



Euclid QLA & HMS

Luca Conversi Euclid SOC Instrument Scientist



- Euclid SOC is in charge of designing, developing and running a QLA system capable of:
 - running autonomously over ALL data;
 - verifying that the intended planned activities are executed;
 - analysing the data to identify instrument problems (misconfigurations, sudden reconfigurations, impacts, others) that could be mitigated with fast SOC/MOC/IOT intervention;
 - data include VIS, NISP-P, NISP-S "science" data, i.e. including calibration exposures
 - analysing and extracting H/K parameters from instruments and S/C;
 - analysing AOCS data for pointing performance assessment;
 - providing quality flags and alerts, augmenting but not part of the level 1 product (i.e. not defined by level 2 requirements).

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• QLA will use level 1 data and run some processing on it - "level 1.5" data produced on the fly (eventually stored only in a local buffer archive). The level of processing is TBD depending on performance.

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Euclid Level 1



- Level 1 is the processing function that gathers and conforms to the data model the data from On Board and from ground, ready for processing by the SGS.
- It is a "special" processing function, since its inputs are not Common Data Model compliant.
- It is also "special", since it is the only processing function where timeliness is required (i.e. 48 hours from reception of last component)
- A level 1 "product" is thus a collection of data containers and associated metadata. It is not necessarily a self standing item (i.e. a zipped file) but a reference in the EAS to metadata and data files.
- The development under EC, however ESAC runs it and contributing to some components: house-keeping telemetry (HKTM), framework, interfaces.
- All the incoming and generated data is ingested in the SOC local EAS Storage, and published in EAS. A distribution policy will ensure that level 1 data is available to all the subsequent Processing Functions.

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Level 1 Functional Description





- The system takes as inputs the raw CFDP files containing instrument scientific data, and also HKTM, ancillary & other external items.
- The instrument processors gather all data belonging to an exposure, decompressing it and formatting in the level 1 Common Data Model structure (FITS).
- Another module deals with HKTM and other sources metadata extraction, and with the generation of the HKTM data files.
- Given different time spans (daily for HKTM, per exposure/ dither on the Science), coordination is required.
- The products are registered in the EAS, involving metadata registration and DSS storage of data files.

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- QLA will run automatically over all received data sets:
 - This means being able to "understand" and qualify quickly all possible instrument modes and data types.
 - A report shall be ready within 48 hours from data reception from MOC (including level 1 generation). Not all possible checks fit.
 - QLA is memory-less: runs over single products, without knowledge of other past exposures.
 - It generates metadata quality information gathered in the form of reports, and alerts on the "lesser" quality products.
 - For these lesser quality products, QLA will offer ad hoc visual inspection (through external tools) and processes to be conducted by an operator or scientist.
 - Extracted parameters and results will be uploaded into the ARES database which will fed the health monitoring system (HMS)

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QLA Use Cases

- Automatic cases:
 - Data ingestion
 - VIS Checks
 - NISP Checks
 - System Checks (i.e. pointing, certain verification on HKTM, etc.)
 - Alert generation (based on the checks outcome)
- Manual processing of given inputs (all or subset of previous)
- Visualisation of data products
- Extraction and archive of QLA product information as parametric metadata

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- Generation of QLA reports
- Interfacing with EAS



The system will run automatically on all data received, based on triggering rules implemented at the QPF. However, it allows for manual operations (Instrument Scientists at SOC) to verify Alarms or to more closely examine given data sets



QLA Architecture



- QLA Processing Framework (QPF) provides the processing framework to execute system functionalities, implements the main HMI, the data access and persistence mechanisms, the logging and the management of the tasking, and the gathering and collection of reports.
- QLA Diagnostic Tools (QDT): they implement different algorithms and functions to perform over the data. They encompass data extraction (HKTM and parametric data), data processing and reporting:
 - Common (including HKTM extraction and processing)
 - VIS functions
 - NISP functions
 - AOCS functions
- On top, it will rely and integrate external tools for more advanced data analysis (e.g. Sextractor, Scamp) and visualisation (e.g. DS9).

