RPW Operations status

Outlines

- RPW Commissioning
- Cruise Phase operations
- Operation Test/Validation activity status

RPW Commissioning

- See Eric's slides (RPW_Commissioning_Consortium_Meetin_180605V2.pptx)
- Then Olga's slides (SCM_noise_31mai2018.pdf)

Cruise Phase Planning

February 2020 Cruise Phase

- Short compared to previous trajectories:
  - Pro: Nominal Phase starts at the same time as Feb 2019.
  - Con: Difficult to squeeze all checkout activities in.
- Launch: 06 Feb 2020
- Start of Cruise: 14 May 2020
- Start of NMP: 11 November 2021
- Closest Perihelion: 0.5 AU
- Will be divided into 4 planning periods

Cruise Phase Planning

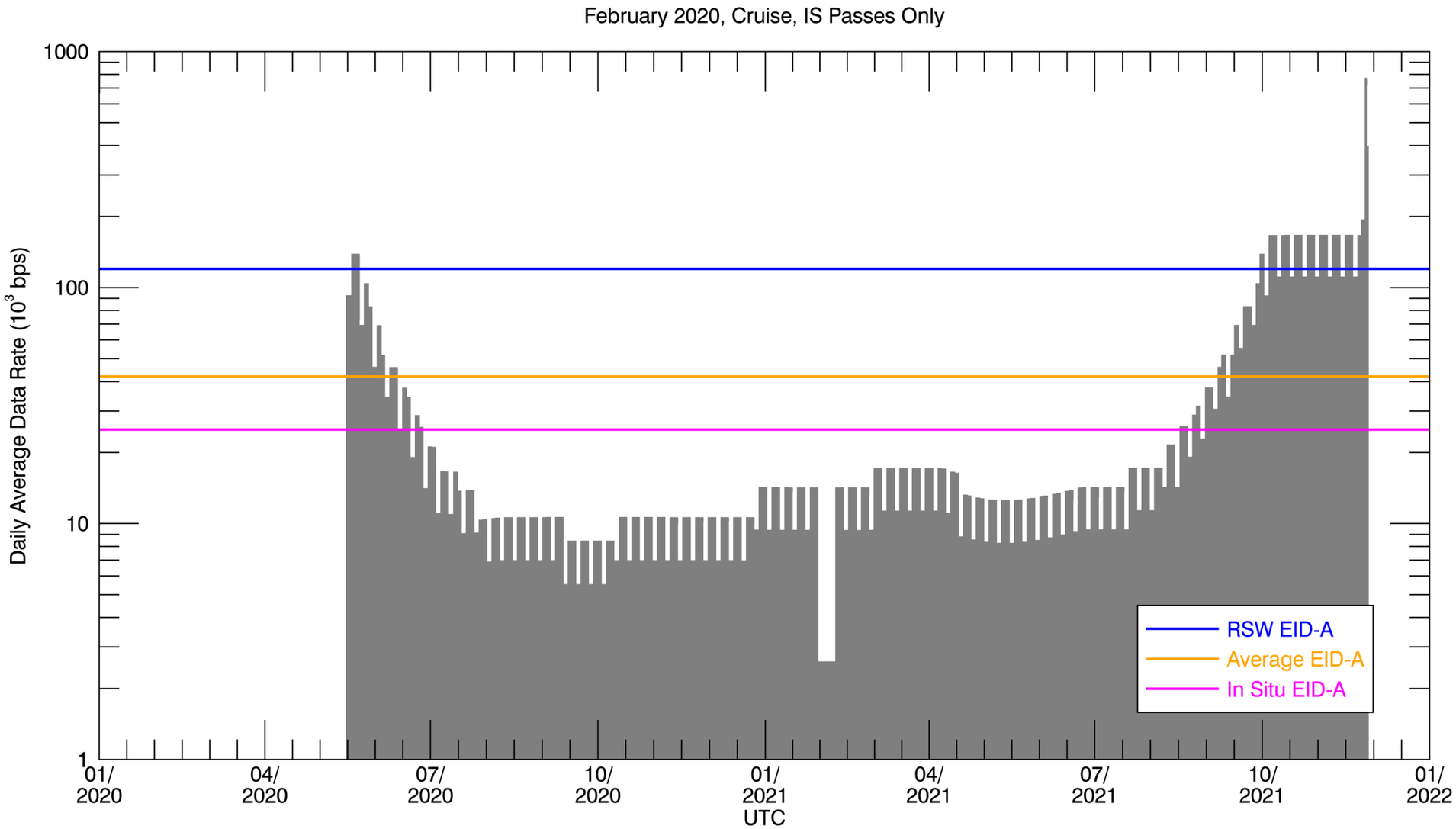
Cruise Phase Baseline & Constraints

- 3 passes per week for In situ data, plus extras for RS Checkout Windows
- No selective downlink*
- No VSTP*
- No TAC
- There will be a window towards the end of cruise for SSMM resizing where no data can be taken.
- Packet stores need to be empty before we do this.
- MAG Calibration rolls as normal.

