



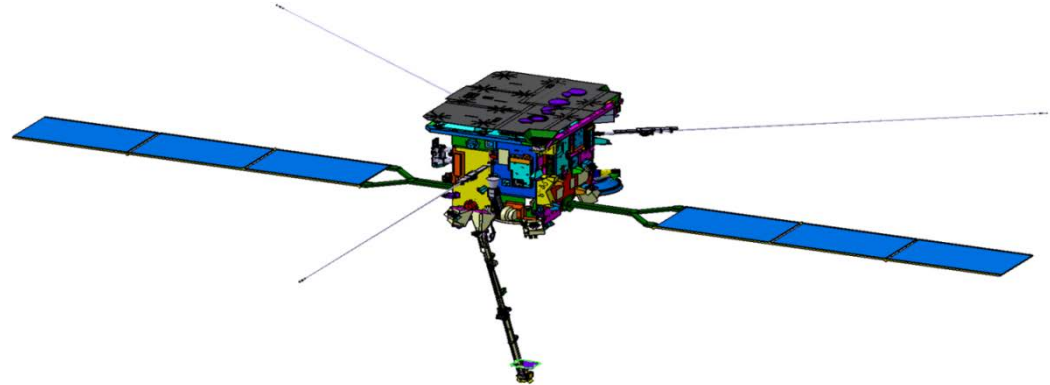
CENTRE NATIONAL D'ÉTUDES SPATIALES

**RPW consortium meeting**

**June 4<sup>th</sup> 2018**

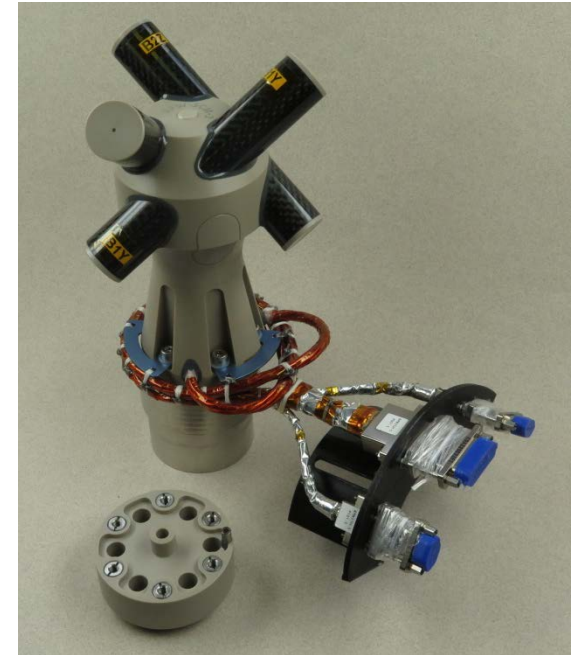


- MEB
- SCM
- Antenna
- RPW system level
- Activities at spacecraft/system level



- MEB PFM electrical integration : **March 2018**
- SFT run with MEB PFM on the S/C : **April 2018 => some FDIR thresholds and Transfer functions to update in IDB**
- LFR :
  - **LFR boot failure** at high temperature on MEB PFM => **probably understood...**
  - **LFR boot failure** at **ambient** temperature on MEB **EM2** => reproduced on MEB EM1, understood (some delays on the booting sequence are a little too short), corrected by :
    - **DAS patch for SFT at S/C level (before S/C environmental test campaign)**
    - **Delivery of a new version of the DAS that already including the correct delays as the default value and upload it in RPW EEPROM (after S/C environmental test campaign for flight)**
  - **Unsynchroneous events** => reproduced on MEB EM1, understood => LFR software bug to correct and validate on MEB EM1
  - **Spurious at 96 Hz** and harmonics emitted by LFR board => **need to update LFR software**
- **LFR spare board (“PFM1”)** finalisation (FPGA programming + soldering) => **activities started => delivery to LESIA planned in sept. 2018**
- LVPS-PDU :
  - **LVPS-PDU spare (FS2) board** procurement => **MRR held May 23th – delta MRR to be held mid June – delivery in November 2018 (TBC)**
  - **LVPS-PDU PFM1 retrofitted - EMC tests pending (to be done at ASI, due to retrofit (new transformers))**

