

RPW Consortium Meeting #24 – RPW NECP Status & Report

E. Lorfèvre - June 26th 2020

Agenda

- **General status on NECP**
- **RPW instrument behavior**
- **Main activities summary**
- **Unexpected events & anomalies**
- **Open activities**

General Status on NECP

Despite the COVID context, all activities, originally planned for NECP, have been carried out.

- **Timeline Summary of Activities**

	Date/Hour (UTC) - Start	Date/Hour (UTC) - End
First RPW Switch ON	11/02/2020 08:00:37	
PZ Antenna Deployment – IW3	11/02/2020 09:21:11	11/02/2020 09:33:17
IBoom Deployment – IW2	12/02/2020 19:03:00	12/02/2020 19:04:00
PY Antenna Deployment – IW3	13/02/2020 00:12:11	13/02/2020 00:24:21
MY Antenna Deployment – IW3	13/02/2020 00:36:41	13/02/2020 00:48:46
RPW SFT – IW1	24/02/2020 23:35:00	25/02/2020 03:07:00
Calibration rolls #1 to 4 - IW4	25/02/2020 03:27:00	28/02/2020 11:16:00
Continuous activity - IW8	28/02/2020 11:16:00	16/06/2020 00:00:00
PAS Filtering - IW7	07/05/2020 20:00:00	08/05/2020 05:00:00
Interference campaign - IW6	02/06/2020 06:47:00	03/06/2020 13:17:00
Continuous activity – IW8	03/06/2020 13:17:00	06/06/2020 05:00:00
IIC - IM-IIC_MAG_RPW_EPD_SWA	06/06/2020 05:00:00	06/06/2020 08:00:00

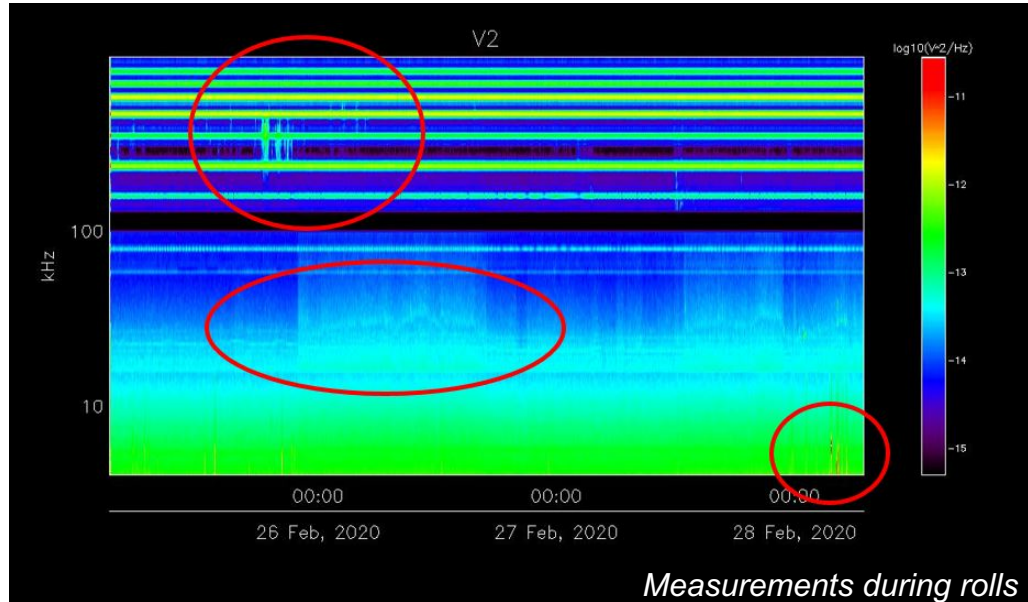
- A draft version of RPW commissioning report (SOLO-RPW-RP-2490-CNES) has been provided for MCRR held on June 25th.

RPW Instrument Behavior

- I-boom and RPW antennas have been fully deployed during LEOP phase.
- RPW instrument and its sub-systems show a nominal functional behavior in-flight.
- The SFT performed at the beginning of the NECP phase allowed to assess the good health of the instrument suffering the launch environmental constraints. The behavior of the instrument and its sub-systems is nominal and all functional parameters are in the range of the expected values.
- Unfortunately, perturbations are observed especially in the 120 kHz domain (PCDU APRs).
- All unexpected errors and anomalies observed during LEOP and NECP phases are described in the RPW commissioning report (*SOLO-RPW-RP-2490-CNES*). All of them are understood, fixed or minor (see slides 8-9).
- RPW thermal behavior is in accordance with the expected one. A detailed analysis will be provided in the final version of the RPW commissioning report.

