

# An update on the status of the IRS L1 prototype



# Context: status of the L1PP in November 2018

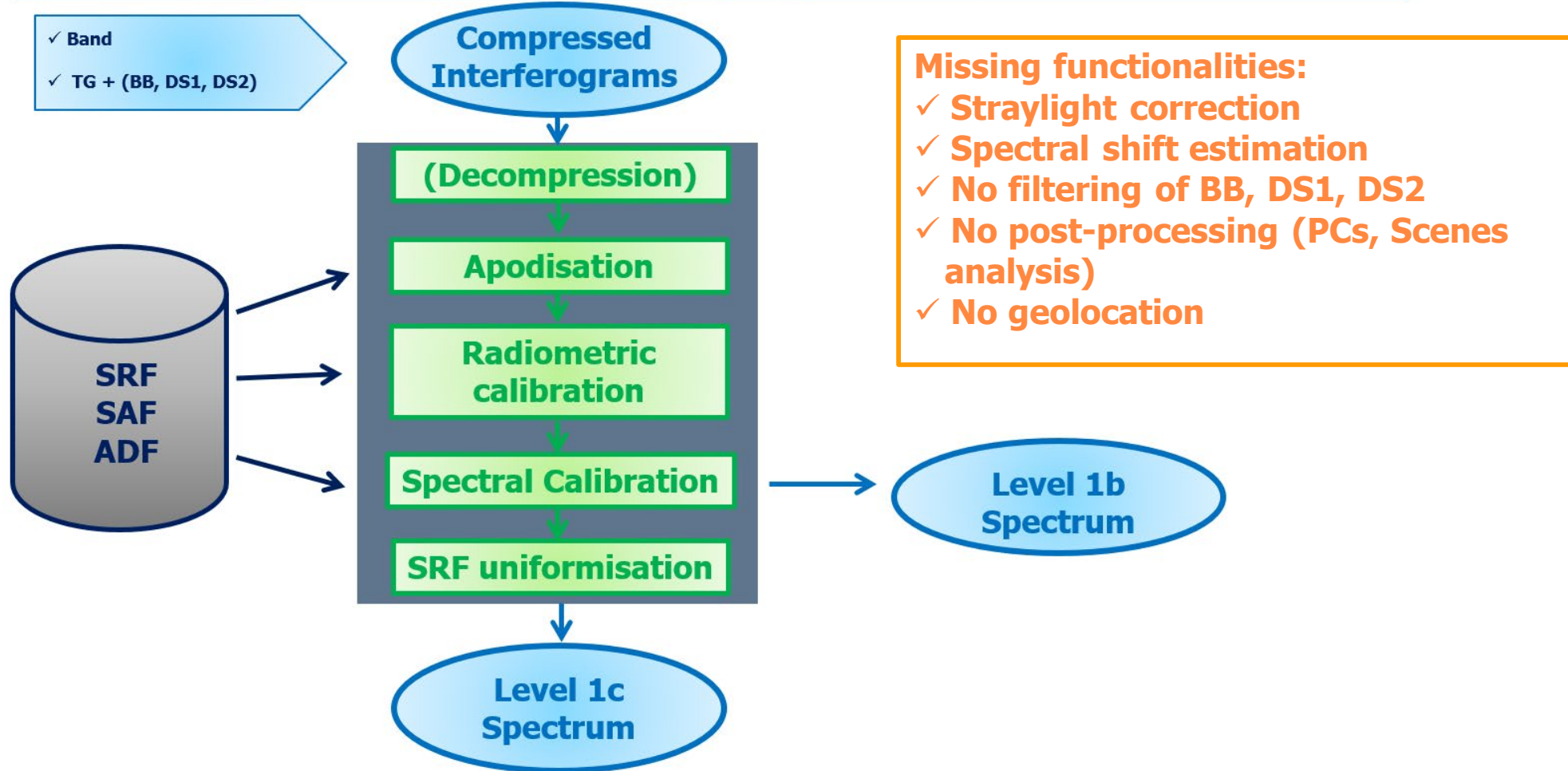
- The Karlsruhe Institute for Technology (KIT) has developed a prototype of the IRS L1 processor (L1PP) based on the EUMETSAT processing specifications document (IRSL1PS)
- Software delivery occurred in June 2018, documentation followed in July and the final review took place on October 16<sup>th</sup>
- No validation performed; unit testing ok.
- The L1PP is not a one-to-one image of the IRSL1PS:
  - Some modules of the PS are not included in the L1PP
  - Some functions differs with the PS
  - The “spirit” of the processing is the same but the architecture is different

