ECLAIRs and GRM data analysis for the Core Program:

products, tasks, pipelines, organization

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Introduction

- **Most "high-energy" Scientific Products (SP) will result from similar or joint analyses**
  - Data analyzed with similar methods → ECL / GRM "mirror" products (e.g., T_{90})
  - Data combined in joint analyses → ECLGRM products (e.g., joint spectrum)

- **Different analysis software would cause unwanted additional systematic effects**
  - Example 1: in case of common detection, the ECLGRM notice must be compatible with the ECL / GRM individual instrument notices
  - Example 2: in case of different populations of GRBs (GRM-only; ECL-only; ECL+GRM), do not introduce biases in the spectral parameter distributions

➜ **It was agreed to develop common data analysis software whenever possible**

- **Generally speaking, the development of the ECLAIRs and GRM data processing pipelines must be coordinated between the French and Chinese parties**
  - Share and maintain a documentation on the data products and calibration products
  - Share and maintain a documentation on the data analysis software, their development and integration to the FSC and CSC pipelines

Outline

- **ECLAIRs and GRM data analysis tasks**
  - And related scientific products

- **Pipeline definition and workflows**
  - Including activation conditions and output notices

- **Pipeline development**
  - Software developers
  - Status of the FSC VHF and X-band pipelines, plans for 2019
  - Simulations: ongoing efforts and needs in the short term
  - Requests to the GRM team

➜ **Goal of this presentation**

- **Updated proposal to organize the development of software and pipelines**

- **Focus on the development activities in 2019**

VHF data analysis tasks

- **OTLOC-[ECL, GRM] – Onboard Trigger and LOCalization**
  - Output SP: trigger time (T0), trigger confidence level, quick position

- **RSP-GRM – ReSPonse generation**
  - Compute the DRM of each GRD for the current GRB-Earth-detector geometrical configuration (accounting for the scattering of the GRB signal in the spacecraft and the Earth's atmosphere)
  - Outputs: DRM of each GRD for the current GRB

- **QSPEC-GRM – Quick SPECtrum**
  - For each GRD: use the total / bkg count spectra (generated onboard) and DRM (from RSP-GRM task)
  - Spectral fits with XSPEC (PGstat) using simple spectral models (PL, COMP, Band)
  - Output SP: crude time-integrated spectrum, parameters and covariance matrix

- **QTEMP-[ECL, GRM] – Quick TEMPoral analysis**
  - Background modeling and subtraction (temporal fit)
  - Analysis of bkg-subtracted count light curves (+ selection of the useful GRDs)
  - Output SP: source count light curves, peak flux, duration (T_{90})

- **QHR-[ECL, GRM, ECLGRM] – Quick Hardness Ratios**
  - Use the results of the previous tasks
  - Output SP: time-integrated hardness ratios

- **CLASS – CLASSification of the triggered event from previous tasks (ECL and/or GRM)**
  - Output SP: nature of the event (GRB, other?)

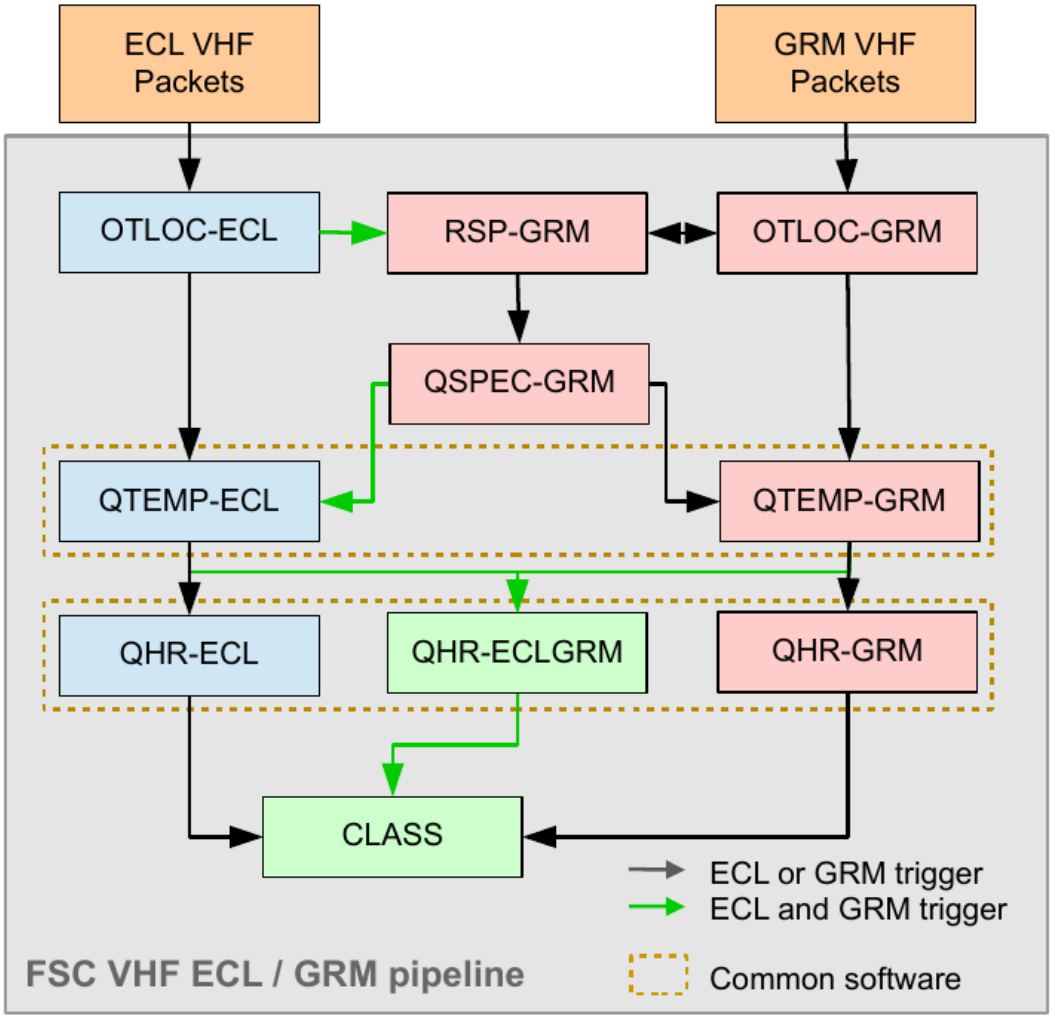
VHF data analysis tasks and scientific products

	TASK	SUB-TASK	SCIENTIFIC PRODUCTS *(and other products)*		COMMON SOFTWARE?
VHF DATA ANALYSIS	OTLOC	ECL	TT_ECL	Trigger time - ECLAIRs (T0)	NO
			QCL_ECL	Quick confidence level - ECLAIRs	
			QPO_ECL	Quick position - ECLAIRs	
		GRM	TT_GRM	Detection time - GRM	
			QCL_GRM	Quick confidence level - GRM	
			QPO_GRM	Quick source position - GRM	
	RSP	GRM	*GRM Detector Response Matrices including Earth/SC scattering effects*		NO
	QSPEC	GRM	QSP_GRM	Quick spectral parameters - GRM	NO
	QTEMP	ECL	OBLC_ECL	On-board count light curves - ECLAIRs	YES
			QLC_ECL	Quick light curves - ECLAIRs	
			QPF_ECL	Quick peak flux - ECLAIRs	
			QT90_ECL	Quick duration - ECLAIRs	
		GRM	OBLC_GRM	On-board count light curves - GRM	
			QLC_GRM	Quick light curves - GRM	
			QPF_GRM	Quick peak flux - GRM	
			QT90_GRM	Quick duration - GRM	
	QHR	ECL	QHR_ECL	Quick hardness ratios - ECLAIRs	YES
		GRM	QHR_GRM	Quick hardness ratios - GRM	
		ECLGRM	QHR_ECLGRM	Quick hardness ratios - ECLAIRs and GRM	
	CLASS	ECL|GRM	CRCLASS	Crude classification	YES

See the IAP SP database for details on scientic products and methods

- **Many SP will be generated by the same software**
  - Similar methods (*_ECL and *_GRM "mirror" SP) or joint analyses (QHR_ECLGRM and CRCLASS)
- **Some tasks are specific to an instrument: no common software for OTLOC-ECL, OTLOC-GRM, RSP-GRM and QSPEC-GRM**

VHF pipeline workflow, activation and notices



See backup slides for more details on notices (definition, distribution)

Condition	VHF pipeline to be run	Notice	Sent out by
ECL-only onboard trigger	FSC	N1 N2a	FSC
Common onboard trigger	FSC	N1 N2a	FSC
GRM-only onboard trigger	FSC	N1b N2a (*)	CSC?