- **FS : calibrated with MEB PFM + delivered to Airbus/ESA in January 2018**
- **MLIs spare bake-out (to be used around SCM FS for TVAC at S/C level, not for flight) => TRB planned on June 8<sup>th</sup> – delivery date TBD**
- **SCM internal calibration with LFR : LFR software updated => to be tested at LPP in June (TBC)**
- **SCM heater activation strategy :**
  - survival (S/C) heating thresholds decreased w.r.t. operational ones in order to avoid simultaneous activation and noise coming from S/C heating lines.
  - Need to pre-heat SCM before start-up
- **MAG/RPW synchronisation test :**
  - Rehearsal with both EM sensors (in  $\mu$ metal box) + MEB EM1 at LESIA => beg. of sept.2018
  - Procedure update/finalisation => september 2018



The magnetic moment test results for each antenna model are summarized in the table below, including the calculation of the magnetic moment at pre-amplifier geometrical center, as explained in paragraph 3.3.

- Magnetic moments :

Antenna	Axis	Measurement at original reference point	Calculation at PA geometrical center point
		M (mA.m <sup>2</sup> )	M (mA.m <sup>2</sup> )
QM	X	8.18	8.88
	Y	-2.77	-2.85
	Z	-7.99	-9.40
<b>Moment (mA.m<sup>2</sup>)</b>		<b>11.77</b>	<b>13.24</b>
FM1	X	-8.55	-9.02
	Y	2.16	2.15
	Z	-7.11	-7.43
<b>Moment (mA.m<sup>2</sup>)</b>		<b>11.32</b>	<b>11.88</b>
FM2	X	-4.26	-4.59
	Y	-1.09	-1.08
	Z	-10.27	-10.60
<b>Moment (mA.m<sup>2</sup>)</b>		<b>11.18</b>	<b>11.61</b>
FM3	X	-3.8	-4.02
	Y	1.58	1.57
	Z	-4.04	4.20
<b>Moment (mA.m<sup>2</sup>)</b>		<b>5.77</b>	<b>6.02</b>
FS1	X	-6.48	-6.99
	Y	2.04	2.03
	Z	-16	-16.52
<b>Moment (mA.m<sup>2</sup>)</b>		<b>17.38</b>	<b>18.05</b>

Table 10 Magnetic moment for all RPW antennas

All antenna models are compliant with requirement of AD1 except the FS01 which is slightly above the magnetic moment limit of 15 mA.m<sup>2</sup>.