# Data flow in the L1RP

- Most of the development of the L1RP was dedicated to render it able to process a continuous flow of dwells hence a complicated dataflow handled through so-called workers (“Celery”) that are controlled through a controller (“RabbitMQ”)
- This renders the inclusion of a new module difficult
- This is furthermore not useful for simple testing purposes (which is the main aim of the L1RP)
- The L1RP can however run outside this framework

# Why not using IRASS ?

IFG decompression, apodisation, spectrum complex radiometric calibration, spectral calibration, resampling, removal of the ISRF



# Processing spec. vs. L1PP vs IRASS

IRSLIPs vs IRSLIRP mapping	PS Algorithm	PS Algorithm Name	IRASS	RP Algorithm Na	RP Sta	PS vs RP algorithm comments	GEDIDSc comment
	IDPF-IRS-IMP-IMP-S&A	Static Auxiliary Data Acceptance and Preparation		n/a	n/a	Static data in the L1PP are in general hardcoded. The RP expects LO in IRASS format	
	IDPF-IRS-IMP-IMP-LO	LO Data Acceptance and Preparation		n/a	n/a		
	IDPF-IRS-IMP-IMP-CE	Calibration Feedback Data Acceptance and Preparation		n/a	n/a		
	IDPF-IRS-IMP-IMP-IB	IBS Data Acceptance and Preparation		n/a	n/a		
	IDPF-IRS-IMP-IMP-MV	MVP Data Acceptance and Preparation		n/a	n/a	no MVP data needed in the current version of the PS. This could however be useful in a future version of the cloudscene analysis algo...	
	IDPF-IRS-IMP-IMP-M	MOF Data Acceptance and Preparation		n/a	n/a		
	IDPF-IRS-IMP-IMP-QE	DFFF Data Acceptance and Preparation		n/a	n/a		
	IDPF-IRS-PRE-PRO-LO	LO Parameter Extraction	Need to be checked if there, of course not aligned to PS. Need to be checked	n/a	n/a	missing in RP: IRASS LO missing in RP routine for flagging or it is stated that it is based in large part on A214 of the LIPS vUJ	
	IDPF-IRS-PRE-PRO-Inst	Instrument Data				Flags set are: FLG_SCAL_SCZ Spectral calibration view if Diwell is part of the SCZ from STATIC (set in STATIC_SCAL_SCZ_DWELL_D)	
	IDPF-IRS-PRE-PRO-Band	Band Image Reconstruction	missing in IRASS			FLG_SCAL_INIT_FX Spectral calibration reinitialisation (initialise to False) FLG_RUN_SCAL_Flag indicates SCAL to run (SCAL-D) (end of LACK / SCZ). Note: Not in LIPS	Do we think it is a core algorithm needed in the RP? At least do we need it performing the same of PS?
	IDPF-IRS-PRE-PRO-Bad	Bad Sub/Super Pixel				FLG_RUN_FCAL_Flag indicating FCAL to run (end of retracetrally). Note: Not in LIPS	According to what is written in the KIT user manual the LIA processing should perform both the zero padding and the FFT of the data. So, if this module is not present they claimed think are they done????? In theory the operation done by this module are: dealiasing, apodization, zero padding, FFT.
	IDPF-IRS-IMP-CFL	IMP module Processing			Done	should be ok	Is this difference so huge? I mean, something that really is impossible to correct for the alignment and also that cannot be considered the
	IDPF-IRS-PRE-PRO-	Additional Geometric					
	IDPF-IRS-PRE-PRO-	LIA Spectra Generation	GEDIDSc: operations accomplished by IRASS: dealiasing, apodization, FFT, ... here is the zero padding?			This is where the dealiasing is performed. The RP does include a routine dealias.py that performs the phase correction. The latter is computed online using the routine gen_lia_dealias_phase.py (NB: there is zero-padding, but elsewhere) The routine dealias.py does not perform any zero-padding nor any FFT, conversely to what is in the PS	
	IDPF-IRS-LIB-EVP-	EV Background Estimation (Spectra)	There is no extrapolation in IRASS		Done	should be ok	
	IDPF-IRS-LIB-EVP-	Apply Radiometric Correction (Spectra)	GEDIDSc: this should be similar to the PS	real_appl_correction		- Missing Delta_tau (noted as a comment in the code); - tau is not pixel dependent (as specified in the vUJ) of the PS but TAS has detected that there was an inconsistency and this has been corrected in v2)	
	IDPF-IRS-LIB-EVP-	Apply Spectral Correction (Spectra)	GEDIDSc: this should be aligned to the PS		Done	Should be ok	
	IDPF-IRS-LIB-EVP-	Apply Straight-Correction (Spectra)	GEDIDSc: according to RSP/Dco this is in line to what will be implemented in the PS			missing in RP	