(*) To add to the SRa (“SVOM alert distribution strategy”)

- **GRM-only trigger case**
  - If notice sent out by CSC, needs immediate transmission of the SP from FSC to CSC
  - New baseline since 2018: GRM VHF LC will be produced → send out an N2a notice

Software developers for the FSC VHF pipeline

	TASK	SUB-TASK	SCIENTIFIC PRODUCTS *(and other products)*		RUNNING AT		DEVELOPERS		COMMON SOFTWARE?
					FSC	CSC	F	C	
VHF DATA ANALYSIS	OTLOC	ECL	TT_ECL	Trigger time - ECLAIRs (T0)	x		CEA		NO
			QCL_ECL	Quick confidence level - ECLAIRs					
			QPO_ECL	Quick position - ECLAIRs					
		GRM	TT_GRM	Detection time - GRM	x			IHEP	
			QCL_GRM	Quick confidence level - GRM					
			QPO_GRM	Quick source position - GRM					
	RSP	GRM	*GRM Detector Response Matrices including Earth/SC scattering effects*		x			IHEP	NO
	QSPEC	GRM	QSP_GRM	Quick spectral parameters - GRM	x			IHEP	NO
	QTEMP	ECL	OBLC_ECL	On-board count light curves - ECLAIRs	x		CEA		YES
			QLC_ECL	Quick light curves - ECLAIRs			LUPM		
			QPF_ECL	Quick peak flux - ECLAIRs					
			QT90_ECL	Quick duration - ECLAIRs			IAP		
		GRM	OBLC_GRM	On-board count light curves - GRM	x		CEA	(IHEP)	
			QLC_GRM	Quick light curves - GRM			LUPM		
			QPF_GRM	Quick peak flux - GRM					
			QT90_GRM	Quick duration - GRM			IAP		
	QHR	ECL	QHR_ECL	Quick hardness ratios - ECLAIRs	x		IAP		YES
		GRM	QHR_GRM	Quick hardness ratios - GRM	x		IAP	(IHEP)	
		ECLGRM	QHR_ECLGRM	Quick hardness ratios - ECLAIRs and GRM	x		IAP	(IHEP)	
	CLASS	ECL|GRM	CRCLASS	Crude classification	x		IRAP	(IHEP)	YES

- **Software that are specific to GRM (OTLOC-GRM, RSP-GRM, QSPEC-GRM) will be developed by IHEP and then integrated at FSC by CEA/IAP/LUPM**

- **Laboratory quoted with parentheses "(IHEP)" will support the s/w development by:**
  - Providing simulations to validate the data analysis software (see next slides)
  - Testing the data analysis software

Software development for the FSC VHF pipeline in 2019

	TASK	SUB-TASK	SCIENTIFIC PRODUCTS *(and other products)*		RUNNING AT		DEVELOPERS		COMMON SOFTWARE?
					FSC	CSC	F	C	
VHF DATA ANALYSIS	OTLOC	ECL	TT_ECL	Trigger time - ECLAIRs (T0)	x		CEA		NO
			QCL_ECL	Quick confidence level - ECLAIRs					
			QPO_ECL	Quick position - ECLAIRs					
		GRM	TT_GRM	Detection time - GRM	x			IHEP	
			QCL_GRM	Quick confidence level - GRM					
			QPO_GRM	Quick source position - GRM					
	RSP	GRM	*GRM Detector Response Matrices including Earth/SC scattering effects*		x			IHEP	NO
	QSPEC	GRM	QSP_GRM	Quick spectral parameters - GRM	x			IHEP	NO
	QTEMP	ECL	OBLC_ECL	On-board count light curves - ECLAIRs	x		CEA		YES
			QLC_ECL	Quick light curves - ECLAIRs			LUPM		
			QPF_ECL	Quick peak flux - ECLAIRs					
			QT90_ECL	Quick duration - ECLAIRs			IAP		
		GRM	OBLC_GRM	On-board count light curves - GRM	x		CEA	(IHEP)	
			QLC_GRM	Quick light curves - GRM			LUPM		
			QPF_GRM	Quick peak flux - GRM					
			QT90_GRM	Quick duration - GRM			IAP		
	QHR	ECL	QHR_ECL	Quick hardness ratios - ECLAIRs	x		IAP		YES
		GRM	QHR_GRM	Quick hardness ratios - GRM	x		IAP	(IHEP)	
		ECLGRM	QHR_ECLGRM	Quick hardness ratios - ECLAIRs and GRM	x		IAP	(IHEP)	
	CLASS	ECL|GRM	CRCLASS	Crude classification	x		IRAP	(IHEP)	YES

- **Goals for the French DC-1 (12/2019) at FSC: full analysis of the ECL and GRM count LC**
  - Develop the QTEMP, QHR and CLASS tasks for ECL, GRM and ECLGRM
  - OTLOC-ECL task will be developed in 2020 (DC-2)
- **Request to the GRM team: please provide a roadmap for the OTLOC-GRM, RSP-GRM and QSPEC-GRM tasks (see also backup slide)**

X-band data analysis tasks

- **TEMP-[ECL, GRM, ECLGRM] – TEMPoral analysis**
  - Background modeling and subtraction for ECL (imaging with GP pipeline) and/or GRM (temporal fit)
  - Analysis of bkg-subtracted count light curves (+ selection of the useful GRDs)
  - Output SP: source count light curves, duration (T_{90}), time intervals for spectral analysis

- **RSP-GRM – ReSPonse generation (same software as for the VHF RSP-GRM task)**
  - Compute the DRM of each GRD for the current GRB-Earth-detector geometrical configuration (accounting for the scattering of the GRB signal in the spacecraft and the Earth's atmosphere)
  - Outputs: DRM of each GRD for the current GRB in each time interval

- **LOC-[ECL, GRM] – LOCalization**
  - For ECL (imaging with GP pipeline) and/or GRM (relative count rates in 3 GRDs, correcting for the signal scattering in Earth's atmosphere from RSP-GRM task)
  - Output SP: source position

- **SPEC-[ECL, GRM, ECLGRM] – SPECtral analysis**
  - Generate total count spectra and bkg count spectra for ECL and/or each GRD
  - Use the DRM of ECL (from CalDB) and/or of each GRD (from RSP-GRM task)
  - Spectral fits with XSPEC (PGstat) using simple spectral models (PL, COMP, Band)
  - Output SP: time-dependent source spectra, parameters and covariance matrices

- **LC-[ECL, GRM], [FLUENCE, HRL]-[ECL, GRM, ECLGRM]: LC, FLUENCE, HR and Lags**
  - Use the results of the previous tasks
  - Output SP: flux light curves and peak flux, (time-dependent) fluences, hardness ratios and lags

