



# RPW Science Data Processing Activities

ROC team

## ROC data pipelines:

- ROC-SGSE software and L1/HK data products status
- ROC Operations and Data Pipeline (RODP) software and L1/HK data products status
- Ancillary data products

## RPW Calibration Software (RCS)

- Software and data products status
- New versions of the RCS ICD and guidelines
- RCS responsibilities (recap')

## Data processing-related planning

## Software

- New version V2.1 of the software has been released, with:
  - Leap seconds in Epoch zVariable
  - SWF missing packet data correctly processed
  - New E-GSE time format processing (i.e., "dd/MM/yyyy - HH:mm:ss.ffffff")
  - Possible bug in Epoch time resolution with TDS SWF datasets (to be identified and fixed)
- V2.1 deployed on the ROC server at LESIA.
- Not enough time to be deployed at CNES for the beginning of the delta-calibrations (V2.0 deployed, but without the new E-GSE time format processing + leap second table outdated)
- Delta-calibration data has been sent by CNES to be processed at LESIA

## L1/HK CDF data products

- Some preliminary test data have been already processed during the delta-calibrations.
- Full delta-cal. data package was sent by CNES team last week. It will be processed at LESIA and made available in <https://rpw.lesia.obspm.fr/roc/data/private/cal/system/cnes-gse/PFM/DELTA-CALIBRATION> before end of June. (V03 CDF files processed with V2.1.X software version)
- Production of ROC-SGSE L1/HK V03 CDF data files from all calibration campaigns (EM2/PFM/DELTA) data is planned at LESIA on Sept. 2017 (see planning after)

ROC-SGSE will be used to process RPW data from tests performed at S/C level. (The way to get data must be discussed with CNES)

ROC plans to use the ROC-SGSE during the mission to analyse data from « spare » model on-ground (GSE capabilities during mission to be discussed)

### Software

- The dev. of the RODP, used for mission data processing, has started (inherited from the ROC-SGSE)
  - First migration from the ROC-SGSE source code has been done, but several modules need updates.
  - RODP database definition is in progress (also inherited from ROC-SGSE)
  - Module for Low Latency data processing is working (First RPW LLVM « processing » version delivered to the SOC on March)
  - RCS integration activity needs to be continued. Especially, the RCS ICD Validation tool is not compliant with the new RCS ICD.
  - Interfaces implementation with SOC/MOC is partially done (GFTS OK, EDDS client to be done). But the way to use these interfaces are not yet fully clear (cf. next SOWG#10)
- As highlighted during the ROC KP on January, an additional ROC developer is needed to carry-on the pipeline dev.

### SOLO/RPW data products

- First list of RPW datasets available in the new RODP-RCS spreadsheet (<https://docs.google.com/spreadsheets/d/1awoWBj4la6YgLcuktOFq5L9178lvbUCOeIMETTBqqiQ/edit#gid=1700168470>). Inherited from the ROC-SGSE datasets.
- The ROC team has started to upgrade the content of the L1/HK datasets to be compliant with the ESA spec. [SOL-SGS-TN-0009]. It mostly concern the meta-data (attributes), but some zVars also require attention (quality\_flag, bitmask, etc.)
- Incoming activities:
  - Same work must be done for the RCS L2 datasets, with support of teams
  - L1R datasets list (WF for E and B) and expected content (TDS/LFR teams have inputs)
  - L3/L4 datasets first list and expected content. Not planned to be produced by the ROC pipelines, but might be archived at LESIA and distributed (or at least mirrored) from the ROC Web site (TBC)
  - Quicklooks
  - Auxiliary data (see next slide)
  - Bias specific datasets (cf. dedicated splinter session)

Delivered by the SOC in 2 formats:

- SPICE Kernel format files
- CDF format files

RODP will use the SOC SPICE kernels as primary ancillary data for operations and L1/HK data processing (i.e., OBT-UTC time conversion, orbit/attitude, reference frames)

Producing ancillary CDF files at ROC might be not necessary since SOC will do (TBC). But:

- Orbit/attitude data are required to produce some L2 data files (inputs for RCS?)
- Required for visualization tools (ROC data monitoring tool will include orbit/attitude plotting)

**ROC wants to list the exact needs for RPW data processing**

Ref: [https://issues.cosmos.esa.int/solarorbiterwiki/display/SOSP/SOWG+%239+Agenda+and+Presentations?preview=/18515118/18515930/SOWG9\\_Ancillary\\_Data\\_Walsh.pptx](https://issues.cosmos.esa.int/solarorbiterwiki/display/SOSP/SOWG+%239+Agenda+and+Presentations?preview=/18515118/18515930/SOWG9_Ancillary_Data_Walsh.pptx)



## Software

- First version of RCS source codes and CDF skeletons were delivered by teams and validated by the ROC in the end of Dec. 2016
- The activity relative to the RCS integration into the ROC pipelines has just restarted after ~6 months
- Some upgrades required concerning the ROC-RCS interface to be compliant with the new RCS ICD.

## L1R/L2 CDF data products

- It has been decided to replace the L2R dataset by a L1R dataset [RD1]. Main advantages are:
  - Perform the L2 end calibration at the sensor site
  - Keeping the sharing of calibration responsibilities
  - Keeping the associated expertise
- TDS/LFR teams has indicated that the description of the L1R datasets is in progress. (cf. TDS/LFR slides)
- SOLO/RPW L2 datasets list and skeletons have to be completed/upgraded from the ROC-SGSE L2R data.

