COLIBRI
Instrument Center
GIC

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GIC main functions

1) Store COLIBRI status/weather/performance data and display them in a viewer. ✓

2) Display observation plannings (past, present and near future)

3) Make calibration reference images and their validations. ✓

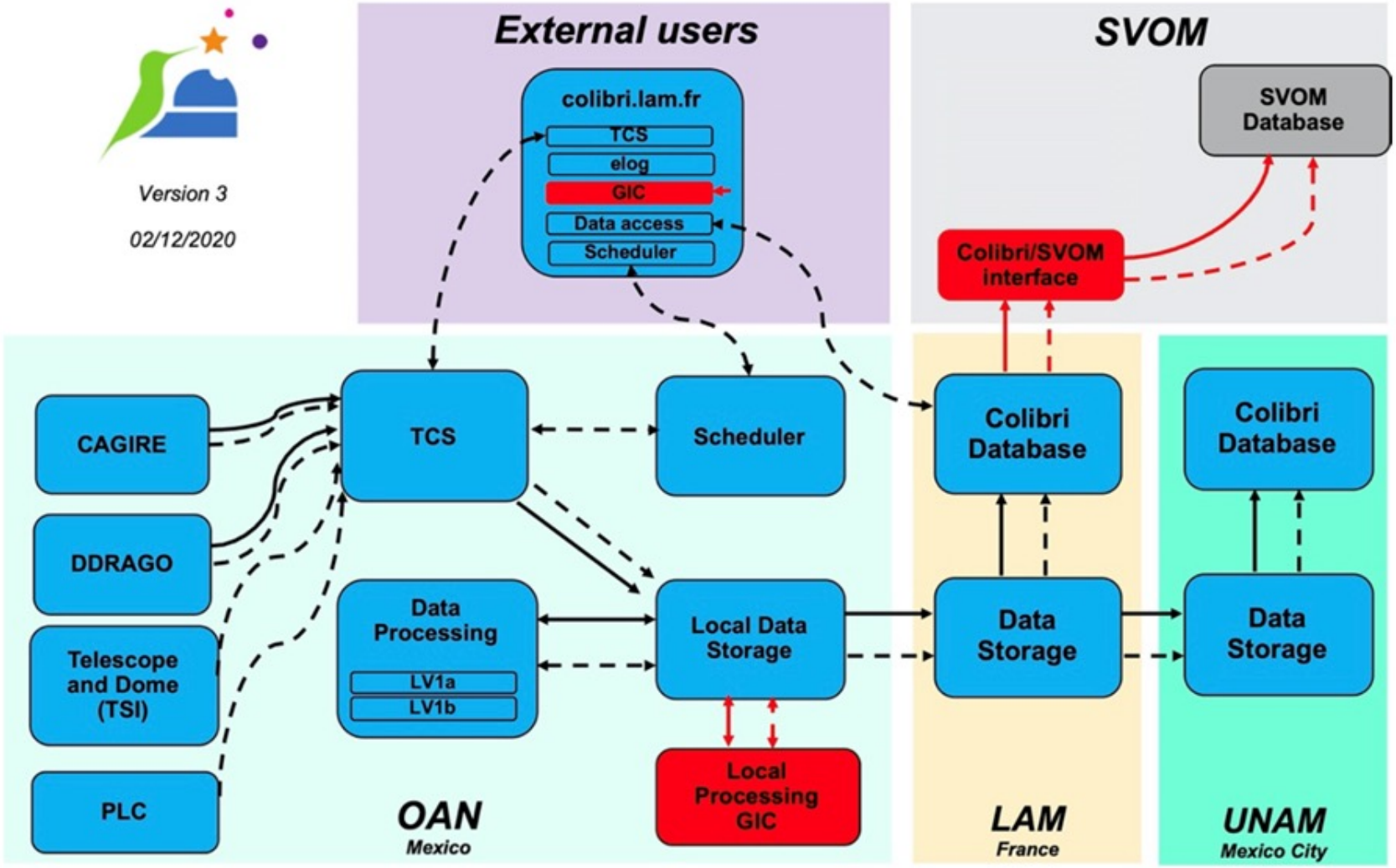
4) Make SVOM scientific products from the GP1 outputs, validation and insertion in the SDB ✓

5) Dashboard GP1/GIC and display outputs of GP1

6) Management of the observing strategies with direct link with the telescope.