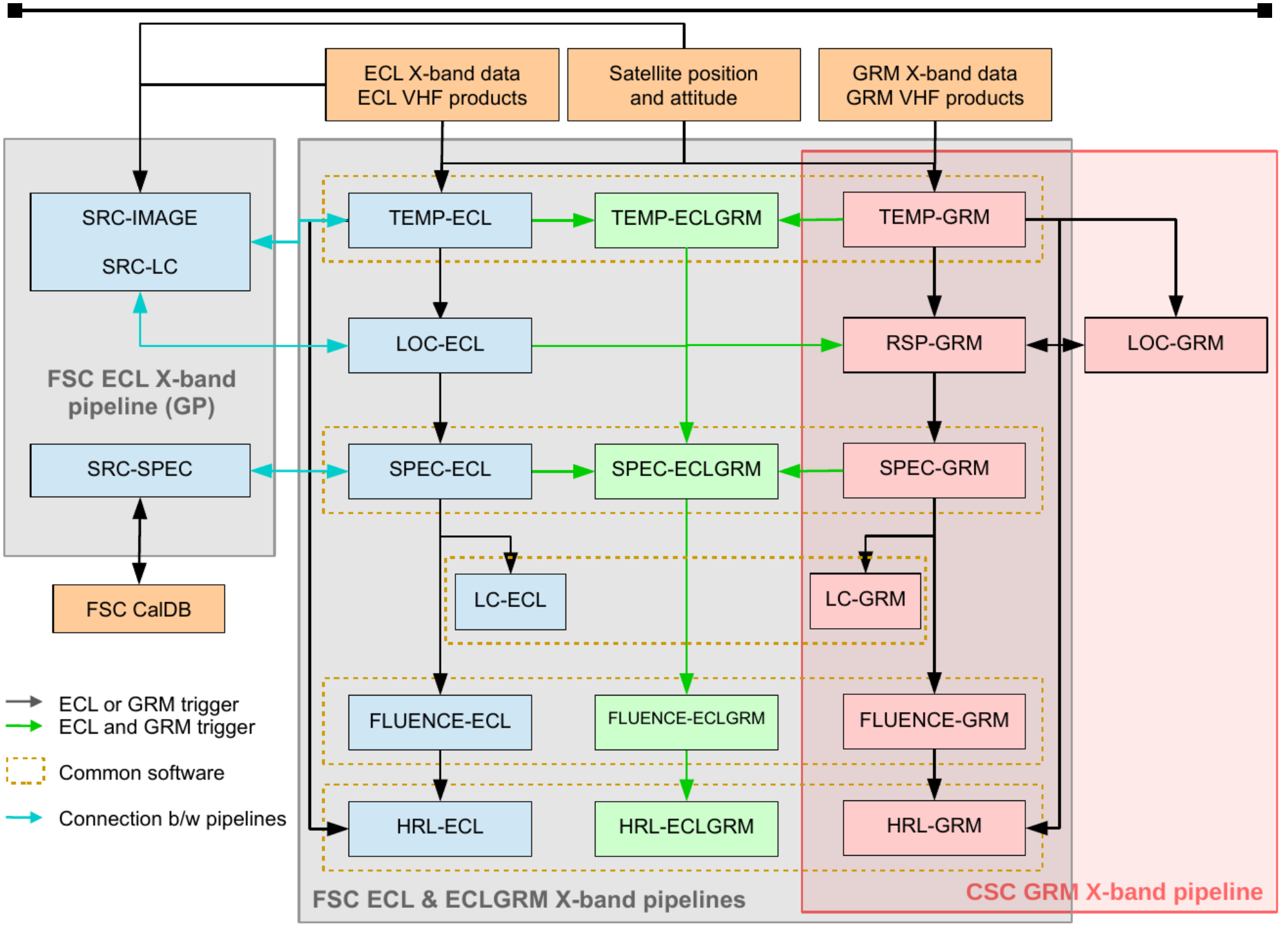
X-band data analysis tasks and scientific products

	TASK	SUB-TASK	SCIENTIFIC PRODUCTS *(and other products)*		COMMON SOFTWARE?
X-BAND DATA ANALYSIS	LOC	ECL	PO_ECL	Source position - ECLAIRs	NO
		GRM	PO_GRM	Source position - GRM	
	TEMP	ECL	T90_ECL	Duration - ECLAIRs	YES
		GRM	T90_GRM	Duration - GRM	
		ECLGRM	*Joint analysis to define common time intervals for the spectral analysis*		
	RSP	GRM	*GRM Detector Response Matrices including Earth/SC scattering effects*		NO
	SPEC	ECL	SP_ECL	Spectra in physical units - ECLAIRs	YES
		GRM	SP_GRM	Spectra in physical units - GRM	
		ECLGRM	SP_ECLGRM	Spectra in physical units - ECLAIRs and GRM	
	LC	ECL	LC_ECL	Light curves in physical units - ECLAIRs	YES
			PF_ECL	Peak fluxes - ECLAIRs	
		GRM	LC_GRM	Light curves in physical units - GRM	
			PF_GRM	Peak fluxes - GRM	
	FLUENCE	ECL	FLUENCE_ECL	Fluences - ECLAIRs	YES
		GRM	FLUENCE_GRM	Fluences - GRM	
		ECLGRM	FLUENCE_ECLGR	Fluences - ECLAIRs and GRM	
	HRL	ECL	HR_ECL	Hardness ratios - ECLAIRs	YES
			LAG_ECL	Time lags between light curves - ECLAIRs	
		GRM	HR_GRM	Hardness ratios - GRM	
			LAG_GRM	Time lags between light curves - GRM	
		ECLGRM	HR_ECLGRM	Hardness ratios - ECLAIRs and GRM	
			LAG_ECLGRM	Time lags between light curves - ECLAIRs and GRM	

See the IAP SP database for details on scientic products and methods

- **Many SP will be generated by the same software**
  - Similar methods (*_ECL and *_GRM "mirror" SP) or joint analyses (*_ECLGRM SP)
- **Few tasks are specific to an instrument: no common software for LOC-ECL, LOC-GRM and RSP-GRM**

X-band pipeline workflow



Activation of X-band pipelines, notices

Activation condition	X-band pipeline to be run	Notice	Sent out by
ECL trigger (regardless of GRM)	FSC ECL	N3 ECL (trigger validation / cancellation or new burst)	FSC
GRM trigger (regardless of ECL)	CSC GRM	N3 GRM (trigger validation / cancellation or new burst)	CSC
ECL trigger and GRM trigger	FSC ECLGRM	N3 ECLGRM (*) (if both triggers validated)	FSC

(*) To add to the SRa (“SVOM alert distribution strategy”)

See backup slides for more details on notices (definition, distribution)

- **Reminder: if both ECL and GRM trigger, the ECLGRM joint analyses will run at FSC**
  - Because the ECL data analysis heavily relies on the GP ECL pipeline at FSC
- **Note: three N3 notices if common detection (both ECL and GRM triggers validated)**
  - N3 for ECL, N3 for GRM, N3 for ECLGRM

