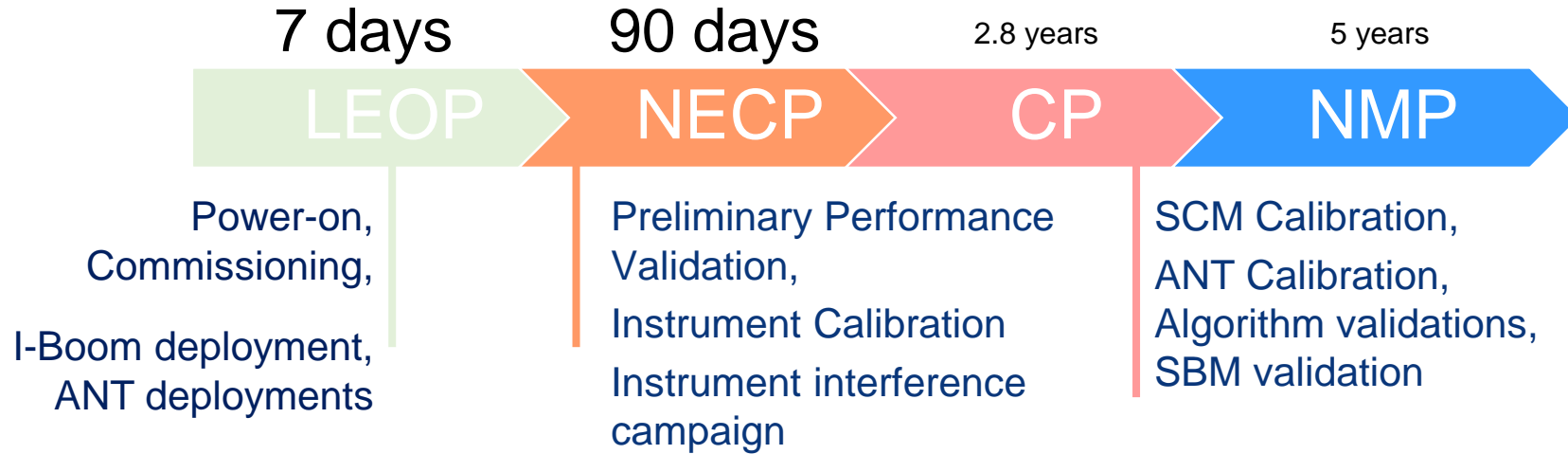


# RPW COMMISSIONING

RPW Consortium Meeting #21



# Instrument Operation Time line



## Launch & Early Orbit Phase (LEOP)

- **RPW first power-on / CNES responsibility with LESIA support**

*Aim : RPW instrument health check*

- To check startup sequence, health status

- **RPW In-Flight SFT (in stowed config.) / CNES responsibility with LESIA support**

*Aim : RPW instrument functional check before any deployment*

- To check TMTC, behavior, currents, secondary bias, temperatures,...
- To check mechanical parts (BIAS and preamp relays )
- To check science TM, noise floor, sweep + low latency, internal calibrations

- **I-Boom Deployment / CNES responsibility with LESIA support**

*Aim : SCM deployment monitoring and Science Measurement*

- To check SC HK (switch, temperatures...)
- To perform science measurement (see discussion during previous consortium meeting)

- **ANT Deployments / CNES responsibility with LESIA support**

*Aim : ANT deployment monitoring and Science Measurement*

- To check SC HK ( $\mu$ switch, temperatures...)
- To perform science measurement (see discussion during previous consortium meeting)

## Near Earth Commissioning Phase (NECP)

- **Instrument Calibration / CNES responsibility with LESIA support**
  - To perform ANT auroral kilometric radiation (AKR) calibration rolls
  - To perform SCM calibration in earth lobes magnetosphere
- **Instrument interference campaign / CNES responsibility with LESIA support**

**Aim : Assessment of the in-flight performances**

  - To check inter instrument interferences (wrt auto compatibility results)
- **Preliminary Performance Validation**

**Aim : Assessment of the in-flight performances**

  - To check science mode & TM, noise floor, sweep, low latency
  - To check internal calibrations and algorithm validation (LFR, TDS, SBM)
  - To check PAS filtering, wheels filtering
  - To validate the Bias current setting operation routine
  - To perform first galaxy measurement
  - To take into account HGA interference and Spice heatshield door illumination

## RPW First Power on & In-Flight SFT (to be discussed)

### **Assumptions:**

- After a first RPW switch-on, instrument health is checked performing an in-flight Short Functional Test (SFT) is perform to check.
- I-boom and antennas are in stowed positions.

**In this phase, RPW is powered on for the first time in flight then a SFT is perform (step by step or not). General behavior, TMTC, currents, secondary bias, temperatures are checked, mechanical parts (BIAS and preamp relays ) are switched and science TM, noise floor, sweep + low latency, internal calibrations are verified.**

**This phase shall be planned at least 12h min and 24h max before the next RPW switch-on (i.e. for I-Boom or ANT deployment). Total duration is ~1h30mn.**

# I-Boom Deployment Operation Specification (to be discussed)

## Assumptions:

- The I-Boom deployment will occur during the LEOP phase.
- RPW will be switched-off before and after the I-Boom deployment.
- During the Boom deployment only the MAG instrument will be also switched-on.
- The SSMM will be available.
- MOC will control the deployment of the I-boom.

**In this phase, RPW measures the noise of the platform. RPW is set in a single specific configuration for I-BOOM deployment. Measurements will be also taken during the first and last 10 minutes before and after the IBOOM deployment. RPW in SURVEY\_BURST SCIENCE submode with both spectral modes (all frequencies for B) and waveforms.**

## Minimal requirements:

THR: B field on channel 1 and E on channel 2 (all frequencies, max freq resolution).