# PA heater harness shielding

## 8.4.1 NOMINAL HEATER LINE

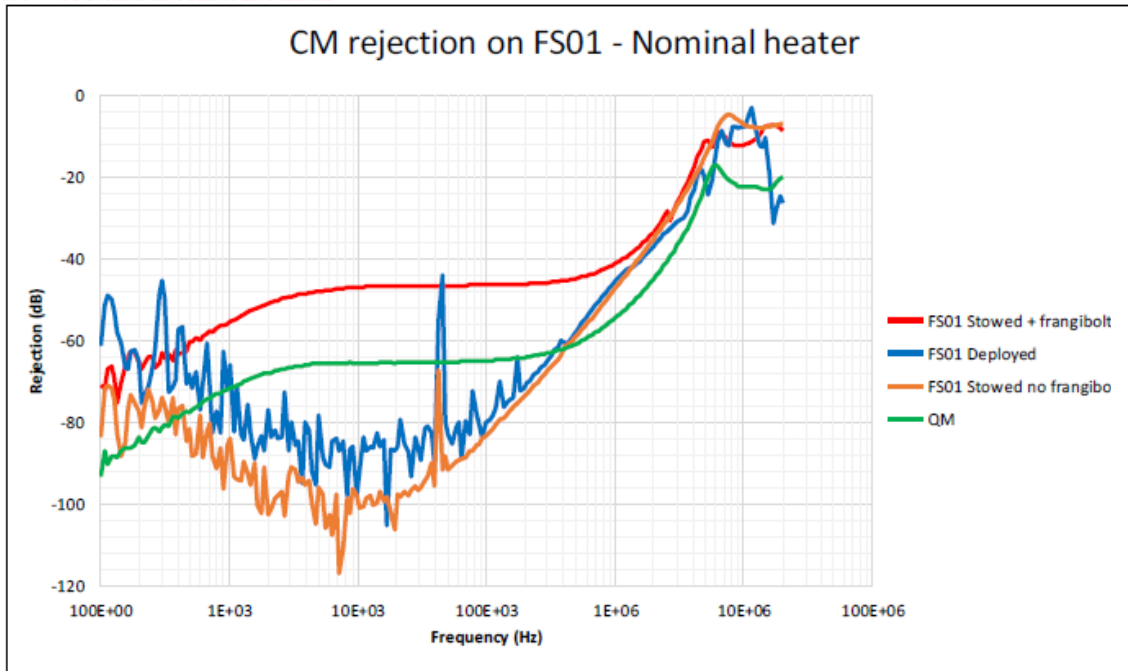


Figure 15 FS01 rejection on nominal heater

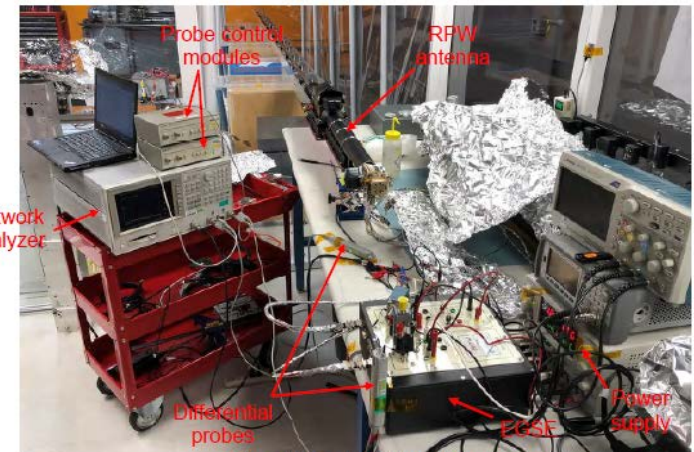
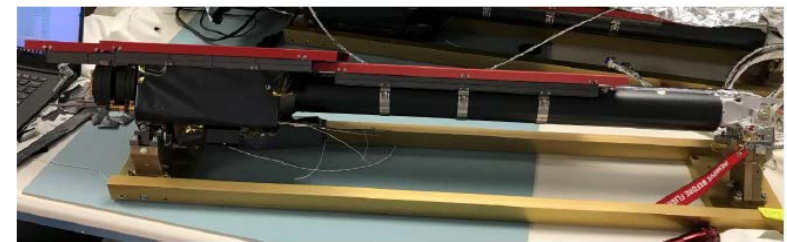