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Health Monitoring System



- Euclid SOC is also in charge of designing, developing and running a HMS capable of:
 - gathering all observable parametric information linked to instrument and mission performance;
 - archiving it in a mission-long database: ARES;
 - providing access methods and tools to investigate and identify trends and evolutions;
 - providing this access also to IOTs;
 - running automated analysis;
 - providing systems for automatic alerting.
- Data in the ARES database will come from e.g. H/K information, but also from "higher level" processed products such as parameters obtained during the QLA analysis

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QLA Current Status



- It is a software developed in Python (QDT) and QTk/C++ (QPF)
- The QLA was released as part of the SOC V1 software release in April 2016
- The QPF component very advanced, implementing:
 - HMI (System Start, Stop, Log, Monitor, Partial Configuration)
 - Task registration, configuration and connection
 - Execution of processing
 - Access to EAS/DSS
 - Internal DB for local persistence of products
- The QDT was released for VIS, allowing a subset of checks to be implemented over raw data sets as produced by the VIS SIM data as well as lab data (some reformatting needed). Available as stand alone functions called from command line
- VIS processing emanated from a VIS-QLA Data Description and Diagnostics document, describing the "pipeline". A NISP similar document under evaluation, provided by IPAC
- Tested successfully on V1 release
- AOCS diagnostic tools developed in MatLab

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QLA QPF System



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STOP SYSTEM	Processing Task	ks Agents Sta	tus Alerts	<u> </u>								
	Started at	09 18 49 899507	Finished	at	Task Name	Ager	Proc.Eleme	nt Aan1-201005111111	ALL TO EL VIS Metadatat	Status	Progress	Exit Code
INITIALISED Ity: INFO 2016-05-11 10:06:33.192	2018-05-11 2018-05-11 2018-05-11	09 17:08 04:9028 09 22:51 09:545 09 24:07 392095	5272 2016-05- 552 2016-05- 7132 2016-05-	11709 17 18 11709 23 01 11709 24 07	2521876422 TskAge2 //munk_st 5066691882 TskAge1 //mappy_b 9376343912 TskAge2 //backstal	onebrakky Tsk/ anach Tsk/ sbing_meitner Tsk/	gn2 /gp//run/Tek gn1 /gp//run/Tek ge2 /gp//run/Tek	kAge2-20160511T111 KAge1-20160511T112 KAge2-20160511T112	1704-1/LE1_VIS_MeteodataC 248:2/LE1_VIS_Processor 1401-2/LE1_VIS_Ingestor	oliactor Finished Finished FAILED	100% 100% 0%	2
<hosts></hosts>			Sour	e: homeleur	onsituficiation v1 m1 multihost e	undex02+eurodex03	ion					
				Gener	al Hosts							
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QLA QPF System Logging



