SOLAR ORBITER   RPW   ROC

RPW Operation Centre

RPW L3 Data Production Implementation Plan

ROC-PRO-PIP-NTT-00141-LES
Iss.01, Rev.00

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Change Record

Issue	Rev.	Date	Authors	Modifications
1	0	25/11/2020	X.Bonnin	First release

Acronym List

Acronym	Definition
AD	Applicable Document
CDAG	Calibration Data Access Group
CDF	Common Data Format
CLI	Command Line Interface
ESAC	European Science Astronomy Centre
ICD	Interface Control Document
L3	Level 3 data processing
LESIA	Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique
RCS	RPW Calibration Software
RD	Reference Document
ROC	RPW Operation Centre
RODP	RPW Operation and Data Pipeline
RPW	Radio and Plasma Waves instrument
SCM	Search Coil Magnetometer
SFTP	Secure File Transfer Protocol
SOAR	Solar Orbiter Archive
TDS	Time Domain Sampler
LFR	Low Frequency Receiver
THR	Thermal Noise and High Frequency Receivers

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1 GENERAL

1.1 Scope of the Document

The RPW L3 data production implementation plan (L3DPIP) presents the strategy to generate and disseminate the RPW data products at the level 3 data processing.

According to [AD1], the level 3 data processing definition applies to added-value science products derived from lower level data, including the RPW summary plots.

1.2 Applicable Documents

This document responds to the requirements of the documents listed in the following table:

Mark	Reference/Iss/Rev	Title of the document	Authors	Date
AD1	SOL-SGS-TN-0009/2/4	Metadata definition for Solar Orbiter science data	SOC team	02/09/2019
AD2	ROC-GEN-SCI-PLN-00077-LES1/0	RPW science Data Validation and Verification Plan (DVVP)	X.Bonnin	27/05/2019
AD3				

1.3 Reference Documents

This document is based on the documents listed in the following table:

Mark	Reference/Iss/Rev	Title of the document	Authors	Date
RD1	ROC-GEN-SYS-SPC-00036-LES/1/1	ROC Software System Design Document	X.Bonnin, S.Lion	09/01/2017
RD2	ROC-PRO-ICD-00037-LES/1/4	RPW Calibration Software Interface Control Document (RCS ICD)	X.Bonni, M.Duarte	20/10/2020
RD3	ROC-GEN-SYS-NTT-00019-LES/1/3	ROC Engineering Guidelines for external Users (REGU)	X.Bonnin	19/05/2020
RD4	https://spdf.gsfc.nasa.gov/sp_use_of_cdf.html	Space Physics Guidelines for CDF	NASA SPDF team	24/11/2020
RD5	ROC-PRO-DAT-NTT-00075-LES/1/2	RPW Data Product Description Document (DPDD)	X.Bonnin	29/09/2020
RD6				
RD7				
RD8				

2 RPW L3 DATA PRODUCTION OVERALL APPROACH

During the Solar Orbiter mission, the ROC is in charge to produce and deliver to ESA calibrated science data for the RPW instrument. The task is performed by the RPW Operations and Data Pipeline (RODP) [RD1]; the main RPW data processing pipeline hosted on the ROC server at LESIA (Meudon, France).

Especially the RODP is capable of running the RPW Calibration Software (RCS), in order to calibrate the instrument science data and to generate the resulting output RPW L2 files in the Common Data Format (CDF). The production is performed in an autonomous way thanks to a dedicated interface [RD2].

RPW L3 data production approach is slightly different and can be divided into two workflows:

- A **RPW L3 summary plot generation workflow**, to be implemented at LESIA and run by the ROC ;
- A **RPW L3 science data production workflow**, which involves the contribution of the RCS teams.

Both workflows are described in the present document.

3 RPW L3 SCIENCE DATA PRODUCTION IMPLEMENTATION PLAN

3.1 Implementation overview

The RCS teams are in charge of producing and delivering to the ROC their RPW L3 science data products.

The ROC is responsible of retrieving the RPW L3 science data products, verifying the compliance with the Solar Orbiter data standards [AD1] and delivering the L3 products to the Solar Orbiter Archive (SOAR) at ESAC (Madrid, Spain).

3.2 RPW L3 science data products

3.2.1 Data standards and conventions

The RPW L3 science data products must comply with data standards defined in [AD1]. Especially, the file must be saved in the CDF format and using the Solar Orbiter data file naming convention.

IMPORTANT:

- The `descriptor` field of a L3 data product must be unique and be defined in agreement with the ROC team

- The L3 data must be always delivered to the ROC by the RCS teams as "CDAG-flagged" CDF files. It means that the "-cdag" suffix must be appended to the descriptor field, e.g., "solo_L3_rpw-tnr-fp-**cdag**_V01.cdf".

- The RCS teams must keep up-to-date the version of the file. Any L3 CDF file which is badly versioned will be rejected by the ROC. The versioning convention is the same as

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for lower level data, namely the first file delivered must always be "V01" version, then next versions must be an increment of 1, e.g., V02, V03, …

Additionally the L3 data should be also consistent with ISTP CDF guidelines [RD4].