* Apart from during final ”Dress Rehearsal” RSCW.

Cruise Phase Planning

Downlink Performance – In Situ



Recall that during cruise RS have dedicated passes for checkouts.

This means IS and RS data constraints can be considered decoupled, and IS generation is independent of RSCW location.

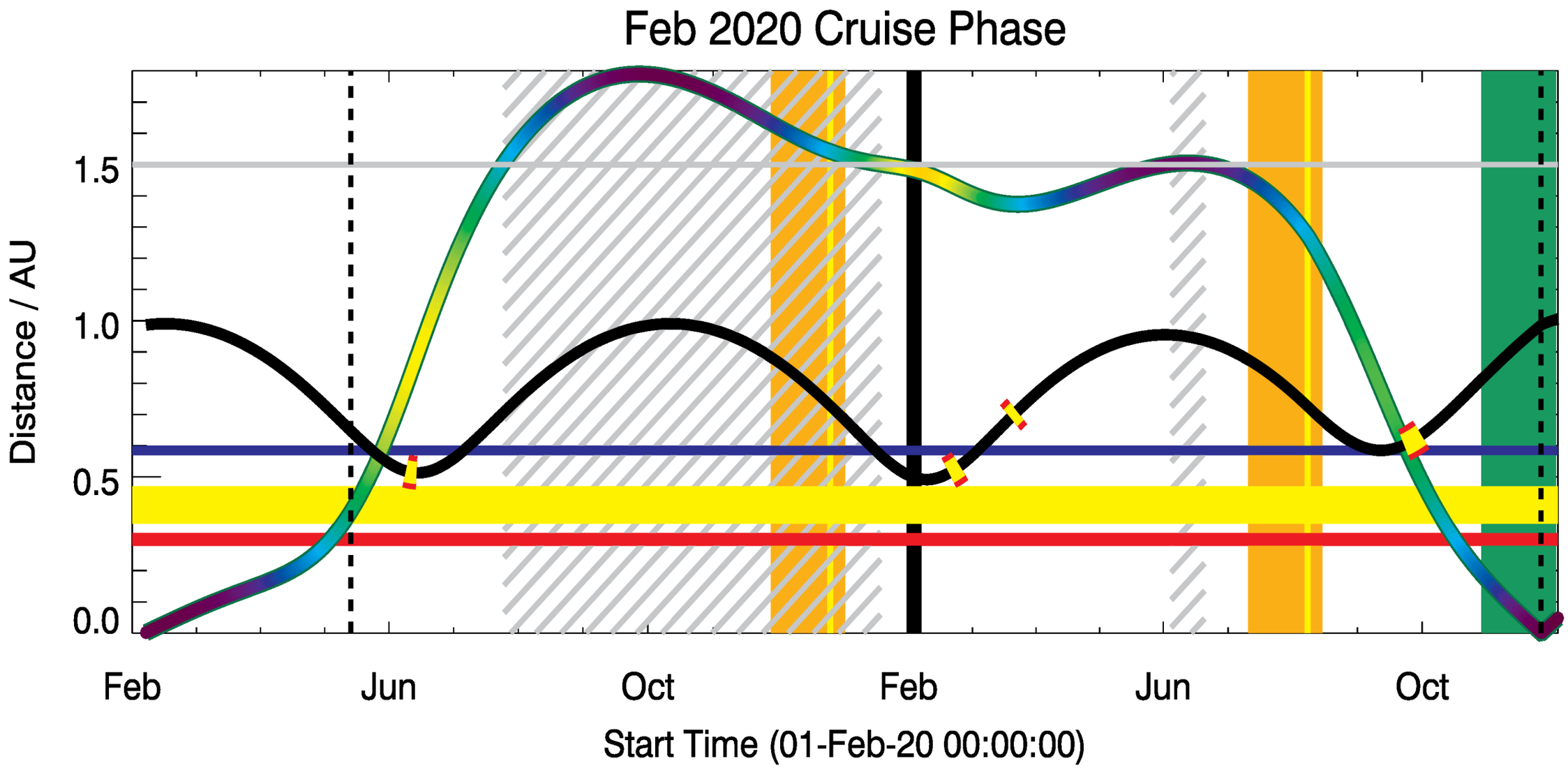
Cruise Phase Planning

Data Generation Rules: In Situ

- For now, assume the following:
  - 15 May 2020 – 15 July 2020: **100% EIDA**
  - 15 July 2020 – 15 September 2021: **50% EIDA**
  - 15 September 2021 – 11 November 2021: **100% EIDA**
- Additionally, during checkout windows:
  - MAG: **150% EIDA** for EMC Characterisation
  - RPW: **150% EIDA** for EMC Characterisation
- For one week after stores become empty (~6 October 2021)
  - No data sent to SSMM (OMM HK OK)