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File Edit Tools Window Help Main Control 8 Log Messages Data Ingestion Monitoring Browser Internal/Local Archive Actions OPEHM - 0 EvtMng _ 0 DataMng - 0 STOP SYSTEM 10:06:33.753000 GPFHMI [I] New state: OPERATIONA 11:16:57.200921 Evising (I) Incoming measurage: INDAT/ [["cselor"."UNRICHIN","endTime".","Initrament"."NIP, "obsilicde".","productid"."EUC_NIP_INFO_C-0000-11:16:45:501474 OPPHMI [I] Incoming measurage: TASK, RES 11:16:58.201578 Evilling [1] Incoming measuring: TASK, RES. 1_20200707T0350552","productSilve", 11:16:46.501619 GPPHMI [I] New TaskRes churk: TakAge1-20160511T111644-1 - 0 - -2 11:17:00.202232 Evilling [1] Incoming message: TASK, RES 4362, "producti Status" "OK", "producti Type", "NiPL INFO", "productives tor", "01, 00", "stgrafure", "C-0030-1", "start 11:17:04.201753 Evilling [1] Incoming mesosage: TASK_RES Time" "20200"0" T0350552","urf "Tile // home/eucope/gpt data/Fbox/ 11:16:54.502147 GPFHMI [I] Incoming mesosage: TASK, RES Stop processing 11:16:54.502653 GPFHMI [I] New TaskRes churk: TskAget-20160511T111644-1 - 2 - 1 11:17:04.208775 Evilling (§ RECEIVED NOTIFICATION OF TASK TakAget-20160511T111644-1 EUC_NIR_INFO_C-0030-1_20200707T0350552.xm7;"uttipace";"INBCX"] incoming data FINISHED AT 20160511T091700 11:16:58.502179 GPFHMI [I] Incoming message: TASK_RES 11:16:58.502501 GPFHMI [I] New TaskRes churk: TakAget-20160511T111644-1 - 4 - 1 11:17:04.219901 Evising[1] incoming me INGK TASK, RES 11:19:21.000765 DataMrg[I] incoming measurage: INDATA 11:17:00.501710 GPFHMI [I] Incoming message: TASK_RES 11:17:04.223042 Evilling [I] RECEIVED NOTIFICATION OF TASK Tak Aget-20160511T111644-1 11.19.22.030668 DataMrg [E] ERROR: Falled and 'INSERT INTO products_Into product_bt, product_type, System info 11:17.00.502006 GPFHMI [I] New Task Res churk: Tsk Aget-20160511T111644-1 - 6 - 1 FINISHED AT 20160511T091700 product status ki, product version, product size, creator ki, retrument ki, dzernoda ki, signature, start_time, and_time, registration_time, unt VALUES (EUC_NIR_INPO_C-1130-2_20200707T0411582"). 11:17:04.501688 GPFHMI [I] Incoming mesosage: TASK, RES 11:17:06.206650 Evilling [1] Incoming measurage: TASK_RES 11:17:12:201840 ExtBing [1] Incoming message: TASK_RES 11:17:16:201827 ExtBing [0] Incoming message: TASK_RES 11:17:04.502019 GPFHMI [I] New Task Res churk : Tsk.Aget-20160511T111644-1 - 100 - 0 'NIR_INFC7, 0, '01.00', 4364, 1, 1, 2, 'C-1130-2', '2020-07-07 04:11:982'', '2001-01-01 00:00:00.0', RUNNING Status: 11:17:04.503775 OPFHMI [I] Incoming message: TASK, RES 2016-05-11 11:19:22, "Tile://home/escops/spit/data/Pico/ 11:17:06.907609 GPFHMI [I] Incoming message: TASK_RES 11:17:17.200756 Evilling [1] Incoming message: INDATA EUC_NIR_INPO_C-1130-2_20200707T041198Z.xm//: ER/ROR: duplicate key value violates unique INFO Verbosity 11:17:06.507740 GPFHMI [I] New TaskRes churk: TakAge2-20160511T111704-1 - 0 - -2 11:17:18:201981 Eviling (I) Incoming message: TASK_RES constraint "products_into_pkey" DETAIL: Key product ktw/EUC_NIR_INFO_C-1130-2_20200707T0411582) alwardy exists 2016-05-11 10:06:33.192 11:17:12.501723 OPENMI [I] Incoming meanage: TASK, RES. 11:17:22.201645 Evilling FE Incoming measuring: TASK, RES. Uptime: 11:17.12.502030 GPPHMI [I] New Task Res churk: Tak Age2-20160511T111704-1 - 2 - 1 11:17:22.231507 Evilling[[] RECEIVED NOTIFICATION OF TASK Tik Age 20160511T111704-1 11:17:16.502342 GPFHMI [I] Incoming mesosage: TASK, RES FINISHED AT 20160511T091718 11.19.22.033787 DataMrg [8] ERROR Hosts <hosts> 11:17:22.249536 Evilling (§ Incoming message: TASK_RES 11:17.16.502507 GPTHMI [I] New Task Res Chark : Tsk Age2-201605117111704-1 - 4 - 1 [["sealor"/"UNKNOWN"/endTime"/"/"rstrament"/"NIR/"/bb/Mode"/"/product/d"/"EUC_NIR_INFO_C-1130-11:17:18.901668 GPFHMI [I] Incoming message: TASK, RES 11:17:22.290398 Evilling [1] RECEIVED NOTIFICATION OF TASK TekAgeD-20190511T111704-1 2 20200101T0411582","productSize". 11:17:18.501948 GPFHMI [I] New Task Res chark: Tak Age2-20160511T111704-1 - 6 - 1 FINISHED AT 20160511T091718 4364 "productStatus" "OK", "productType"."NIR_INFO", "productives ior"."01.00", "signature"."C-1130-2", "start 11:17:22.901743 GPFHMI [I] Incoming message: TASK_RES 11:17:37.200829 Evitiing [I] Incoming message: INDATA Time": 20200707T0411982": "urf."Tile://home/eucops/gpt/da/a/hbos/ 11.19.01.200701 Evilling[i] incoming measuring KINDATA 11:17:22.502022 GPFHMI [I] New Task Res chark: Tak Age 20160511T111704-1 - 100 - 0 EUC_NIR_INPO_C-1130-2_20200707T041158Z.xmf,"utSpace"."INBCI(%) 11:17:22.503365 GPFHMI [I] Incoming meanings: TASK, RES 11.19.21.200759 Evising [1] Incoming measuring CATA - 0 - 0 TEMON TskMng 11:19:04.001440 Tekore [D] NIR_INPO : EUC_NIR_INPO_C-0030-1_20200707T0350552 [Re.