	IDPF-IRS-LIB-EVP-	SFF Uniformisation	done			missing in RP	
	IDPF-IRS-LIB-EVP-	DC Image EV Radiometric Correction	GEDIDSc: not needed			GEDIDSc: not needed	
	IDPF-IRS-POP-SCA-	Scenes Input Preparation	GEDIDSc: new algo is in place			GEDIDSc: new algo is in place	
	IDPF-IRS-POP-SCA-	Scene Analysis	GEDIDSc: new algo is in place as an independent tool, it is implemented by RSP/TTH			GEDIDSc: this has been seen as an independent tool, it is implemented by RSP/TTH	
	IDPF-IRS-POP-PCA-	Calculate PC Scores and Residuals				Done in the RP but not as specified in the PS	what is not done as the PS? Again huge difference or we can accept this implementation and/or align quickly?
	IDPF-IRS-LIB-CVP-III	Spectra Background Modelling	There is no extrapolation in IRASS			missing in RP (BC)	
	IDPF-IRS-LIB-CVP-IB	DC Image Background	There is no extrapolation in IRASS			missing in RP	
	IDPF-IRS-LIB-AUX-SS	Spatial Smoothing Algorithm				missing in RP	
	IDPF-IRS-LIB-CVP-RI	Core Section Radiometric Response	Not explicitly computed: IRASS rather computes the gain and offset. However the equation is the same than in the PS.	real_core_section_resp inst_determination		- no average in the routine itself (the averaged BB and DSI are passed as arguments) conversely to what is done in the PS	Note that IRASS and the RP share the same file: no average in the routine
	IDPF-IRS-LIB-CVP-IX	Determination of Mean Signal for DC Images				missing in RP	
	IDPF-IRS-LIB-AUX-TE	Temperature Evaluation algorithm				missing in RP	
	IDPF-IRS-LIB-SPC-IC	Intermediate Interferogram Generation			Done	Done	
	IDPF-IRS-LIB-SPC-SI	Scale Factor Determination			Done	Done	
	IDPF-IRS-LIB-SPC-SI	Short Term Scale Predictor Estimation	IRASS does not include MIDOS spectral parameters computation		Done	Done	
	IDPF-IRS-MOM-SFC-Estimator	Medium Term Scale Predictor Estimator		scal_detamp	Done	missing in RP	
	IDPF-IRS-LIB-AUX-DF	Determine RSF Position and Amplitude			Done	Done	
	IDPF-IRS-LIB-AUX-DE	Determine Spectral Feature Positions			Done	Done	
	IDPF-IRS-LIB-SFF-SE	SFF Estimation Model		n/a	n/a	the SRF model is an offline tool	I think in any case monitoring algo needs to be written from 0 since a discussion is still in
	IDPF-IRS-LIB-SFF-SE	SFF Estimation Model (option)		n/a	n/a	the SRF model is an offline tool	
	IDPF-IRS-LIB-PCR-FI	Flip-In-Mirror Characterization				missing in RP	
	IDPF-IRS-LIB-PCR-F	Front Section Transmission Characterization				missing in RP	
	IDPF-IRS-LIB-PCR-S	Scan Reflection Law Characterization				missing in RP	
	IDPF-IRS-LIB-PCR-C	Chromatism determination				missing in RP	
	IMP-CFI	TAS IMP-APEX				missing in RP	
	IDPF-IRS-MOM-PER-RTS	RTS Noise				missing in RP	
	IDPF-IRS-MOM-PER-OPD	OPD Stability Check				missing in RP	
	IDPF-IRS-MOM-PER-On-board	On-board Processing				missing in RP	
	IDPF-IRS-MOM-PER-Non	Non Linearity Check				missing in RP	
	IDPF-IRS-MOM-PER-Radiometric	Radiometric Range				missing in RP	
	IDPF-IRS-MOM-PER-Detector	Detector Characterisation				missing in RP	
	IDPF-IRS-MOM-PER-NEDT	Detector Short Term NEΔT and Correlated Noise				missing in RP	
	IDPF-IRS-MOM-PER-Medium	Medium Term Radiometric Stability				missing in RP	
	IDPF-IRS-MOM-PER-ZPD	ZPD Monitoring				missing in RP	
	IDPF-IRS-MOM-PER-Geometric	Geometric Performance				missing in RP	
	IDPF-IRS-MOM-PER-Field	Field of View				missing in RP	
	IDPF-IRS-MOM-PER-Dut	Dut-of-Field Straight				missing in RP	
	IDPF-IRS-MOM-PER-Metrology	Metrology Laser Monitoring				missing in RP	
	IDPF-IRS-MOM-PER-Identification	Identification of Overlapping Pixels				missing in RP	
	IDPF-IRS-MOM-PER-Spectral	Spectral Performance				missing in RP	
	IDPF-IRS-MOM-PER-Evaluation	Evaluation of Overlaps				missing in RP	
	IDPF-IRS-MOM-PER-SRF	SRF Centroid Uncertainty and Stability				missing in RP	
	IDPF-IRS-ADF-LIB-DI	Dissemination Datasat Summary Parameters				missing in RP	
	IDPF-IRS-ADF-LIB-TF	Archive Datasat Summary Parameters				missing in RP	
	IDPF-IRS-ADF-LIB-PADT	Monitoring Datasat Parameters				missing in RP	