Cruise Phase Planning

Step 1: Placement of RS checkouts: **Final**

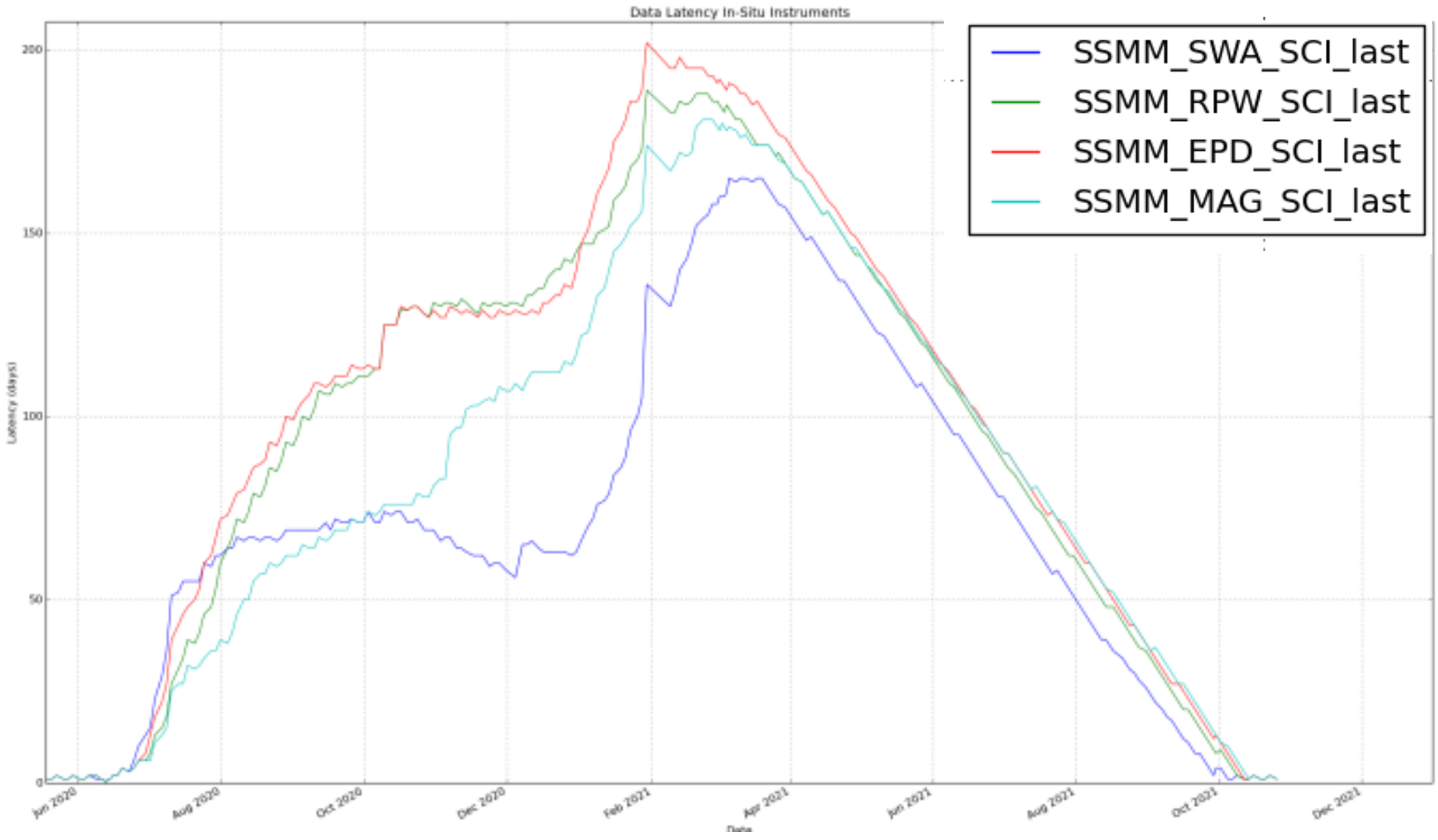


Cruise Phase Planning

Data Latency-IS

IS – expect data from Feb 2021 down in August 2021

We will work on latency, to make even(ish) for LTP.