7) Tools to manage COLIBRI IS shift for SVOM operations ✓

GIC global architecture



GIC modules

GIC local (OAN):

- Collect status data from the different subsystems (TCS, GP1, scheduler) and prepare the JSON summary files for the transfer to France
- Create the scientific products from the GP1 outputs
- Create the calibration imqges (bias, flat, dark) and validate automatically them

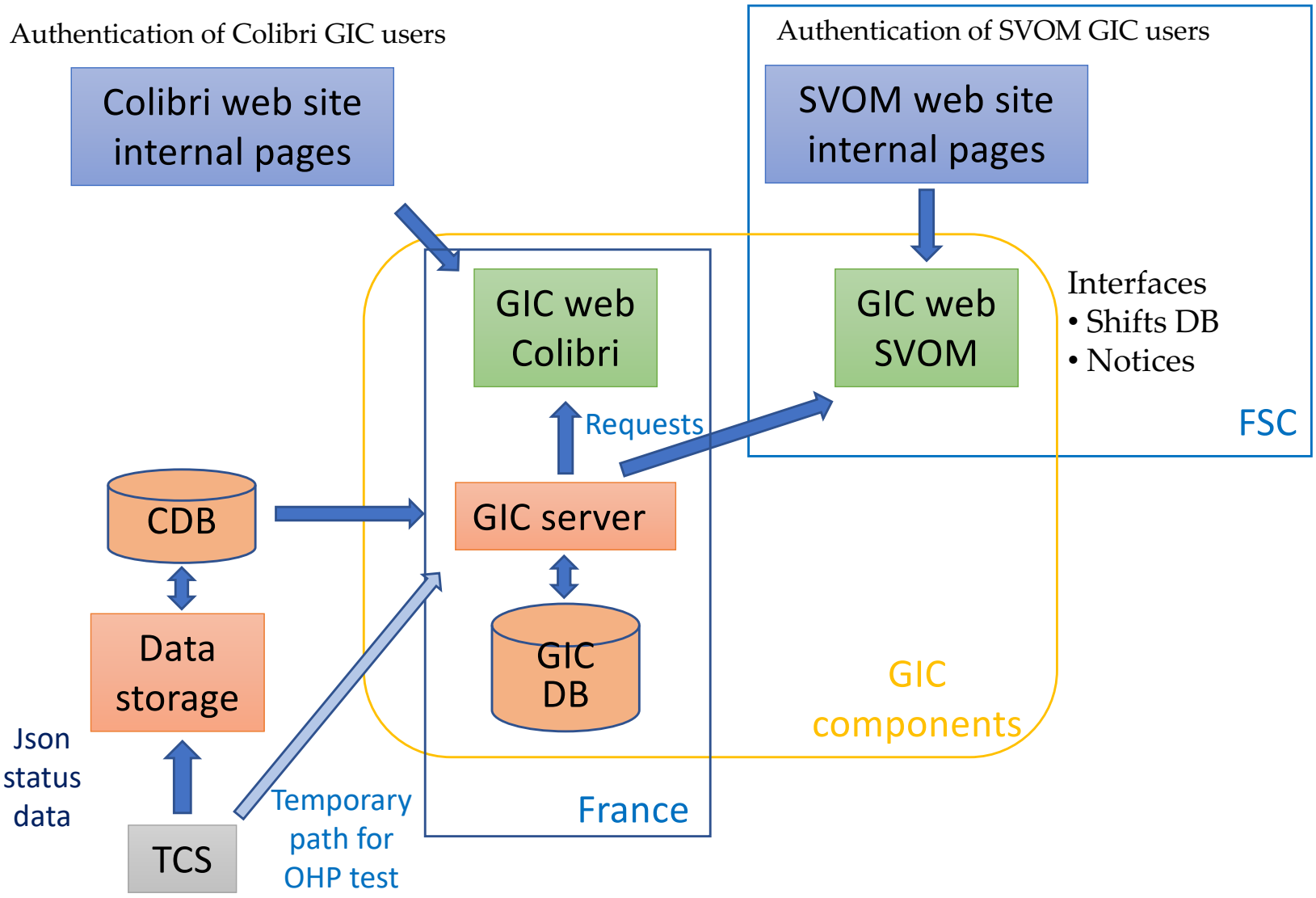
GIC web(France):