3.2.1 Data product description

The description of the RPW L3 data products must be given in the RPW Data Product Description Document (DPDD) [RD5].

3.3 RPW L3 science data delivery procedure

The RPW L3 science data must be dropped by the RCS team as CDF files in the ROC SFTP server at LESIA.

Table below gives for each team, the SFTP server and user account to use, as well as the local path of the directory where L3 files must be uploaded.

Team	SFTP server	SFTP user account	Path
BIAS	sftp-lesia.obspm.fr	solbia	/obs/solbia/l3
LFR	sftp-lesia.obspm.fr	sollfr	/obs/sollfr/l3
SCM	sftp-lesia.obspm.fr	solscm	/obs/solscm/l3
TDS	sftp-lesia.obspm.fr	soltds	/obs/soltds/l3
TNR-HFR	sftp-lesia.obspm.fr	solthr	/obs/solthr/l3

Upon reception, the ROC takes in charge any new L3 files found in the SFTP server, check it and move it in its RPW data file system.

If an error is encountered during file check, delivery process is stopped. An issue is open by the ROC team and the team in charge is informed.

The ROC should be taken informed if new versions of already delivered L3 data files have been uploaded. Especially, the reason and the data changes should be provided to keep a trace of the L3 data releases.

N.B. It is not mandatory but highly recommended to apply the CDF skeleton table mechanism, in order to design and generate the L3 data CDF files. If CDF skeleton table is used, a copy must be saved in the DataPool repository in the ROC Gitlab server (see SOLO/RPW/CDF/Skeleton folder in https://gitlab.obspm.fr/ROC/DataPool).

4 RPW L3 SUMMARY PLOT PRODUCTION IMPLEMENTATION PLAN

4.1 Implementation overview

The ROC is in charge of generating, publishing and delivering to the SOAR the RPW L3 summary plots.

The RCS teams are responsible to provide to the ROC the software producing the RPW summary plots.

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4.2 RPW L3 summary plot products

4.2.1 Data standards and conventions

The RPW L3 summary plot products must comply with data standards defined in [AD1]. Especially, the file must be saved in the PNG format and using the Solar Orbiter data file naming convention.

The file name and version of summary plot should as much as possible be the same than the L2 parent file, except in the following special cases:

- There are several summary plots for a given L2 parent file. In this case the `<free_field>` field can be used to distinguish between the summary plots.

- There are several L2 parent files to generate a summary plot. This case should be as much possible avoid, however if there is no other option than doing it, the summary plot file name and version must be consistent with L2 parent files.

In all cases, the ROC team must be involved in the process to define and approve the file name for a given L3 summary plot product.

4.2.2 Data product description

The description of the RPW L3 data products must be given in the RPW Data Product Description Document (DPDD) [RD5].

4.3 RPW L3 summary plot production software interface specification

The ROC must be able to run the L3 summary plot software as cronjobs in its production server at LESIA.

It means that the RCS teams must supply a software which:

- Can be run as an executable in the ROC software environment

- Offers a command line interface (CLI), which accepts at least the expected input and output file paths as arguments

- Can create its own log file containing self-explicit enough information for the ROC team to understand when the software starts/ends, what it does and when an error occurs. (Conventions applied to the RCS log file can be here re-used, see [RD2]). The path to the log file must be passed as an argument in the CLI

Besides, using absolute paths in the software code is not allowed and setting specific environment variables to run the software should be as much as possible avoided.

N.B. In the case where the L3 summary plot production is performed by the RCS it-self, please make sure to be able to run the software outside of the scope of the RCS ICD [RD2], i.e., L3 summary plot must not be defined as dataset in the descriptor file.

4.4 RPW L3 summary plot production software delivery procedure

The RPW L3 summary plot generation software must be delivered by the RCS team.

As for RCS software:

- A copy of the software files must be uploaded in a repository in the RCS group of the ROC gitlab server at LESIA https://gitlab.obspm.fr/ROC/RCS.

- Only tagged versions (see [RD3] for versioning conventions) in the "master" branch will be used by the ROC.

- The ROC team must not need to compile the software source code. The RCS teams must hence deliver the software as an executable program[1].

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[1] The RCS teams are free to use the ROC development server (roc2-dev) to test the execution of their software before delivery.

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5 LIST OF TBC/TBD/TBWS

TBC/TBD/TBW			
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6 DISTRIBUTION LIST

LISTS See Contents lists in "Baghera Web": Project's informations / Project's actors / RPW_actors.xls and tab with the name of the list or NAMES below	Tech_LESIA
	Tech_MEB
	Tech_RPW
	[Lead-]Cols
	Science-Cols

INTERNAL

LESIA CNRS			LESIA CNRS		

EXTERNAL (To modify if necessary)

CNES		C. FIACHETTI	AsI/CSRC		J.BRINEK
		C. LAFFAYE			P.HELLINGER
		R.LLORCA-CEJUDO			D.HERCIK
		E.LOURME			P.TRAVNICEK
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					M. STELLER
LPC2E		P. FERGEAU	LPP		T.CHUST
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		T.DUDOK de WIT			P.LEROY
		M. KRETZSCHMAR			M.MORLOT
		V. KRASNOSSELSKIKH			
SSL		S.BALE			