Software developers for the X-band pipelines

	TASK	SUB-TASK	SCIENTIFIC PRODUCTS *(and other products)*		RUNNING AT		DEVELOPERS		COMMON SOFTWARE?
					FSC	CSC	F	C	
X-BAND DATA ANALYSIS	LOC	ECL	PO_ECL	Source position - ECLAIRs	x		CEA		NO
		GRM	PO_GRM	Source position - GRM		x		IHEP	
	TEMP	ECL	T90_ECL	Duration - ECLAIRs	x		IAP / LUPM		YES
		GRM	T90_GRM	Duration - GRM	x	x	IAP / LUPM	IHEP	
		ECLGRM	*Joint analysis to define common time intervals for the spectral analysis*		x		IAP / LUPM	IHEP	
	RSP	GRM	*GRM Detector Response Matrices including Earth/SC scattering effects*		x	x		IHEP	NO
	SPEC	ECL	SP_ECL	Spectra in physical units - ECLAIRs	x		LUPM		YES
		GRM	SP_GRM	Spectra in physical units - GRM	x	x	LUPM	IHEP	
		ECLGRM	SP_ECLGRM	Spectra in physical units - ECLAIRs and GRM	x		LUPM	IHEP	
	LC	ECL	LC_ECL	Light curves in physical units - ECLAIRs	x		LUPM		YES
			PF_ECL	Peak fluxes - ECLAIRs					
		GRM	LC_GRM	Light curves in physical units - GRM	x	x	LUPM	IHEP	
			PF_GRM	Peak fluxes - GRM					
	FLUENCE	ECL	FLUENCE_ECL	Fluences - ECLAIRs	x		LUPM		YES
		GRM	FLUENCE_GRM	Fluences - GRM	x	x	LUPM	IHEP	
		ECLGRM	FLUENCE_ECLGR	Fluences - ECLAIRs and GRM	x		LUPM	IHEP	
	HRL	ECL	HR_ECL	Hardness ratios - ECLAIRs	x		IAP		YES
			LAG_ECL	Time lags between light curves - ECLAIRs					
		GRM	HR_GRM	Hardness ratios - GRM	x	x	IAP	IHEP	
			LAG_GRM	Time lags between light curves - GRM					
		ECLGRM	HR_ECLGRM	Hardness ratios - ECLAIRs and GRM	x		IAP	IHEP	
			LAG_ECLGRM	Time lags between light curves - ECLAIRs and GRM					

- **The French team will integrate all software expected to run at FSC**
- **The Chinese team will integrate all software expected to run at CSC**

Development of X-band analysis software in 2019

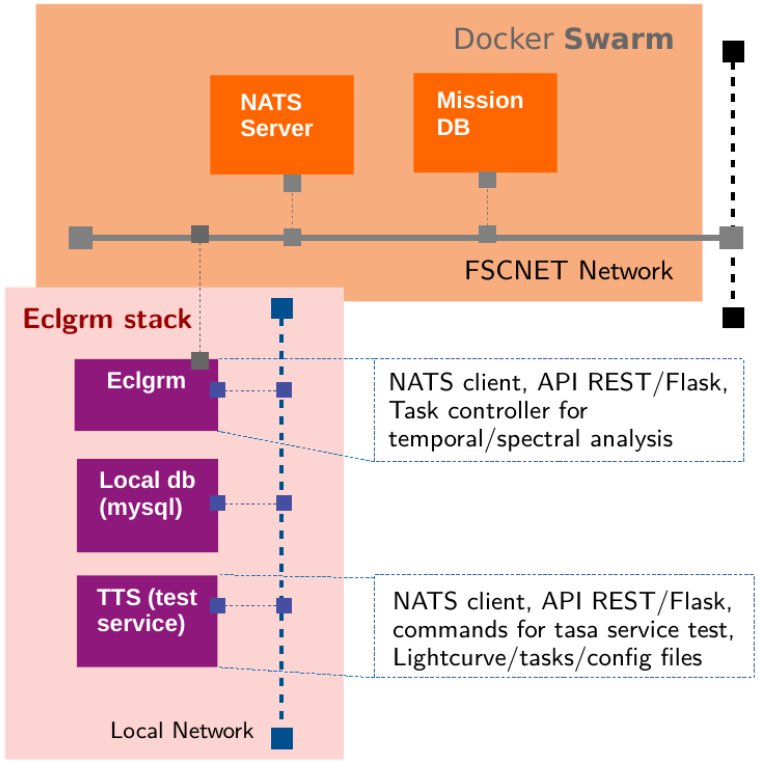
	TASK	SUB-TASK	SCIENTIFIC PRODUCTS *(and other products)*		RUNNING AT		DEVELOPERS		COMMON SOFTWARE?
					FSC	CSC	F	C	
X-BAND DATA ANALYSIS	LOC	ECL	PO_ECL	Source position - ECLAIRs	x		CEA		NO
		GRM	PO_GRM	Source position - GRM		x		IHEP	
	TEMP	ECL	T90_ECL	Duration - ECLAIRs	x		IAP / LUPM		YES
		GRM	T90_GRM	Duration - GRM	x	x	IAP / LUPM	IHEP	
		ECLGRM			x		IAP / LUPM	IHEP	
	RSP	GRM	*GRM Detector Response Matrices including Earth/SC scattering effects*		x	x		IHEP	NO
	SPEC	ECL	SP_ECL	Spectra in physical units - ECLAIRs	x		LUPM		YES
		GRM	SP_GRM	Spectra in physical units - GRM	x	x	LUPM	IHEP	
		ECLGRM	SP_ECLGRM	Spectra in physical units - ECLAIRs and GRM	x		LUPM	IHEP	
	LC	ECL	LC_ECL	Light curves in physical units - ECLAIRs	x		LUPM		YES
			PF_ECL	Peak fluxes - ECLAIRs					
		GRM	LC_GRM	Light curves in physical units - GRM	x	x	LUPM	IHEP	
			PF_GRM	Peak fluxes - GRM					
	FLUENCE	ECL	FLUENCE_ECL	Fluences - ECLAIRs	x		LUPM		YES
		GRM	FLUENCE_GRM	Fluences - GRM	x	x	LUPM	IHEP	
		ECLGRM	FLUENCE_ECLGR	Fluences - ECLAIRs and GRM	x		LUPM	IHEP	
	HRL	ECL	HR_ECL	Hardness ratios - ECLAIRs	x		IAP		YES
			LAG_ECL	Time lags between light curves - ECLAIRs					
		GRM	HR_GRM	Hardness ratios - GRM	x	x	IAP	IHEP	
			LAG_GRM	Time lags between light curves - GRM					
		ECLGRM	HR_ECLGRM	Hardness ratios - ECLAIRs and GRM	x		IAP	IHEP	
			LAG_ECLGRM	Time lags between light curves - ECLAIRs and GRM					

- **Goals for the French DC-1 (12/2019) at FSC (building on DC-0 achievements)**
  - Develop the TEMP and SPEC tasks (simplified algorithms) of the ECL/ECLGRM pipelines
  - Implement the communication between the ECL/ECLGRM CP and ECL GP pipelines
  - LOC-ECL, LC-*, FLUENCE-* and HRL-* tasks will be developed in 2020 (DC-2)

- **Request to the GRM team: please provide a roadmap for the LOC-GRM and RSP-GRM tasks (see also backup slide)**

Status of the FSC VHF and X-band pipelines

- **French "High-energy" pipeline development group active since 01/2018**
  - CEA, IAP, IRAP, LUPM – redmine wiki, mailing list (23 people), regular meetings



- **Pipeline delivered to FSC for DC-0 (12/2018)**
  - Optimized docker container (Ubuntu 18.04)
  - Communication services (NATS and Flask servers)
  - Task controller
  - Prototype algorithms for the temporal and spectral analyses (VHF or X-band)
  - Local DB
  - Gitlab documentation