Cruise Phase RPW operations

- A first CP mission level planning (MLP) timeline has been built during SOWG11 (based on Feb. 2020 launch scenario, TBC)
- ~March 2019 SWT is "the last chance to agree the activity plan"
- For RPW, ask for as much as possible SURVEY_BURST mode, and SBM_DETECTION the rest of the time (but no selective downlink during CP)
- Very bad telemetry between July and Sept. 2021: required to define specific instrument RPW "low rate" configurations for RPW (i.e., < 2.4 kbps)
- First science default configuration tested and validated
- Need to finalize the RPW "galaxy" configuration
- Specific config. for MAG rolls and Remote-sensing checkout windows (EMC additional characterization for MAG and RPW)?

RPW "Low rate" config.

- Required for bad telemetry rate periods (< 2.4 kbps)
- Shall permit to maximize the science return while minimizing the RPW bit rate
- "Degraded" version of the science default configuration
- Two scenarios have been studied by the ROC. To be discussed/ approved by RPW consortium

Low rate config. scenario #1

Config low rate 1		Bit rate (uncompressed) Kbits/s	Bit rate (compressed) Kbits/s
Duration of burst Mode (min per day)	8	3,26	2,40
Time between 2 snapshots LFR&TDS (s)	no snapshot		
Measurement time LFR Basic Parameter (s)	120		
Compression rate	2		

Low rate config. scenario #2

Config low rate 2		Bit rate (uncompressed) Kbits/s	Bit rate (compressed) Kbits/s
Duration of burst Mode (min per day)	0	3,30	2,40
Time between 2 snapshots LFR&TDS (s)	3600		
Measurement time LFR Basic Parameter (s)	120		
Compression rate	2		

Low rate config. details

Nomal mode		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	data size (byte)	snapshots /day
LFR Waveforms	LF E(1V+2E) 16HZ	3	16	1	16	0,0625	4032	N/A
	LF 3B 16Hz	3	16		16	0,0625		
	LF E(1V+2E) + 3B 256Hz	6	16	1	256	3600	24576	24
	LF E(1V+2E) + 3B 4kHz	6	16	1	4096	3600	24576	24
	LF E(1V+2E) + 3B 25kHz	6	16	1	24576	3600	24576	24
LFR basic param								
F0	set 1 : B^2 & E^2	2	16	11	0,008333333	120	121	
	set 1 : wave norm vector	1	17					
	set 1 : param ellipticity	1	4					
	set 1 : deg of polarization	1	3					
	set 1 : Poynting flux	1	16					
	set 1 : Phase speed	1	16					
F1	set 1 : B^2 & E^2	2	16	13	0,008333333	120	143	
	set 1 : wave norm vector	1	17					
	set 1 : param ellipticity	1	4					
	set 1 : deg of polarization	1	3					
	set 1 : Poynting flux	1	16					
	set 1 : Phase speed	1	16					
F2	set 1 : B^2 & E^3	2	16	12	0,008333333	120	132	
	set 1 : wave norm vector	1	17					
	set 1 : param ellipticity	1	4					
	set 1 : deg of polarization	1	3					
	set 1 : Poynting flux	1	16					
	set 1 : Phase speed	1	16					
F0	**TM_LFR_SCIENCE_NORMAL_BP2_F0 Packet**							
	set 2 : spectral matrices Bi^2, Ei^	5	16	11	0,05	20	330	
	set 2 : spectral matrices	20	8					
	TM_LFR_SCIENCE_NORMAL_ASM_F0 Packet							
	LFR High res Full spec mat / Auto	5	32	88	0,000277778	3600	8800	
	LFR High res Full spec mat / Real	10	32					
	LFR High res Full spec mat / Im	10	32					
F1	**TM_LFR_SCIENCE_NORMAL_BP2_F1 Packet**							
	set 2 : spectral matrices Bi^2, Ei^	5	16	13	0,05	20	390	
	set 2 : spectral matrices	20	8					
	TM_LFR_SCIENCE_NORMAL_ASM_F1 Packet							
	LFR High res Full spec mat / Auto	5	32	104	0,000277778	3600	10400	
	LFR High res Full spec mat / Real	10	32					
	LFR High res Full spec mat / Im	10	32					
F2	**TM_LFR_SCIENCE_NORMAL_BP2_F2 Packet**							
	set 2 : spectral matrices Bi^2, Ei^	5	16	12	0,05	20	360	
	set 2 : spectral matrices	20	8					
	TM_LFR_SCIENCE_NORMAL_ASM_F2 Packet							
	LFR High res Full spec mat / Auto	5	32	96	0,000277778	3600	9600	
	LFR High res Full spec mat / Real	10	32					
	LFR High res Full spec mat / Im	10	32					
TNR-HFR	TNR AGC	2	12	4	0,083333333	12		
	TNR auto	2	12	128	0,083333333	12		
	TNR cross	2	12	128	0,083333333	12		
	HFR1 AGC	1	12	96	0,083333333	12		
	HFR2 AGC	1	12	96	0,083333333	12		
TDS	TDS regular snpashots	4	16		262144	3600	32768	24
	TDS triggered snapshots	4	16		262144		131072	64
	TDS statistics				0,1	10	19	8640
	TDS histogram 1D	4	16	64	0,003333333	300	512	288
	TDS histogram 2D	1	16	4096	0,000555556	1800	8192	48