Figure 4 Picture of rejection test setup

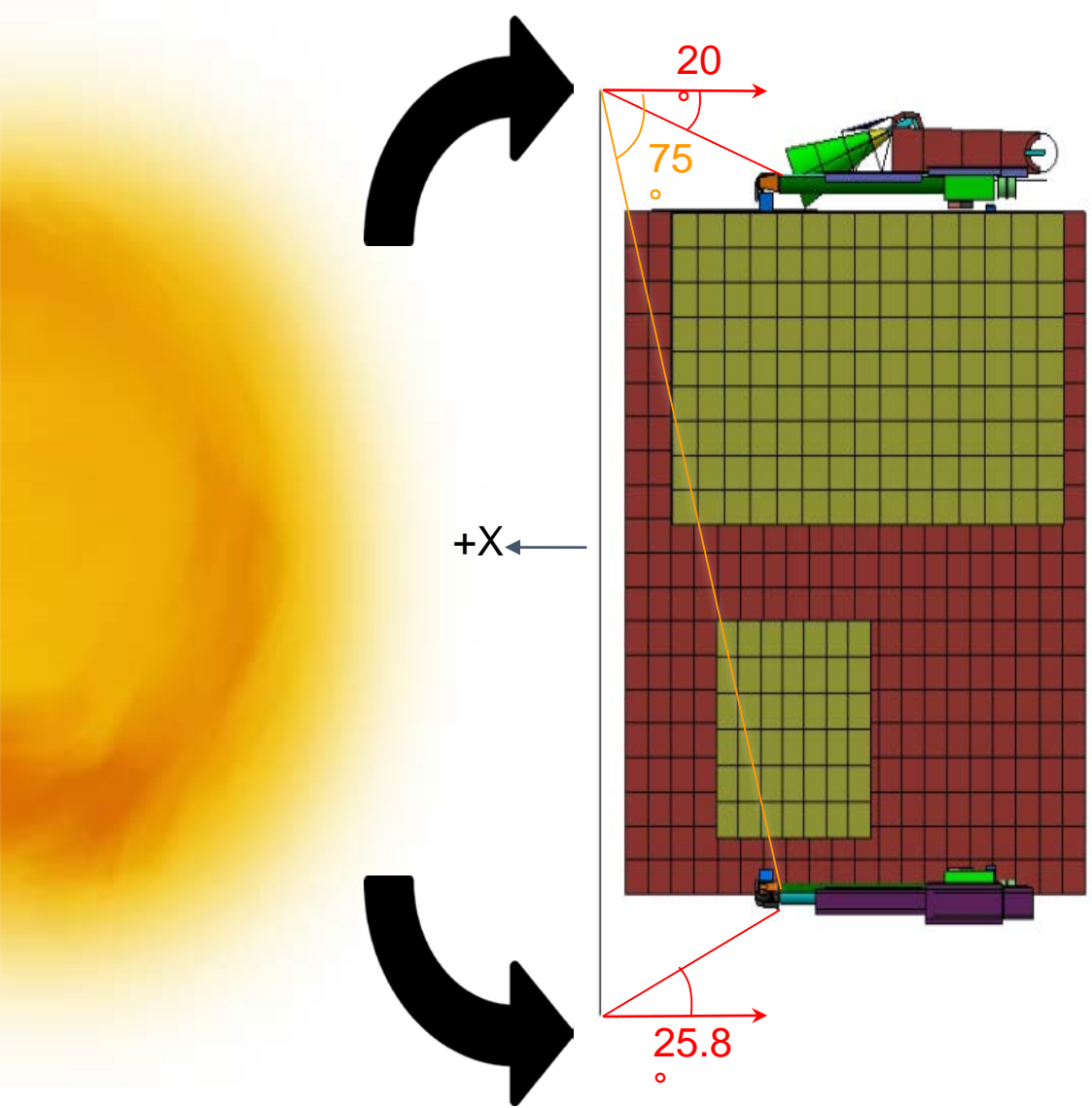
- Acceptance tests (Vibrations/TVAC) : January- February
- Boom and stacer deployments after environmental tests
- FS hinge motorization tests to show positive torque margins for boom deployment until  $-65^{\circ}\text{C}$  => **deployment required above  $-55^{\circ}\text{C}$**  ( $10^{\circ}\text{C}$  qualification margin)
- **Cold motorization issue : in-orbit predicted hinge temperature is around  $-80^{\circ}\text{C}$** 
  - spacecraft rotations around +Y axis, needed in LEOP => to be assessed by Airbus
  - Additional motorization tests at CNES on QM hinge with flight representative flyweightbrake (until  $-70/-75^{\circ}\text{C}$  if possible) – June to August 2018
- Risk of PZ antenna stacer unexpected deployment when sun illuminated => **no PZ antenna in TVAC sat...**



**DRB at CNES : April 12-13<sup>th</sup>**



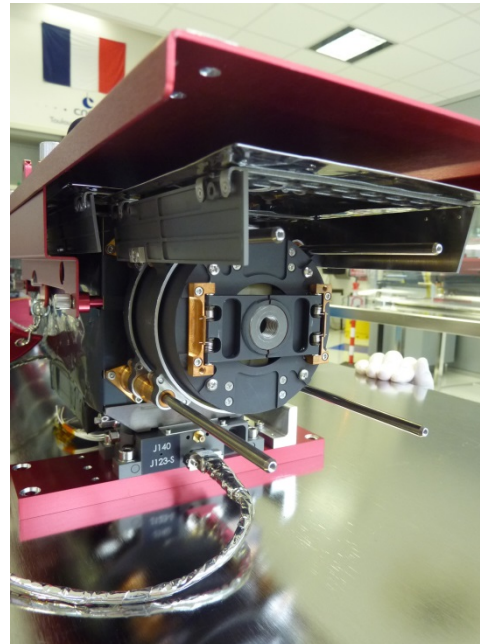
# Satellite rotation around Y axis to escape heat shield shadow