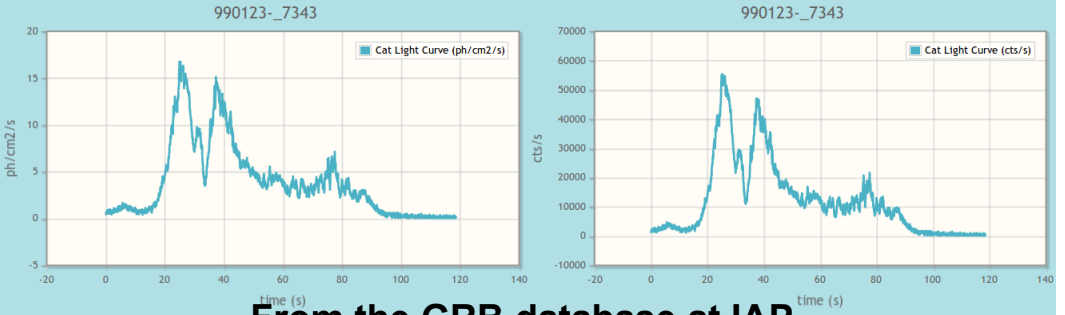
Example: output of the temporal analysis application (3 GRBs)

id	status	creation_date	start_time	end_time	lcID	binary	products	productsID	products_status	oFileName	coreId	loopNum
0	DONE	Tuesday 25 September 2018 07:26:13	Tuesday 25 September 2018 07:26:13	Tuesday 25 September 2018 07:26:13	0	python3.5	["t5", "t25", "t50", "t75", "t90", "t95"]	0	COMPUTED	["970926-_6399_t90.json"]	0	3
1	DONE	Tuesday 25 September 2018 07:26:13	Tuesday 25 September 2018 07:26:13	Tuesday 25 September 2018 07:26:13	1	python3.5	["t5", "t25", "t50", "t75", "t90", "t95"]	1	COMPUTED	["980626-_6877_t90.json"]	0	3
2	DONE	Tuesday 25 September 2018 07:26:13	Tuesday 25 September 2018 07:26:13	Tuesday 25 September 2018 07:26:13	2	python3.5	["t5", "t25", "t50", "t75", "t90", "t95"]	2	COMPUTED	["990123-_7343_t90.json"]	0	3

Simulations to support the pipeline development

- **Simulations of ECL and GRM data will be used to test the analysis algorithms along their development in 2019**

- **Catalogued GRBs to be simulated**
  - Preliminary list of 14 GRBs has been selected, with various properties
    - Durations: long or short
    - Light curves: simple or complex
    - Spectra: different E_{peak}, time varying
  - Later this year: bigger GRB samples for statistical analyses



From the GRB database at IAP

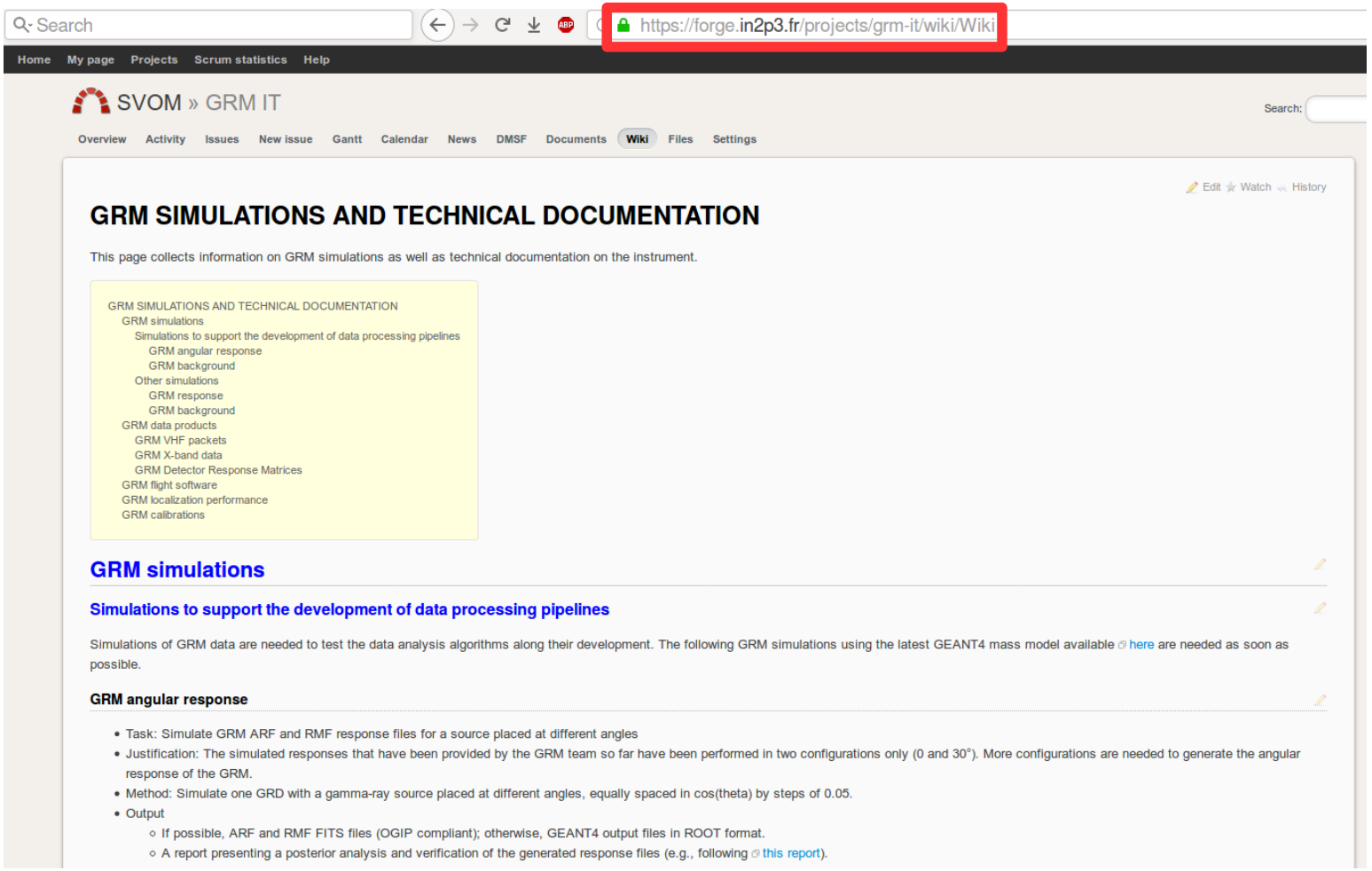
GRB NAME	CATALOG	T90 catalog	Sp model	Epeak catalog	E3Obs	E4Obs	SNRmax	SNRmax index	Smooth on (s)	Lightcurve
990123-_7343	MIXTEGK	63.36	COMP	643.46	4	150	166.65	11	20.48	Click here
920414-_1553	MIXTEGK	0.96	SBPL	769.35	4	150	29.37	6	0.64	Click here
980703-_6891	MIXTEGK	411.648	SBPL	-1	4	150	70.89	11	20.48	Click here
980329-_6665	MIXTEGK	18.56	SBPL	230.13	4	150	261.57	10	10.24	Click here
940902-_3152	MIXTEGK	1.793	COMP	1649.86	4	150	34.14	4	0.16	Click here
011130	HETE2	10.64	BAND	3.9	4	150	34.19	10	10.24	Click here
041006	HETE2	22.08	COMP	47.7	4	150	232.94	11	20.48	Click here
030528	HETE2	62.8	BAND	32	4	150	143.95	11	20.48	Click here
040924	HETE2	3.37	COMP	41.1	4	150	753.12	8	2.56	Click here
030328	HETE2	138.27	BAND	130	4	150	154.55	11	20.48	Click here
090720710	GRUBER	10.752	COMP	1481.15	4	150	54.12	5	0.32	Click here
100714686	GRUBER	5.632	COMP	89.88	4	150	37.21	6	0.64	Click here
050922C	SWIFTP	4.54	COMP	130.5	4	150	79.79	7	1.28	Click here
080411	SWIFTP	56.33	COMP	259	4	150	390.85	9	5.12	Click here