- Collect all the status data from the COLIBRI database (CDB - LAM) and the SDB
- Store them in the GIC DB
- Display them in the GIC web (for COLIBRI users and for SVOM users)
- Link to the Shift DB in the FSC
- Make a direct link with TCS to manage observations for alerts

COLIBRI-SVOM interface (FSC):

- Collect all the scientific products from the CDB
- After validation, insert the products in the SDB

GIC Web architecture



Calibration production & validation

- Calibration images are taken regularly. Master images are created and validated automatically
- Process is launched daily, after the end of the observation period
- If no calibration images were taken, nothing is done

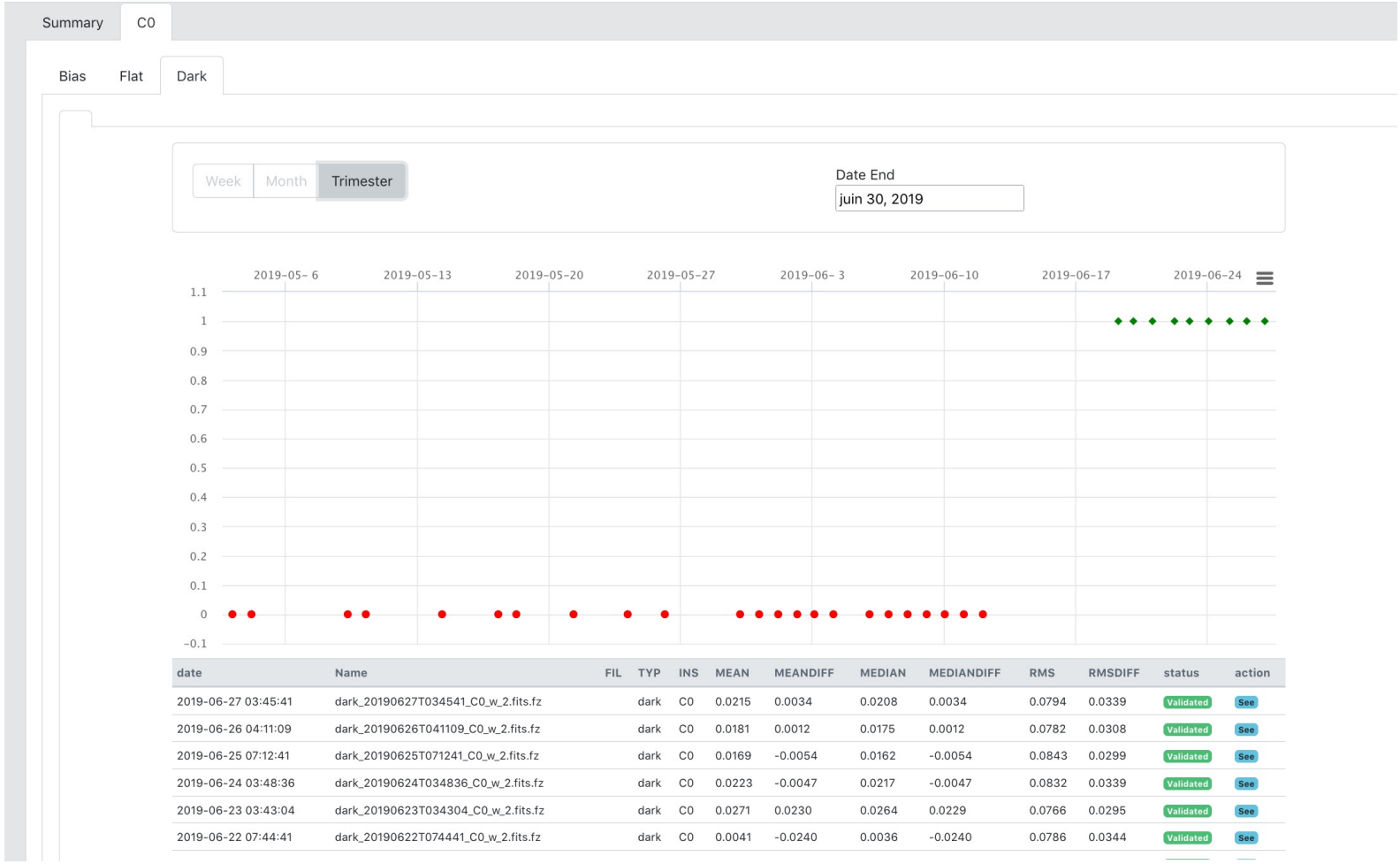
Candidates building

- For each type/camera/filter images, a candidate is built from raw calibration images