Main Activities Summary 1/3

- **I-boom and RPW antennas deployments (IW2 & 3)**
 → Successful
- **RPW SFT (IW1)**
 → Successful
- **Calibration Rolls (IW4)**
 - To properly estimate the antenna gain, effective length and vector direction in space using AKR measurements, rolls along the spacecraft +X axis have been performed → Analysis in progress



Main Activities Summary 2/3

- **Continuous Activity (IW8)**

- **Very productive activity**

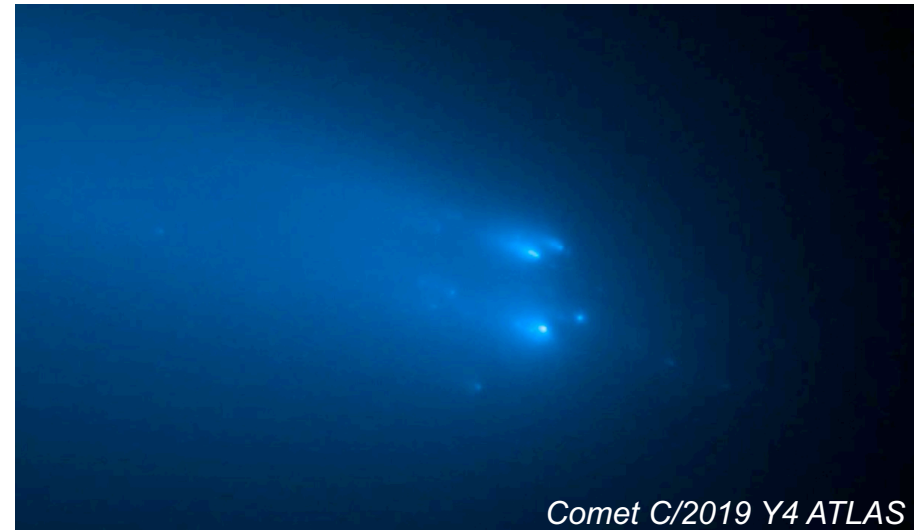
- The activities performed in a continuous way (almost) over the entire NECP period allowed to test in-flight all instrument functional modes :
 - NORMAL mode: DFLT configuration, LOW/HIGH rate, Galaxy mode, as well as many other config. for each analyzer
 - BURST mode: DFLT configuration
 - "Degraded" SBM mode: DFLT configuration
 - BACK UP mode (but only during a half day)
 - Internal Calibration for LFR, TNR-HFR and BIAS
 - BIAS sweep
 - Triggering snapshot (TS) Dump in NORMAL mode
 - Non nominal HK generation

All configurations have been checked in flight with/without data compression and also with/without SWA synchro

- Some capabilities have still to be checked more or less extensively:
 - Other SBM modes (carried out only during IIC test) with TS Dump in SBM2
 - BACK UP mode more extensively
 - LFR k-coefficients in-flight modification
 - HFR list mode (selected frequency acquisition)

Main Activities Summary 3/3

- **PAS Filtering (IW7)**
 - First analysis show no significant perturbation induced by PAS → More details in the final version of the commissioning report.
- **Inter-Instrument Communication Campaign (IM-IIC)**
 - Analysis in progress (see Xavier's slides)
- **EMC Interference Campaign (IW6)**
 - Analysis in progress,
 - Dedicated EMC report to be issued
- **ATLAS Comet Crossing**
 - Analysis in progress



Comet C/2019 Y4 ATLAS

Unexpected Events & Anomalies 1/2

"Operation" Issues

- Temperature FDIR trigg. at SCM switch-ON
- DPU AHB correctable errors
- Time code anomaly observed in Flight
- Error during compression process

- Warning on PDU_BIAS_M5V_CURRENT param.
- DAS buffer overflow

- DPU_EVENT_ME_DPU_WAIT_SYNC

MAJ/ Close/ FDIR threshold has been modified

Min/ Close/ Expected errors

Min/ Close / Use-as-is, good ability to resynchronize

MAJ/ Understood/ Some TDS products more sensitive but depending on periods, events have been deselected

Min/ Close/ Threshold value has been increased

MAJ/ Understood/ SBM data lost, right setting to be checked in-flight and on MEB EM

Min/ Close/ To take into account SWA synchro in command timing

Unexpected Events & Anomalies 2/2

"Design/Development" Issues

- SCM temperature TM value not below $-53,8^{\circ}\text{C}$
- Heater spurious on SCM measurements
- SW_PROCANOMALY errors during SFT
- TIMECODE_CTR errors during SFT
- TDS medium severity error during BIAS sweep
- TNR EPOCH time issue

MAJ/ Close/ FDIR not usable below, SCM temperature monitored at ground with heater duty cycle

MAJ/ Close/ Data processing to filter spurious

Min/ Understood/ To take into acc. in TDS SW upgrade

Min/ Understood/ To take into acc. in TNR SW upgrade

Min/ Understood/ To take into acc. in TDS SW upgrade

Min/ Investigation in progress/ Small amount of data impacted

Issues Under Investigation

- BIAS sweep duration

Other Open Activities (To discuss at Consortium Meeting or later)

- FSW upgrade → To be done after anomaly + EMC perturbations analysis, not planned before next year
- SCM calibration → To be done at next Earth fly-by (Nov. 2021)
- Selected burst modes → To be done during Cruise phase, see Xavier's slides
- Other modes or functionalities to check (HFR list mode, LFR K-coeff setting, backup mode) → To be done during Cruise phase
- HGA induced perturbations → To be addressed
- RPW thermal assessment report → To provide before November (including analysis for 1st VGAM thermal environment)
- Wheel Off Loads → Analysis in progress
- Effect of Solar Array rotation on Potential and S/C perturbations → To be addressed