## ■ Activities at CNES Toulouse

- ◆ Antenna + MLI delivery (3 FM +FS) : 29<sup>th</sup> May 2018
- ◆ Unpacking / Inspection : some MLI blanket NCRs
- ◆ Health check tests : grounding minor open points to discussed with Stellar



## Scientific performances :

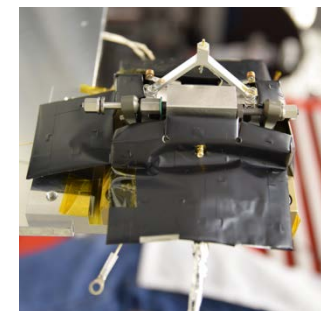
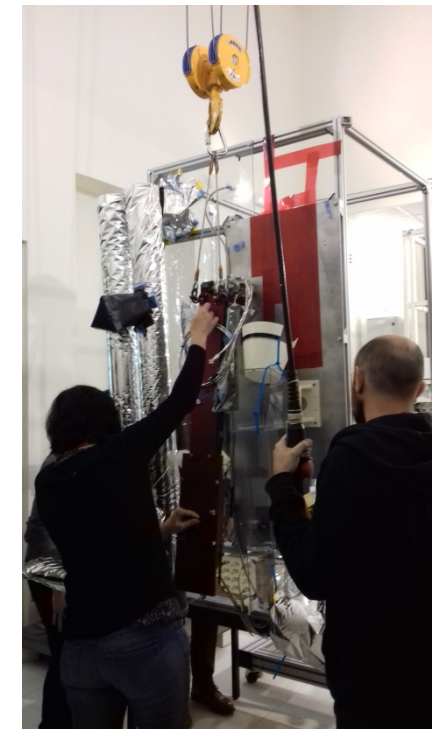
- Delta-calibration of RPW instrument : report released => to be distributed
- Update of “Science performance justification” (SOLO-SY-TN-271-CNES) => April 2018 draft version

## Contamination topics :

- Thruster impingement impacts :
  - nitric acid tests on-going on RPW samples (risk of chemical attack of MLIs (kapton) and silver braids/VDA of antenna hinge harness)
- Molecular contamination risk :
  - During S/C TVAC : if thermal chamber + S/C not fully pre-baked out + S/C venting holes too close from antennas => +Z antenna not installed
  - At BOL, when antennas are stowed => wait for update of contamination analysis with correct temperatures !

## ■ At Airbus DS (Stevenage- UK)

- ◆ **Antenna (+/Y) and antenna +Z (TBC) pre-handover/handover : 25-28<sup>th</sup> June 2018**
- ◆ **Antenna mechanical/electrical integration : 20-26<sup>th</sup> July 2018**
- ◆ **SCM FS mechanical/electrical integration :**
  - On ambient plate for RPW SFT : **July 31<sup>st</sup> – August 1<sup>st</sup> 2018**
- ◆ **SFT – partial FFT (under discussion with ESA) at RPW level on S/C before TVAC :**
  - **2<sup>nd</sup> of August for dry-run with sensors (SCM FS + antennas +/-Y)**
  - **21<sup>st</sup> to 22<sup>nd</sup> of August for formal run**
- ◆ **Antenna MLI integration – 12<sup>th</sup> to 19<sup>th</sup> of September**
- ◆ **Spacecraft shipment to IABG : Sept. 27<sup>th</sup> 2018**



E.Bellouard

## ■ At IABG (Germany)

- ♦ SCM FS (+ MLI) mechanical/electrical integration on thermal plate before TVAC : 2-3 October 2018
- ♦ TVAC : Oct. 17th – Nov. 5th 2018
- ♦ +Z antenna mechanical/electrical integration : November TBD
- ♦ SCM FS (+ MLI) mechanical/electrical integration on I-boom : November 2018
- ♦ I-boom mechanical/integration on +Z panel : November 2018
- ♦ RPW SFT with 3 antennas + SCM FS on I-boom : TBD
- ♦ Mechanical campaign (vibrations sine + acoustic) : January 2019
- ♦ Antenna release checks => cancelled but Frangibolt firing lines validation (TBC) February 2019
- ♦ EMC campaign : April-June 2019 > see Eric's slides
- ♦ FFT in quiet magnetic environment : date TBD – in anechoic chamber ? (under discussion with ESA/ADS)