Validation is done in 2 steps:

- A test of availability is done for each candidate
- Each candidate is compared to the corresponding master
- According to some cuts, candidates becomes the master

GIC Web calibration page



date	Name	FIL	TYP	INS	MEAN	MEANDIFF	MEDIAN	MEDIANDIFF	RMS	RMSDIFF	status	action
2019-06-27 03:45:41	dark_20190627T034541_C0_w_2.fits.fz		dark	C0	0.0215	0.0034	0.0208	0.0034	0.0794	0.0339	Validated	See
2019-06-26 04:11:09	dark_20190626T041109_C0_w_2.fits.fz		dark	C0	0.0181	0.0012	0.0175	0.0012	0.0782	0.0308	Validated	See
2019-06-25 07:12:41	dark_20190625T071241_C0_w_2.fits.fz		dark	C0	0.0169	-0.0054	0.0162	-0.0054	0.0843	0.0299	Validated	See
2019-06-24 03:48:36	dark_20190624T034836_C0_w_2.fits.fz		dark	C0	0.0223	-0.0047	0.0217	-0.0047	0.0832	0.0339	Validated	See
2019-06-23 03:43:04	dark_20190623T034304_C0_w_2.fits.fz		dark	C0	0.0271	0.0230	0.0264	0.0229	0.0766	0.0295	Validated	See
2019-06-22 07:44:41	dark_20190622T074441_C0_w_2.fits.fz		dark	C0	0.0041	-0.0240	0.0036	-0.0240	0.0786	0.0344	Validated	See

Display of the triplet (instrument, calibration_type, filter) over day, week, month, trimester
We show presently Coatli calibration data between march 2018 and January 2020
Display candidate image in the current page is on study

Status & Demo

Functions	Status	Comments
Status/Perfo/Weather data	Done	In test at OHP with PLC
Observation plannings		In discussion with Stephane
Calibration images	Done	Using COATLI data
SVOM SP products	Done	DC2. Interface with GP1 in progress
Dashboard GP1/GIC		To be started soon
Management obs.		In discussion with Alan
Shift IS COLIBRI	Done	

http://192.168.100.27:3000

COLIBRI
Image analysis pipeline
GP1

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GP1

Goals:

- Reduce all the images taken by COLIBRI (bias, flat, dark) and provide them to the data transfer (L1a)
- Only for SVOM GRB alerts and others types of alerts (MM, EM), perform the full image analysis up to the scientific products.

Base:

- Based on the reduction pipeline from Nat Butler (ASU)
- COATLI, DDOTI, RATIR pipelines are already using it
- Only suited for offline processing

COLIBRI requirements:

- Online mode to be able to fulfill requirements of SVOM (1st results in 5min)
- Adapt the pipeline structure to be more modular and work also on documentation
- No change on the COATLI image analysis
- This new software layer is written in python, it is there to facilitate access to the main functions of the pipeline
- All the modules (functions) are independent, configurable by a configuration file specific to each one