[RD1] - [https://confluence-lesia.obspm.fr/display/ROC/RCS+responsibilities+meeting?preview=/3114227/3114229/ROC-MOM-XXXXX-LES\\_Issue01\\_Rev00\(ROC\\_RCS\\_Meeting\\_2017-01-17\).pdf](https://confluence-lesia.obspm.fr/display/ROC/RCS+responsibilities+meeting?preview=/3114227/3114229/ROC-MOM-XXXXX-LES_Issue01_Rev00(ROC_RCS_Meeting_2017-01-17).pdf)



## Documentation

- Updated RCS ICD [ROC-PRO-PIP-ICD-00037-LES\_Iss01\_Rev01] and teams guidelines doc [ROC-GEN-SYS-NTT-00019-LES\_Iss02\_Rev00]. Draft versions submitted to the teams for discussions and approval (see next slides).
- 1 draft of RCS SUM received
- Software technical specification might be also required (TBC)

New RCS ICD [ROC-PRO-PIP-ICD-00037-LES], Issue 01, Rev. 01 (draft):

- Upgrades are required to be consistent with the new ROC pipelines architecture
  - Outputs handling —> ROC pipelines will provide to RCS the path and name of the output CDF files
  - Error/Exception handling
  - Log file convention
  - Testing section —> interface compliance and ROC pipeline integration tests
- ROC pipeline instance (ROC-SGSE or RODP) will have to be transparent from the RCS point of view (same interface, but different datasets and descriptor files)
- From the ROC point of view, the main difference between ROC-SGSE and RODP RCS data should be the file naming convention (done by ROC pipeline in the new ICD) and some meta-data (TBC). At medium term, most of the ROC-SGSE and RODP datasets may be processed in the same way.

**Draft version of the document has been submitted to teams for discussions. It will probably need some upgrades after feedbacks:**

- Case of the Data\_version attributes? Upgraded by RCS from file name or upgraded by the ROC pipeline (before/after RCS execution)
- Descriptor files naming convention to be changed to distinguish between « ROC-SGSE » and « RODP » instance

New Guidelines [ROC-GEN-SYS-NTT- 00019-LES]  
Iss02, Rev00:

- Use of Git for software and CDF skeleton delivery
- ROC-SGSE and RODP will implement the same RCS interface, but one descriptor file per RCS « ROC-SGSE » and « RODP » instance » must be delivered (may need to change the descriptor file naming convention)

Draft version of the document has been submitted to teams for discussions.

# RCS team responsibility

(recap' from Jan. 17 meeting)

RCS data products	Software that produces the data	Software & Data validation leader*
L2 data (except WF)	THR_CALBAR LFR_CALBUT TDS_CALBA	M.Maksimovic (for THR team) T.Chust (for LFR team) J.Soucek (for TDS team)
L1R WF data	LFR_CALBUT TDS_CALBA	T.Chust (for LFR team) J.Soucek (for TDS team)
L2 WF B data	SCML2RL2S	M.Kretzschmar (for SCM team)
L2 WF E data	CALBIS	A.Vaivads (for Bias team)

All L1/HK data will be produced by the ROC

Teams are responsible of the transfer functions for their own sub-system.

In-flight, TNR-HFR team will be the leader for providing the HF antenna parameters and transfer functions. For LF-DC part, done by Bias team (TBC)

Responsibilities per dataset is listed in the ROC-SGSE/RODP spreadsheets

\* At RCS team level

## Software delivery

- ROC: ROC-SGSE V2.1.X released on Sept. 1, 2017 (minor bugs to fix)
- TEAMS: « ROC-SGSE » instances of the RCS - without the new RCS ICD compliance, but with updated transfer functions for L1R/L2S - to be delivered to ROC before Sept. 30, 2017 (TBC)

## Data delivery

- ROC: ROC-SGSE V3 L1/HK CDF files released in Sept. 2017
- TEAMS: RCS L2R/L2S V3 CDF files released on Oct. 31, 2017 (TBC)

## Documentation delivery

- TEAMS: RCS SUM Issue 1, to be delivered on Sept. 30, 2017. *Note that the RCS UM template will be slightly updated to include sections for the descriptions of calibration methods and data processing algorithms.*
- TEAMS: RCS Specification Document might be also required (TBC)

## Ground calibration data archiving

- ROC has started to prepare archiving for data and GSE setup metadata from EM2 blank tests and PFM thermal calibration campaigns.
- Work concerning the archiving of relevant data/doc from standalone calibrations is still to be done

## Software delivery

- ROC: RODP « demo » version delivered on Dec. 31, 2017 (CNES, Lot6 evt 3). To be ready for ROC TRR, Jan. 2018 (TBC)
- TEAMS: First version of RCS « mission » instance (i.e., RCS ICD fully compliant, partial L1R/L2 data processing and testing data) delivered with the RODP « demo » version. Delivery includes RCS UM and L1R/L2 skeletons.
- ROC+TEAMS: « Ready-for-flight » instances of RODP and RCS delivered on June 30, 2018 (CNES, Lot6 evt 4).

## RCS software testing

- ROC: RCS ICD validation tool on roc-dev + doc — To be upgraded before the end of Sept. 2017.
- ROC+TEAMS: RCS integration tests performed between November and mid-December 2017. ROC will schedule separated testing campaign with each team. Test specification details need TBD before end of Sept. (interface compliance + E2E test).

## Data products

- ROC+TEAMS: Full list of RPW data products (including auxiliary, quicklooks and eventually a first set of L3/L4 data) — Sept. 30, 2017
- ROC+TEAMS: SOLO-RPW L1/HK/L1R/L2 CDF skeletons ready — Oct. 31, 2017

## Documentation

- RCS SUM Issue 2, (including L1R/L2 data processing) to be delivered with RCS on Dec. 31, 2017