LFR: spectral mode maximum frequency resolution.

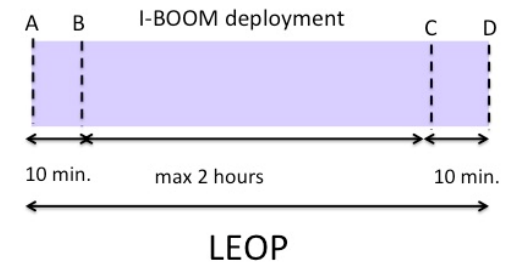
No TDS.

## Maximal requirements

THR: B field on channel 1 and E on channel 2 (all frequencies).

LFR: spectral mode maximum frequency resolution, B waveforms at 256 Hz.

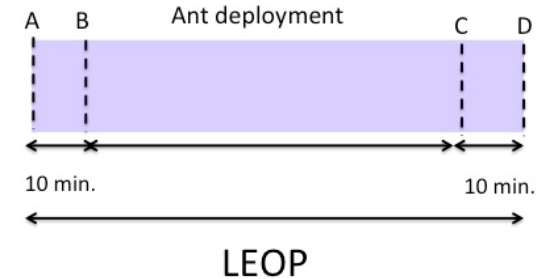
TDS snapshots



# RPW Antennas Deployment Operation Specification (to be discussed)

## Assumptions:

- The main objective is to acquiring RPW data during the electrical antennas (ANT) deployment (x3).
- The antenna deployment will occur during the LEOP phase.
- RPW will be switched-off before and after the antenna deployment.
- The SSMM will be available.
- MOC will control the deployment of the antennas.
- The ANT deployment will be performed one by one, starting with the PZ (ANT1), then PY (ANT2), finally MY (ANT3). Details given in the RPW UM.



**In this phase, RPW measures the noise of the platform. RPW is set in a single specific configuration for antenna deployment. Measurements will be also taken during the first and last 10 minutes before and after the antenna deployment. RPW in SURVEY\_BURST SCIENCE submode with both spectral modes (all frequencies for B) and waveforms.**

## Minimal requirements:

THR: B field on channel 1 and E on channel 2 (all frequencies, max freq resolution).

LFR: spectral mode for B and E at the max frequency resolution, waveforms at the min resolution

TDS snapshots at the minimum resolution

## Maximal requirements

THR: B field on channel 1 and E on channel 2 (all frequencies max freq resolution).

LFR: spectral mode for B and E at the maximum frequency resolution, waveforms at the maximum resolution

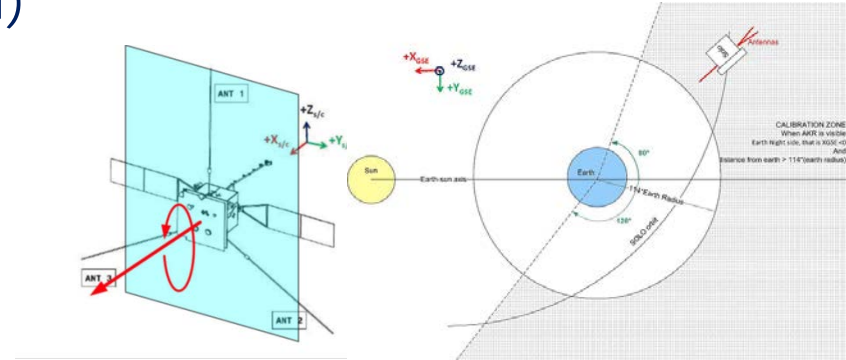
TDS snapshots at the maximum resolution.

## Instrument Calibration (to be discussed)

### ANT auroral kilometric radiation (AKR) calibration rolls

#### **Assumptions:**

- S/C is in Sun pointing attitude (X axis)
- Only rolls around X axis are allowed.
- The Earth distance shall be between greater than 115 and less than 1000 Earth radii, on the night side of the Earth (TBC).



**The ANT calibration rolls can be planned during the first weeks of NECP or immediately after the EGAM.**

### SCM calibration in earth lobes magnetosphere

#### **Assumptions:**

- The measurement will have to be done when the S/C passes through the Earth magnetic lobes (i.e. close to the Earth) during the first weeks of the NECP and/or during the Earth GAM (EGAM) at the end of the CP.
- All other instruments are OFF, S/C is in EMC quiet mode.

**SOLO pass inside the Earth magnetic lobes is the occasion for RPW to measure SCM sensitivity. During the EGAM, instruments should make some sciences only between maneuvers during which the payload shall be switched-off.**



## Instrument Interference Campaign (to be discussed)

### **Assumptions:**

- RPW will run measurements covering the full frequency range for both magnetic and in electric sensors, in normal and burst mode.
- At the beginning of the campaign all the Solar Orbiter Instruments are OFF. Then they are successively set to ON.
- Towards the end of NECP when all instruments have been commissioned.

**The purpose of this campaign is to characterize the Solar Orbiter payload EMC in space. RPW will analyze the influence of each equipment/instrument, one after the other, on its measurements and on the background noise.**

Switch ON sequence

- 1) Successive switch ON of instruments
- 2) All in-situ instruments ON (remote sensing OFF)
- 3) All remote sensing ON (in-situ OFF)
- 4) All instruments ON
- 5) Interference campaign with the platform

## Preliminary Performance Validation

- **LFR software algorithm validation**
- **TDS software algorithm validation**
- **SBM algorithm validation**
- **PAS filtering, Wheel filtering**
- **Validation of the Bias current setting operation routine**
- **HGA interferences**
- **Spice heatshield door illumination of an antenna**
- ...