GP1 description

Available in : marsvom2.in2p3.fr:/data/Pipeline

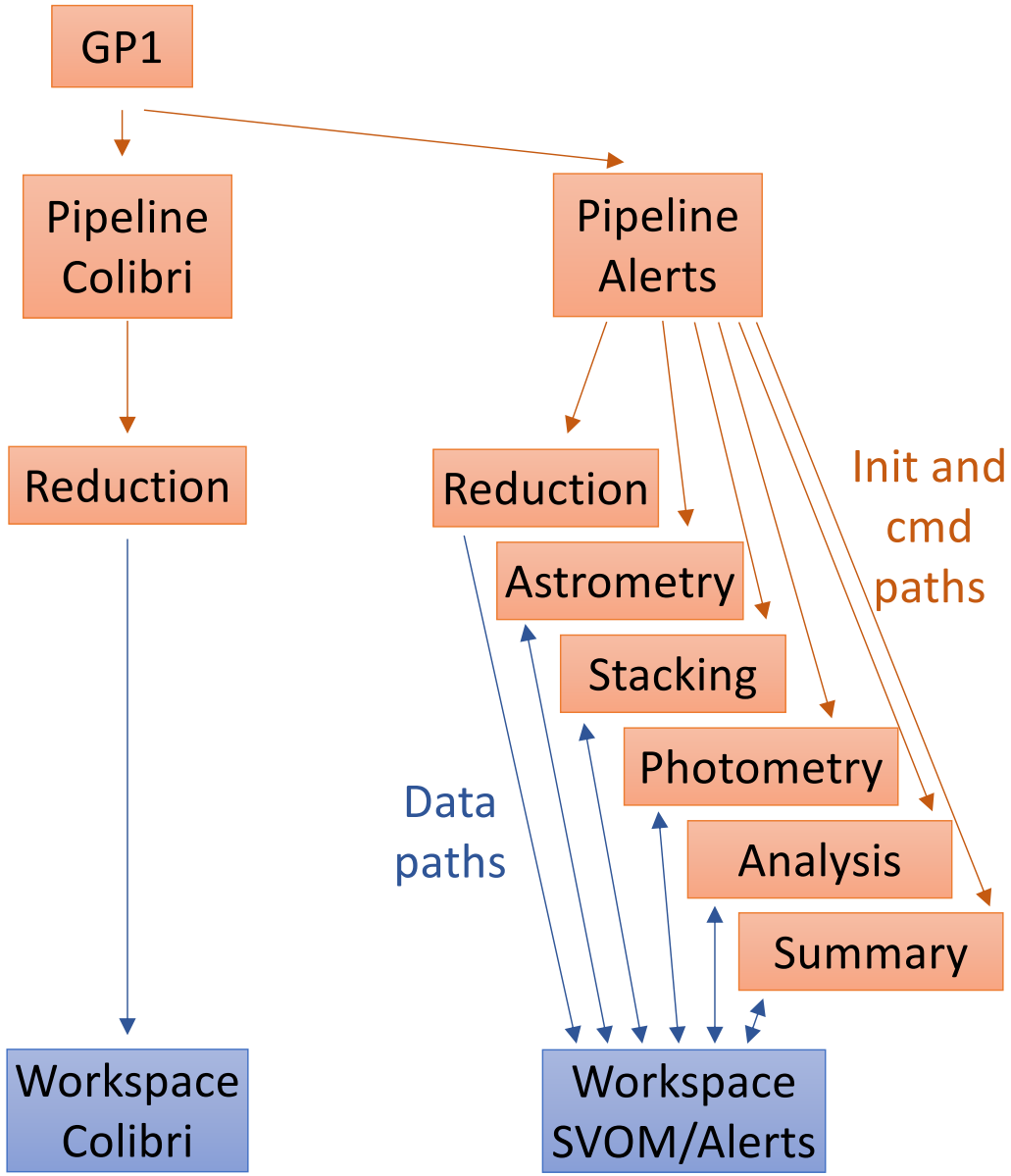
Source extraction: Sextractor
Stacking: Swarp
PSF fitting: hand made (model, gauss+wings)
Alignment: hand made
Arithmetic image operation: imarith
Subtraction image: hotpants
Outputs: files & html
No so well structured and minimal documentation

GP1 architecture

Main module in production
Process image by image

According to the image header, GP1 gives the image to the concerned pipeline

According to its configuration, the pipeline controls the sequence of modules



GP1 level

- Online oriented, GP1 manages 2 instances of the pipeline
- CLI : gp1 --config (-c) *config_file*
- Example: gp1 --config config/gp1.cfg
- Tested with updated pages (headers), an extern process send images regularily
- To be tested with 2 instances of pipeline

```
[General]
input    = /data/pipeline_test/Simulation_online/input
log_path = /data/pipeline_test/Simulation_online/output

# Pipelines
[pipeline-test]
processing_strategy = standard
identifier_header   = EXPTYPE,OBSERVER
identifier_value    = object,svom
configuration_path_dir  = /data/pipeline_test/GP1-V7/config/pipeline-test
workspace_dir       = /data/pipeline_test/Simulation_online/output
```