//home/eucope.opt/data/astr/s/ev/ty VIS LET Melade/aColector 11:16:42:070752 Tak Mng [I] Proc. Elem. In rule: LE1_VIS_Melade/aCollector EUC_NIR_INFO_C-0030-1_20200707T0390552.xml 11:19:04.001448 TeXOs: [0] - NIR_RAW ; EUC_NIR_RAW _C-1130-2_2020070TT0411582 [file://ihome/eucops/gb/data/asthive/in/ 11:16:42.070761 TskMrg [I] Selected Agent Is TskAge1 11:16:46.002576 TskMrg [I] incoming message: TASK_RES EUC_NIR_RAW_C-1130-2_20200F0FT0411982.0bj 11:19:04.001454 TukOto [D] - SIR_INPO : EUC_SIR_INPO_W-1120-2_2020070T10355552 [the://home/eucope.igpl/data/auchive/tr/ 11:16:54.002650 Tok Mrg [I] Incoming message: TASK_RES EUC SIR INFO W-1120-2 20200707T0355552 xml 11:16:58.001710 TskMrg[I] incoming message: TASK, RES 11:17:00.003820 TskMrg[I] incoming message: TASK, RES 11:19:04:001462 TaxOre [D] - SIR_RAW : EUC_SIR_RAW_W-1120-2_20200707T0355552 [18::1home-wuops-optidata.aechtve/th/ EUC_SIR_RAW_W-1120-2_20200707T0355552.0bj 11:17:02:004103 Tek Mrg [I] Incoming message: TASK_PROC 11:19:04.001468 TakOkt [D] - VIS_INPO : EUC_VIS_INPO,W-0001-1_20200707T0344172 [Bit://home-eucops-upit-data.astr/se/IV 11:17:02.004126 Tsk/Mrg [I] Requested Processing of Rule: VIS_LET_Melada/aColection EUC_VIS_INFO_W-0001-1_20200707T0344172.xm8 11:19:04.001475 TakOic [D] - VIS_LET_META : EUC_VIS_LET_META_W-0001-1_20200707T03441172 [file://home/eucops.qp1/data/archive/out/ 11:17:02.004133 Tsk:Mrg[I] Proc.Elem. In rule: LE1_VIS_Metada/taCollector EUC_VIS_LE1_META_W-0001-1_20200707T0344172.xml 11:17:02.004540 TakMrg [I] Selected Agent Is TakAge2 11:17:04.001712 TakMrg [I] incoming measage: TASK, RES 11:19:04.001482 TakOrc [D] - VIS_RAW : EUC_VIS_RAW_W-0001-1_20200707T0344172 [file://home/eucops/gpi/data/archive/tr/ EUC_VIS_MAW_W-0001-1_20200707T034417Z.18s) 11:17:04.036779 Tak Mrg [I] Incoming measurage: TASK_RES 11:19:24.001138 TakOrc [I] Incoming message: INDATA 11:17:06.018248 Tak.Mrg [I] Incoming mesosage: TASK, RES 11.17.12.001633 Tek Mrg [I] Incoming messsage: TASK_REG 11:19:24.001193 TsixOrc [D] Current callalogue contents 11:19:24.001202 TakO6 [D] - NIR_INPO : EUC_NIR_INPO_C-1130-2_2020070TT0411582 [Bec//home/eacops/qpf/data/aschive/tv/ 11:17:16.001925 Tek Mrg [I] Incoming message: TASK_REG EUC_NIR_INFO_C-1130-2_20200707T0411982.xml 11:17:18.002380 TskMrg[I] Incoming messsage: TASK_RES 11:19:24.001210 TakOts [D] - NIR_RAW : EUC_NIR_RAW_C-1130-2_20200707T0411982 [Tec:/home/eucops/gpt/data/asth/evity 11:17:22.001054 Tak Mrg [I] Incoming message: TASK_PROC EUC. NIR. RAW. C-1130-2 20200707T041158Z.ftb) 11:17:22.001090 Tak/Mrg [I] Requested Processing of Rule: VIS_LET_Processing 11:19:24.001217 TakOtt [D] - 5IR_INPO : EUC_SIR_INPO_W-1120-2_20200707T0355552 [Be://home/eucops/opfidala/arthevity/ EUC_SIR_INFO_W-1120-2_20200707T0355552_xm1 11:17:22.001099 Tsk/Mrg [I] Proc.Elem. In rule: LE1_VIS_Processor 11:19/24.001223 TakOk [D] - SIR_RAW : EUC_SIR_RAW_W-1120-2_20200707T0355552 [Bit://home/eucops/spl/dela/astro/eu/tv 11:17:22.001106 Tsk/Mrg [I] Selected Agent Is TskAge3 EUC_SIR_RAW_W-1120-2_20200707T0355552.mb] 11:17:22.043535 Tsk:Mrg [I] incoming message: TASK_RES 11:19:34.001229 TakOk [D] - VIS_INPO : EUC_VIS_INPO W-0001-1_20200101T0344172 [file://home/eucops/gpl/data/archive/in/ 11:17:22.126818 TokMrg [I] incoming message: TASK_RES EUC_VIS_INFO_W-0001-1_20200707T0344172.xml 11:17:42.002257 TokMing [I] Incoming measurage: TASK_PROC 11:19:24.001226 TekOrc [D] - VIS_LE1_META : EUC_VIS_LE1_META_W-0001-1_20200707T0344172 [file://home/eucops/spl/data/archive/out 11:17:42.002280 TakMing [I] Requested Processing of Rule: EUC_VIS_LE1_META_W-0001-1_20200707T034417Z_xm8 VIS LET Processing 11:19:24.001243 TixOre [D] - VIS_RAW : EUC_VIS_RAW_W-0001-1_20200707T0344172 [IBs://frome/eucope/gpl/data/archive/tr/ 11:17:42.002288 TakiMng [1] Proc.Exm. In rule: LE1_VIS_Processor EUC_VIS_RAW_W-0001-1_20200707T0344172.18s) 11:17:42.002295 Tsk/Mrg [I] Selected Agent Is Tsk Age4 Setup DataMng EvtMng LogMng OPEHMI TskAget TskAga2 TskMag TskOrd ✓ Debug Info