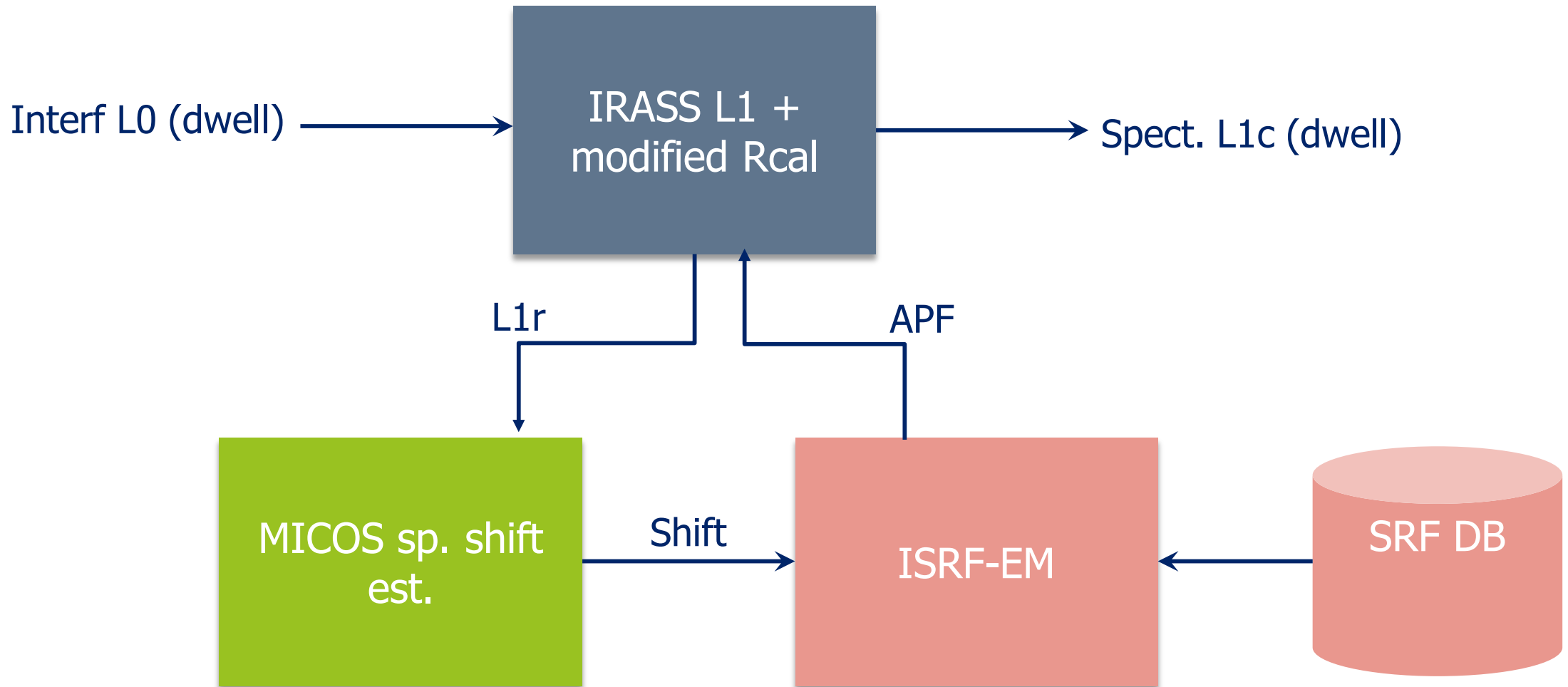
L1PP

IRASS

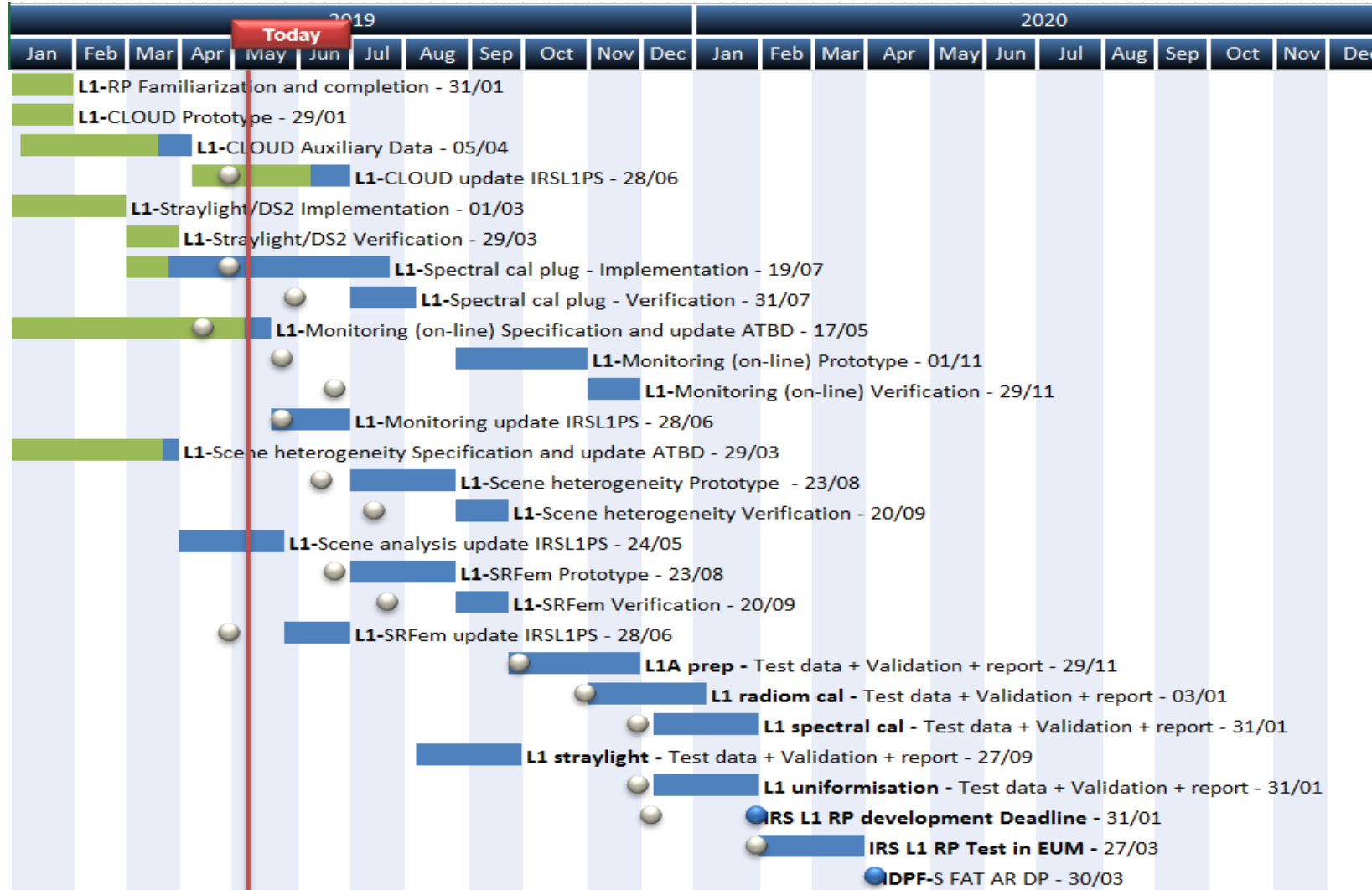
# Toward a new concept for the L1PP

- The idea is to merge the best of the two worlds:
  - The versatility of IRASS and the fact that it is fully validated
  - The spectral routines from the L1PP (the part that is validated)

# Toward a new concept for the L1PP



# Schedule



NB: the schedule is tentative as:

- It is quite busy
- The resources are limited
- There is no margins

But it gives an insight on what is to be done when



# Summary

- In November 2018, we concluded about the L1 prototype:

## Conclusion

- Very busy program ahead of us:
  - Alignment of the L1PP
  - Addition of missing components
  - Generation of test data
  - Update of the ATBD/L1PS
- A new resource in the team will help achieving this ambitious program
- The freeze of the L1PS will not stop the investigations on the L1 processing

24 EUM/RSP/VWG/18/1029820, v1 Draft, 23 October 2018



- This is still valid with a clear way forward