Example of configuration file for gp1

Access to the “pipeline" level

- A pipeline is able to invoke one or more modules
- A pipeline is configurable through a dedicated configuration file
- It will be used for the offline analysis
- CLI : pipeline --config (-c) *config_dir*
- Example: pipeline --config config/svom
- Output directory is built according to some keys present in the fits headers (alertID, instrument, filter)

```
[Workspace]
headers = TRGID,INSTRUME,FILTER

[Input and Output]
input  = /data/pipeline_test/Data/20191016/raw_images
output = /data/pipeline_test/output

[Structure of pipeline]
reduction = yes
findstars = no
alignment = no
stacking  = no
Photometry =no
Image subtraction = no
Summary = no

[Strategy processing]
mode = standard
```

Access to the "module" level

- A module is able to process one or more images
- Each module is configurable through a dedicated configuration file
- Every module may be tested independantly
- CLI : module_name --input (-s) *dir or images list*
  --output (-r) *dir*
  --config (-c) *config_file*
- Example: reduction --input input_dir --output output_dir --config reduction.cfg
- reduction will reduce fits files in input_dir, put the results in output_dir according to reduction.cfg

(Paths given in parameters mask those given in the configuration file)

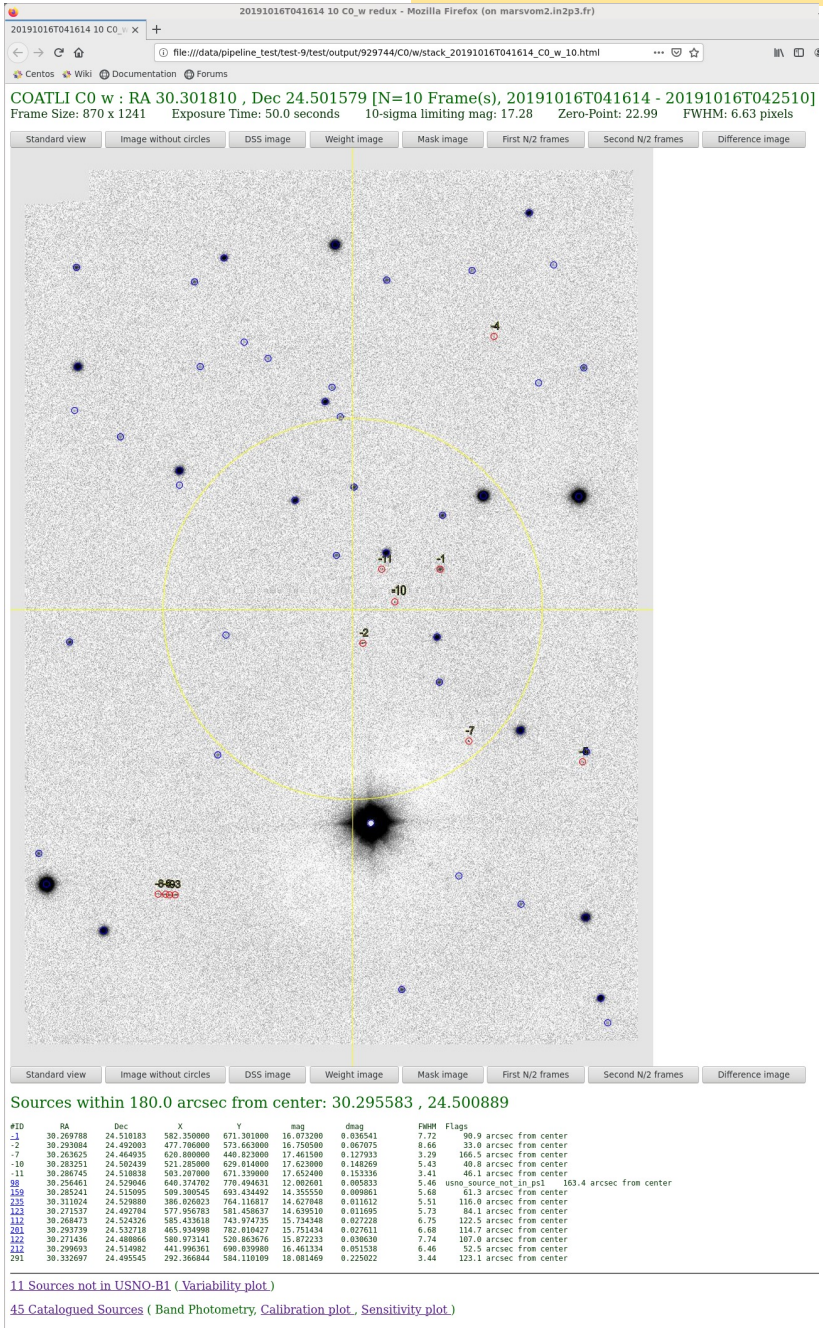
```
[Input and Output]
input  = /data/pipeline_test/Data/20191016/raw_images
output = /data/pipeline_test/output_V6

[Calibration]
dark = /data/pipeline_test/Data/20191016/masters/dark.fits
flat = /data/pipeline_test/Data/20191016/masters/flat.fits
bias = /data/pipeline_test/Data/20191016/masters/bias.fits

[Parameters]
ps          = 0.000195
gain        = 6.2
sat_level   = 7000
detect_thresh = 1
```

