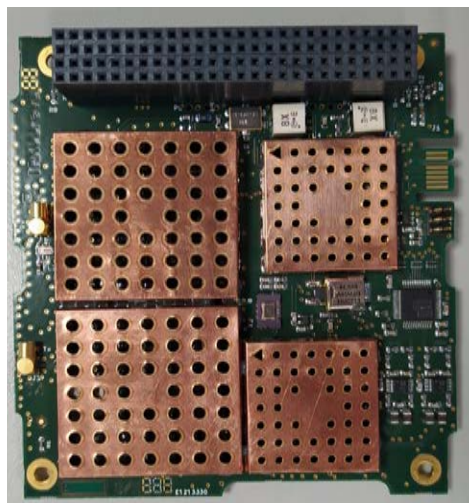
4 – Current status

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4 – Current status

□ SPINO



Conclusions

Our main scientific goal is:

- **To observe essential climate variables with a constellation of small satellites.**

The INSPIRE goals are:

- To initiate a Space Program, and to teach courses related to Space.
- To have Laboratory facilities for hardware development and specialized personnel for teaching.
- To have facilities for building and testing CubeSat/small Instruments.
- To have ground stations for satellite operations.

Our positions are:

- To Design for simplicity and robustness:
 - Assume designs will fail and then prove they will work.
 - Design the satellite for easy assembly and disassembly.
 - Have respectable margins, robust safe modes, few deployables, graceful performance. degradation, and frequent preventative satellite resets.
- To Build an experienced team—it matters:
 - A successful team has veteran member(s) and frequent informal peer reviews (discussions) with proven subject matter experts.

Importance to implement one of our ground station (ELSA or HERMES) in La Réunion.

Conclusions