- **ECLAIRs simulation tools (GEANT4-based) developed / exploited by CEA, IAP and IRAP**
  - Include realistic instrumental effects: photon projection on the detection plane, detection efficiency, energy dispersion, Earth in the FoV, background variation along the orbit, etc
  - Sample GRB spectrum and light curve
  - Generate lists of ECLAIRs counts (GRB + backgrounds)
  - Generate VHF light curve packets for ECLAIRs and GRM

- **GRM instrument simulations are needed as soon as possible: see next slide**

Request to the GRM team: instrument simulations

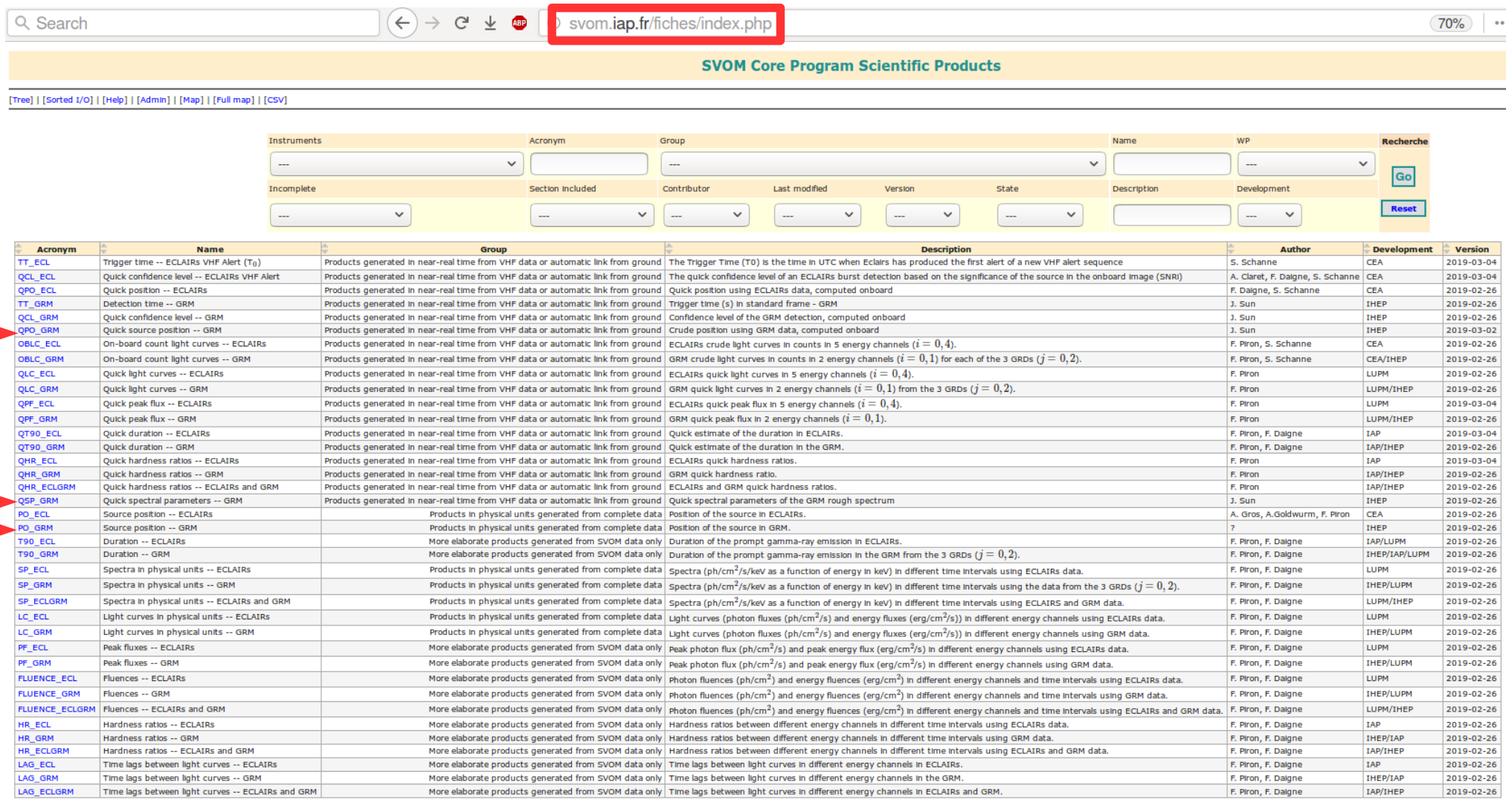
- **Please perform GRM instrument simulations with the latest GEANT4 mass model**
  - **GRD angular response (ARF and RMF):** simulate one GRD with a gamma-ray source placed at different angles (θ) in the FoV, equally spaced in cos(θ) by steps of 0.05
  - **GRM background:** simulate the background in each of the 3 GRDs for several positions on the orbit (Earth behind SVOM, at 20°, 45°, 60° and 90°)
- **See detailed requests in the GRM-IT wiki page on the SVOM redmine**



GRM-IT wiki page to collect GRM instrument simulations and technical documentation

Request to the GRM team: scientific products

- **Please complete the following SP cards using the IAP SP database**
  - Update QPO_GRM and QSP_GRM (see comments and questions inside the cards)
  - Write the PO_GRM missing card