Low rate config. details

Burst mode		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	data size (byte)	snapshots /day
	LF E(1V+2E) + 3B 256Hz	6	16	1	**256**	0,00390625	4032	
LFR basic param								
F0	set 1 : B^2 & E^2	2	16					
	set 1 : wave norm vector	1	17					
	set 1 : param ellipticity	1	4	**22**	**1**	**1**	242	
	set 1 : deg of polarization	1	3					
	set 1 : Poynting flux	1	16					
	set 1 : Phase speed	1	16					
F1	set 1 : B^2 & E^2	2	16					
	set 1 : wave norm vector	1	17					
	set 1 : param ellipticity	1	4	**26**	**1**	**1**	286	
	set 1 : deg of polarization	1	3					
	set 1 : Poynting flux	1	16					
	set 1 : Phase speed	1	16					
F0	**TM_LFR_SCIENCE_BURST_BP2_F0 Packet**							
	set 2 : spectral matrices Bi^2, Ei^2	5	16	**22**	**0,2**	**5**	660	
	set 2 : spectral matrices	20	8					
F1	**TM_LFR_SCIENCE_BURST_BP2_F1 Packet**							
	set 2 : spectral matrices Bi^2, Ei^2	5	16	**26**	**0,2**	**5**	780	
	set 2 : spectral matrices	20	8					
TNR-HFR	TNR AGC	2	12	4	**0,5**	2		
	TNR auto	2	12	128	**0,5**	2		
	TNR cross	2	12	128	**0,5**	2		
	HFR1 AGC	1	12	96	**0,5**	2		
	HFR2 AGC	1	12	96	**0,5**	2		
TDS	TDS regular snpashots	4	16		**262144**	3600	32768	24
	TDS triggered snapshots	4	16		**262144**		131072	64
	TDS MAMP	3	16		**31,99920654**	0,031250775	6144	
	TDS statistics				**0,1**	10	19	8640
	TDS histograms 1D	4	16	64	**0,003333333**	300	512	288
	TDS histograms 2D	1	16	4096	**0,000555556**	1800	8192	48

Galaxy configuration

- Measuring the galaxy radio spectrum with THR
- High spectral resolution on THR
- Other sub-systems shall be switched-off

Galaxy config.

Ch1

ANT	V1-V2		V2-V3	V3-V1
Band	HF	...	HF	HF
HF1	157	...	157	157
HF1 step	50 kHz	...	50 kHz	50 kHz
HF2	157	...	157	157
HF2 step	0	...	0	0

Ch2

ANT	V1-V2	V1-V2	V1-V2	V1-V2		V2-V3	V2-V3	V2-V3	V2-V3	V3-V1	V3-V1	V3-V1	V3-V1
Band	A	B	C	D	...	A	B	C	D	A	B	C	D
AGC	1	1	1	1	...	1	1	1	1	1	1	1	1
Auto	32	32	32	32	...	32	32	32	32	32	32	32	32
cross	0	0	0	0	...	0	0	0	0	0	0	0	0

Spect AVG	sampling time s	TM rate kbits/s
128	20	0.48
16	7.5	1.00

TM rate includes also LL and HK data

Mission Test/Validation planning

- IGST4_2 test at MOC - with MEB EM2 on ETB - has been passed successfully. Minor TC errors to fix. (cf. next slides)
- 0th E2E test with SOC is delayed on June 2018. Inputs delivered by RPW seems to be OK. (cf. next slides)
- FOP Issue 1, planned on Sept. 2018 (TBC)
- SVT1, planned on March and May 2019
- CP E2E test, planned on April 2019
- NMP E2E test, planned during Cruise Phase (CP)

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