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QLA QPF Local Archive System



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File Edit Tools Window Help

Actions	Log Messages Data Ingestion Monitoring Brows	er Internal/Lo	cal Archiv	ve								
	PRODUCTID	PRODUCTTYP	EUCTST	TODUCTVERS	C PRODUCTSIZE	CREATOR	INSTRUMENT	OBSMODE	STARTTIME	ENDTIME	REGTIME	URL
STOP SYSTEM	1 EUC_NIR_INFO_C-0030-1_20200707T035055Z	NIR_INFO	ок	01.00	842412852	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file.///home/eucops/qpf/data/inbo
Stop processing	2 EUC_NIR_INFO_C-1130-2_20200707T041158Z	NIR_INFO	ок	01.00	875967284	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
incoming data	3 EUC_NIR_RAW_C-0030-1_20200707T035055Z	NIR_RAW	ок	01.00	859190834	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
System info	4 EUC_NIR_RAW_C-1130-2_20200707T041158Z	NIR_RAW	ок	01.00	859190834	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
Status: RUNNING	5 EUC_SIR_INFO_W-0020-1_20200707T033452Z	SIR_INFO	ок	01.00	842412852	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file.///home/eucops/qpf/data/inbo
Verbosity: INFO	6 EUC_SIR_INFO_W-1120-2_20200707T0355552	SIR_INFO	ок	01.00	875967284	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
Uptime: 2016-05-11 10:06:33.192	7 EUC_SIR_RAW_W-0020-1_20200707T033452Z	SIR_RAW	ок	01.00	926036789	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
Husia.	8 EUC_SIR_RAW_W-1120-2_20200707T035555Z	SIR_RAW	ок	01.00	926036789	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
	9 EUC_VIS_INFO_W-0000-1_20200707T033452Z	VIS_INFO	ок	01.00	959656242	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file.///home/eucops/qpf/data/inbo
	10 EUC_VIS_INFO_W-0001-1_20200707T034417Z	VIS_INFO	ок	01.00	959656242	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
	11 EUC_VIS_LE1_META_W-0000-1_20200707T0334522	VIS_LE1_ME.	ок	01.00	875770417	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/archi
	12 EUC_VIS_RAW_W-0000-1_20200707T039452Z	VIS_RAW	ок	01.00	825374002	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/inbo
	13 EUC_VIS_LE1_META_W-0001-1_20200707T0344172	VIS_LE1_ME.	ок	01.00	875770417	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpf/data/archi
	14 EUC_VIS_RAW_W-0001-1_20200707T034417Z	VIS_RAW	ок	01.00	825374002	SOC_L1P	VIS	TEST	2020-07-07 0	2001-01-01 0	2016-05-11 1	file:///home/eucops/qpt/data/inbo
Setup												