Acronym	Name	Group	Description	Author	Development	Version
TT_ECL	Trigger time -- ECLAIRs VHF Alert (T_0)	Products generated in near-real time from VHF data or automatic link from ground	The Trigger Time (T0) is the time in UTC when Eclairs has produced the first alert of a new VHF alert sequence	S. Schanne	CEA	2019-03-04
QCL_ECL	Quick confidence level -- ECLAIRs VHF Alert	Products generated in near-real time from VHF data or automatic link from ground	The quick confidence level of an ECLAIRs burst detection based on the significance of the source in the onboard image (SNRI)	A. Claret, F. Daigne, S. Schanne	CEA	2019-03-04
QPO_ECL	Quick position -- ECLAIRs	Products generated in near-real time from VHF data or automatic link from ground	Quick position using ECLAIRs data, computed onboard	F. Daigne, S. Schanne	CEA	2019-02-26
TT_GRM	Detection time -- GRM	Products generated in near-real time from VHF data or automatic link from ground	Trigger time (s) in standard frame - GRM	J. Sun	IHEP	2019-02-26
QCL_GRM	Quick confidence level -- GRM	Products generated in near-real time from VHF data or automatic link from ground	Confidence level of the GRM detection, computed onboard	J. Sun	IHEP	2019-02-26
QPO_GRM	Quick source position -- GRM	Products generated in near-real time from VHF data or automatic link from ground	Crude position using GRM data, computed onboard	J. Sun	IHEP	2019-03-02
OBLC_ECL	On-board count light curves -- ECLAIRs	Products generated in near-real time from VHF data or automatic link from ground	ECLAIRs crude light curves in counts in 5 energy channels ($i = 0, 4$).	F. Piron, S. Schanne	CEA	2019-02-26
OBLC_GRM	On-board count light curves -- GRM	Products generated in near-real time from VHF data or automatic link from ground	GRM crude light curves in counts in 2 energy channels ($i = 0, 1$) for each of the 3 GRDs ($j = 0, 2$).	F. Piron, S. Schanne	CEA/IHEP	2019-02-26
QLC_ECL	Quick light curves -- ECLAIRs	Products generated in near-real time from VHF data or automatic link from ground	ECLAIRs quick light curves in 5 energy channels ($i = 0, 4$).	F. Piron	LUPM	2019-02-26
QLC_GRM	Quick light curves -- GRM	Products generated in near-real time from VHF data or automatic link from ground	GRM quick light curves in 2 energy channels ($i = 0, 1$) from the 3 GRDs ($j = 0, 2$).	F. Piron	LUPM/IHEP	2019-02-26
QPF_ECL	Quick peak flux -- ECLAIRs	Products generated in near-real time from VHF data or automatic link from ground	ECLAIRs quick peak flux in 5 energy channels ($i = 0, 4$).	F. Piron	LUPM	2019-03-04
QPF_GRM	Quick peak flux -- GRM	Products generated in near-real time from VHF data or automatic link from ground	GRM quick peak flux in 2 energy channels ($i = 0, 1$).	F. Piron	LUPM/IHEP	2019-02-26
QT90_ECL	Quick duration -- ECLAIRs	Products generated in near-real time from VHF data or automatic link from ground	Quick estimate of the duration in ECLAIRs.	F. Piron, F. Daigne	IAP	2019-03-04
QT90_GRM	Quick duration -- GRM	Products generated in near-real time from VHF data or automatic link from ground	Quick estimate of the duration in the GRM.	F. Piron, F. Daigne	IAP/IHEP	2019-02-26
QHR_ECL	Quick hardness ratios -- ECLAIRs	Products generated in near-real time from VHF data or automatic link from ground	ECLAIRs quick hardness ratios.	F. Piron	IAP	2019-03-04
QHR_GRM	Quick hardness ratios -- GRM	Products generated in near-real time from VHF data or automatic link from ground	GRM quick hardness ratio.	F. Piron	IAP/IHEP	2019-02-26
QHR_ECLGRM	Quick hardness ratios -- ECLAIRs and GRM	Products generated in near-real time from VHF data or automatic link from ground	ECLAIRs and GRM quick hardness ratios.	F. Piron	IAP/IHEP	2019-02-26
QSP_GRM	Quick spectral parameters -- GRM	Products generated in near-real time from VHF data or automatic link from ground	Quick spectral parameters of the GRM rough spectrum	J. Sun	IHEP	2019-02-26
PO_ECL	Source position -- ECLAIRs	Products in physical units generated from complete data	Position of the source in ECLAIRs.	A. Gros, A.Goldwurm, F. Piron	CEA	2019-02-26
PO_GRM	Source position -- GRM	Products in physical units generated from complete data	Position of the source in GRM.	?	IHEP	2019-02-26
T90_ECL	Duration -- ECLAIRs	More elaborate products generated from SVOM data only	Duration of the prompt gamma-ray emission in ECLAIRs.	F. Piron, F. Daigne	IAP/LUPM	2019-02-26
T90_GRM	Duration -- GRM	More elaborate products generated from SVOM data only	Duration of the prompt gamma-ray emission in the GRM from the 3 GRDs ($j = 0, 2$).	F. Piron, F. Daigne	IHEP/IAP/LUPM	2019-02-26
SP_ECL	Spectra in physical units -- ECLAIRs	Products in physical units generated from complete data	Spectra (ph/cm^2/s/keV as a function of energy in keV) in different time intervals using ECLAIRs data.	F. Piron, F. Daigne	LUPM	2019-02-26
SP_GRM	Spectra in physical units -- GRM	Products in physical units generated from complete data	Spectra (ph/cm^2/s/keV as a function of energy in keV) in different time intervals using the data from the 3 GRDs ($j = 0, 2$).	F. Piron, F. Daigne	IHEP/LUPM	2019-02-26
SP_ECLGRM	Spectra in physical units -- ECLAIRs and GRM	Products in physical units generated from complete data	Spectra (ph/cm^2/s/keV as a function of energy in keV) in different time intervals using ECLAIRS and GRM data.	F. Piron, F. Daigne	LUPM/IHEP	2019-02-26
LC_ECL	Light curves in physical units -- ECLAIRs	Products in physical units generated from complete data	Light curves (photon fluxes (ph/cm^2/s) and energy fluxes (erg/cm^2/s)) in different energy channels using ECLAIRs data.	F. Piron, F. Daigne	LUPM	2019-02-26
LC_GRM	Light curves in physical units -- GRM	Products in physical units generated from complete data	Light curves (photon fluxes (ph/cm^2/s) and energy fluxes (erg/cm^2/s)) in different energy channels using GRM data.	F. Piron, F. Daigne	IHEP/LUPM	2019-02-26
PF_ECL	Peak fluxes -- ECLAIRs	More elaborate products generated from SVOM data only	Peak photon flux (ph/cm^2/s) and peak energy flux (erg/cm^2/s) in different energy channels using ECLAIRs data.	F. Piron, F. Daigne	LUPM	2019-02-26
PF_GRM	Peak fluxes -- GRM	More elaborate products generated from SVOM data only	Peak photon flux (ph/cm^2/s) and peak energy flux (erg/cm^2/s) in different energy channels using GRM data.	F. Piron, F. Daigne	IHEP/LUPM	2019-02-26
FLUENCE_ECL	Fluences -- ECLAIRs	More elaborate products generated from SVOM data only	Photon fluences (ph/cm^2) and energy fluences (erg/cm^2) in different energy channels and time intervals using ECLAIRs data.	F. Piron, F. Daigne	LUPM	2019-02-26
FLUENCE_GRM	Fluences -- GRM	More elaborate products generated from SVOM data only	Photon fluences (ph/cm^2) and energy fluences (erg/cm^2) in different energy channels and time intervals using GRM data.	F. Piron, F. Daigne	IHEP/LUPM	2019-02-26
FLUENCE_ECLGRM	Fluences -- ECLAIRs and GRM	More elaborate products generated from SVOM data only	Photon fluences (ph/cm^2) and energy fluences (erg/cm^2) in different energy channels and time intervals using ECLAIRs and GRM data.	F. Piron, F. Daigne	LUPM/IHEP	2019-02-26
HR_ECL	Hardness ratios -- ECLAIRs	More elaborate products generated from SVOM data only	Hardness ratios between different energy channels in different time intervals using ECLAIRs data.	F. Piron, F. Daigne	IAP	2019-02-26
HR_GRM	Hardness ratios -- GRM	More elaborate products generated from SVOM data only	Hardness ratios between different energy channels in different time intervals using GRM data.	F. Piron, F. Daigne	IHEP/IAP	2019-02-26
HR_ECLGRM	Hardness ratios -- ECLAIRs and GRM	More elaborate products generated from SVOM data only	Hardness ratios between different energy channels in different time intervals using ECLAIRs and GRM data.	F. Piron, F. Daigne	IAP/IHEP	2019-02-26
LAG_ECL	Time lags between light curves -- ECLAIRs	More elaborate products generated from SVOM data only	Time lags between light curves in different energy channels in ECLAIRs.	F. Piron, F. Daigne	IAP	2019-02-26
LAG_GRM	Time lags between light curves -- GRM	More elaborate products generated from SVOM data only	Time lags between light curves in different energy channels in the GRM.	F. Piron, F. Daigne	IHEP/IAP	2019-02-26
LAG_ECLGRM	Time lags between light curves -- ECLAIRs and GRM	More elaborate products generated from SVOM data only	Time lags between light curves in different energy channels in ECLAIRs and GRM.	F. Piron, F. Daigne	IAP/IHEP	2019-02-26

Summary

- **Technical requirements of ECLAIRs-GRM pipelines for the Core Program are specified**
  - Scientific products, data analysis tasks, pipeline definition and workflows
  - Sharing of responsibilities for the software development

- **Development of the FSC pipelines is underway**
  - CEA/IAP/IRAP/LUPM involved, significant progress on containers and simulations in 2018
  - First pipelines delivered for DC-0 (12/2018) and running well
  - Detailed work plan toward DC-1 (12/2019) established and documented in JIRA
    - VHF pipeline with full analysis of the ECLAIRs and GRM count LC
    - ECL / ECLGRM X-band pipelines with simplified temporal and spectral analyses

- **Expected contributions from the GRM team as soon as possible**
  - Please provide a roadmap for the analysis software that are specific to the GRM
    - Related tasks: OTLOC-GRM, RSP-GRM, QSPEC-GRM, LOC-GRM
  - Please provide GRM simulations with GEANT4 to support the software development
    - See detailed requests in the **GRM-IT wiki page** on the SVOM redmine
  - Please update / write the cards of QPO_GRM, QSP_GRM and PO_GRM
    - Using the **IAP SP database**

➜ Progress meeting through visio-conferencing early May?