Example of configuration file for reduction

Running GP1



2021-09-11 16:13:25,668 - INFO - GP1: Configuration file is correct - loading data
2021-09-11 16:13:25,669 - INFO - GP1: Building pipeline
2021-09-11 16:13:25,669 - INFO - pipeline-test: Loading pipeline configuration
2021-09-11 16:13:25,670 - INFO - pipeline-test: The output is now /data/pipeline_test/output_V6
2021-09-11 16:13:25,671 - INFO - Reduction: The configuration file is correct - loading of data
2021-09-11 16:13:25,672 - INFO - Reduction: The new dark file is now /data/pipeline_test/Data/20191016/masters/dark.fits
2021-09-11 16:13:25,672 - INFO - Reduction: The new bias file is now /data/pipeline_test/Data/20191016/masters/bias.fits
2021-09-11 16:13:25,672 - INFO - Reduction: The new flat file is now /data/pipeline_test/Data/20191016/masters/flat.fits
2021-09-11 16:13:25,672 - INFO - Reduction: The output is now /data/pipeline_test/output_V6
2021-09-11 16:13:25,672 - INFO - pipeline-test: The output is now /data/pipeline_test/Simulation_online/output
2021-09-11 16:13:25,673 - INFO - Reduction: The output is now /data/pipeline_test/Simulation_online/output
2021-09-11 16:13:45,552 - INFO - GP1: New astronomical image - /data/pipeline_test/Simulation_online/input/20191016T042001C0o.fits.fz.
2021-09-11 16:13:45,882 - INFO - pipeline-test: The pipeline processes 1 image(s)
2021-09-11 16:13:45,882 - INFO - pipeline-test: Processing of /data/pipeline_test/Simulation_online/input/20191016T042001C0o.fits.fz
2021-09-11 16:13:45,911 - INFO - Reduction: The output is now /data/pipeline_test/Simulation_online/output/929744/C0/w
2021-09-11 16:13:48,555 - INFO - GP1: New astronomical image - /data/pipeline_test/Simulation_online/input/20191016T042452C0o.fits.fz.
2021-09-11 16:13:48,591 - INFO - pipeline-test: The pipeline processes 1 image(s)
2021-09-11 16:13:48,591 - INFO - pipeline-test: Processing of /data/pipeline_test/Simulation_online/input/20191016T042452C0o.fits.fz

GP1 status

- All the modules of the Nat's pipeline have been adapted to the new structure
- Comparison tests are done on files content (text and fits) after each step using COATLI observations to Swift triggers
- Nat is regularly updated on the progress of GP1
- Start tests of performances of each step
- Start the interface between the GP1 outputs and the SVOM SPs
- Waiting for COLIBRI/DDRAGUITO images to really adapt the GP1

SVOM Scientific Products:

- 6 products available in the new FITs structure
- DT_GFT, QLC_GFT, PO_GFT, LC_GFT, QTI_GFT, QF_GFT
- Shaping of the SPs OK and test of insertion in the SDB OK
- Missing all the multi-camera products link to the redshifts and environment parameters