Backup

Note on the GRM response to GRBs

- **The DRM of each GRD depends on the GRB-Earth-detector geometrical configuration**
  - Due to the scattering of the GRB signal in the spacecraft and the Earth's atmosphere (and because the GRM is not an imager, unlike ECLAIRs)
- **How does the GRM team plan to deliver these GRB-specific calibration products?**

- **For example, the Fermi/GBM response to a GRB can be retrieved in two ways**
  - Either from the burst data products available at the Fermi Science Support Center
  - Or by running the GBM Response Generator available at the same site

From https://fermi.gsfc.nasa.gov/ssc/data/access/gbm

Trigger and Burst Data Products

The following data products are created by the GIOC and sent to the FSSC whenever a trigger has been detected, regardless of whether the trigger resulted from a gamma-ray burst (for example, a solar flare or an electron precipitation event may have caused the trigger). These data products have a latency of 1 day. Any of the products may be updated with new versions after the initial delivery. In particular, the catalog entry files (GS-105, GS-106, and GS-109) may be updated as trigger parameters are refined.

ID	Name	Description
GS-101	CTIME (burst version)	For each detector, the counts accumulated every 0.064 s in 8 energy channels
GS-102	CSPEC (burst version)	For each detector, the counts accumulated every 1024 s in 128 energy channels.
GS-103	GBM TTE (burst version)	Event data for the burst. There is one file for each detector.
GS-104	GBM DRMs	8 and 128 energy channel Detector Response Matrices (DRMs) for all 14 detectors. These files may not be produced for all triggers.
GS-105	GBM Trigger Catalog Entry	Classification of GBM trigger with some characteristics (e.g., trigger time, coordinates). This file is used to create the GBM Trigger Catalog.
GS-107	GBM TRIGDAT	All the GBM's messages downlinked through TDRSS. These messages are the basis of the GCN Notices for the burst.
	Quicklook Plots	Lightcurves and spacecraft pointing history files in GIF and PDF format.

From https://fermi.gsfc.nasa.gov/ssc/data/analysis/gbm

Documentation for the GBM Response Generator

SA_GBM_RSP_Gen.pl:

A routine that processes Fermi Gamma-ray Burst Monitor (GBM) science data and creates level 1 ICD-compliant FITS Detector Response Function files (GS-104 from GLAST-GS-ICD-0006). Written, Aug. 13, 2008, by RDP @ UAH.

(To install, please see the Installation Instructions.)

NOTE: GRB trigger data from GBM already have a standard set of response functions delivered to the data archive, so there is generally no need to redo them.

The GBM response file generator has two modes of operation:
1) Production of response files for a triggered event from GBM, and
2) production of response files for an arbitrary source location at an arbitrary time.

Notice levels

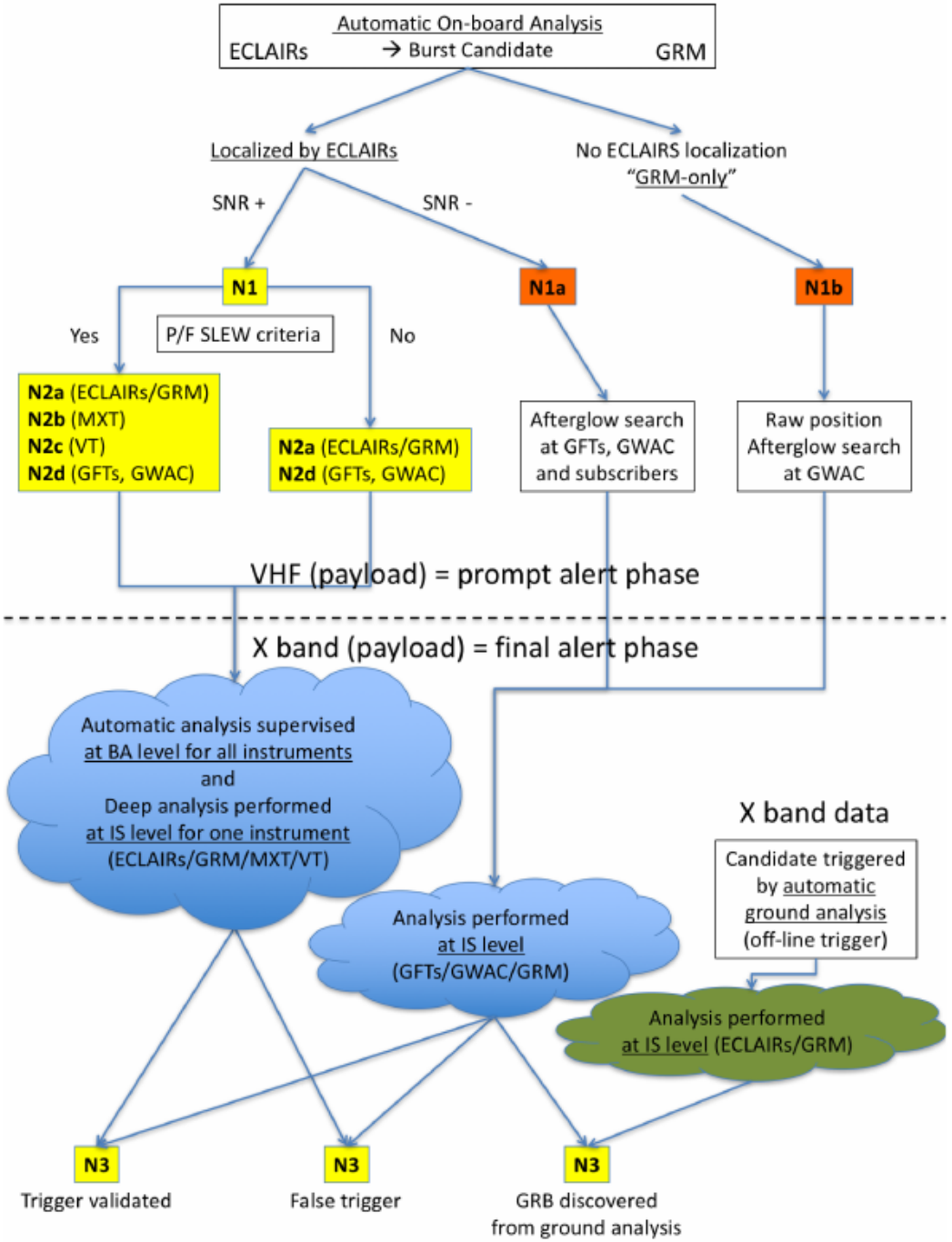
From the "SVOM alert distribution strategy" document (SV-SY-AN-53-JPO)

Table 1 — Definition of alert levels for notices.

Prompt alert phase	N1	ECLAIRs localization (SNR above threshold)
	N1a	ECLAIRs localization (SNR below threshold)
	N1b	GRM only detection (raw localization)
	N2a	Burst parameters derived from a subset of ECLAIRs and GRM data[1]
	N2b	MXT localization (only if platform slew)
	N2c	VT localization (only if platform slew)
	N2d	F-GFT, C-GFT and GWAC results
Final alert phase	N3	Final results for a validated trigger Or Cancellation of previous notices for a false trigger Or New burst detected by the ground data processing or confirmed after counterpart has been found (N1a, N1b)

[1] The data set downloaded through alert level 2a contains data from ECLAIRs and also from GRM in several large energy bands.

Notice generation and distribution



From the "SVOM alert distribution strategy" document (SV-SY-AN-53-JPO)