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QLA QPF System: Agents And Tasks



Processing Tasks Agents Status Alerts	
TskAge1 Total tasks: 2 Run: 0 Walt: 0 Peu: 0 Sto: 0 Fall: 0 Fin: 2 Max.Concurrent Tasks: 3	Client/Server:tcp://10.66.180.97:7111/tcp://*:7111 Load Avgs.: 2.14 1.55 1.27 Up time: 0
TskAge2 Total tasks: 2 Run: 0 Walt: 0 Pau: 0 Sto: 0 Fall: 1 Fin: 1 Max.Concurrent Tasks: 3	Client/Server:1cp://10.66.180.97:7112/1cp://*:7112 Load Avgs.: 2.14 1.55 1.27 Up time: 0
TskAge3 Total tasks: 0 Run: 0 Walt: 0 Peu: 0 Sto: 0 Fall: 0 Fin: 0 Max.Concurrent Tasks: 3	Client/Server:top://10.66.180.95:7113/top://*:7113 Load Avgs.: 2.14 1.55 1.27 Up time: 0
TskAge4 Total tasks: 0 Run: 0 Walt: 0 Pau: 0 Sto: 0 Fall: 0 Fin: 0 Max.Concurrent Tasks: 3	Client/Server:1cp://10.66.180.95:7114/tcp://*:7114 Load Avgs.: 2.14 1.55 1.27 Up time: 0
TskAge5 Total tasks: 0 Run: 0 Walt: 0 Pau: 0 Sto: 0 Fail: 0 Fin: 0 Max.Concurrent Tasks: 3	Client/Server:tcp://10.66.180.95:7115/tcp://*:7115 Load Avgs.: 2.14 1.55 1.27 Up time: 0
TskAge6 Total tasks: 0 Run: 0 Walt: 0 Pau: 0 Sto: 0 Fail: 0 Fin: 0 Max.Concurrent Tasks: 3	Client/Server:tcp://10.66.180.95:7116/tcp://*:7116 Load Avgs.: 2.14 1.55 1.27 Up time: 0
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QLA QPF System: Database Interface



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List Of AOCS Checks





Radial Pointing Error



- Translate jitter angles into displacement on the VIS and NISP focal plane
- Radial error evolution in the field of view (FOV)



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Ellipticity

- Compute ellipticity induced by jitter on a Gaussian beam
- Methods:
 - Quadrupole moments
 - Ellipse fitting at FWHM
 - 2D gaussian fit







- Target: reconstruct focal displacement (and eventually the spacecraft's attitude if possible) by using the CCD readout during the linearity observations. Pros:
 - Independent source of information
 - Higher frequency than FGS HK data
- Simulation concept: simulate the readout of a CCD quadrant region with some specified width around the original position of the selected source.
 - Evaluate optical PSF according to a known focal displacement (X/Y) and readout velocity (Y).
 - Noise and background characterised from images generated with the VIS simulator.
 - Limitations: no CTI, cosmic rays not included in the simulations, Gaussian PSF.
- Reconstruction basis: Perform one-dimensional fits of the PSF along Ycutouts to infer the focal displacement evolution.
- X/Y problems are decoupled:
 - X-direction: evolution of PSF's mean relative location.
 - Y-direction: evolution of PSF's area.

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Y-direction Reconstruction

- Y-jitter can be viewed as slowing/accelerating the movement of charges during the read-out
- The curve along the read-out direction will be equivalent to the derivative of the jitter plus a constant: the number of electrons generated during a readout in case of no jitter



Reconstruction Envelope

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- Further correction available:
 - Linear fit 1 Hz residuals from FGS HK data
 - Combine the reconstruction of different sources in the FOV
- Simulations show stars of magnitude 11 or below are needed for proper reconstruction





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List Of VIS QDT Checks



Common Checks

identify the VIS observing mode

compare commanded to executed/downloaded data.

subract the bias, for each of the 144 quadrants

convert to FLOAT each of the 144 quadrants

run a series of checks on exposures taken in all modes

identify all overflow pixels in each of the 144 quadrants

identify all underflow pixels in each of the 144 quadrants

determine the readout noise in each of the 144 quadrants

determine the electronic offset value in each of the 144 quadrants

Nominal Exposure Checks

determine saturation level in each of the 144 quadrants

identify saturanted pixels in each of the 144 quadrants determine, for each of the 36 CCDs, the sky background statistics: mean, median, stddev, ...

identify cosmics in each of the 36 CCDs

create a catalogue of objects for each of the 36 CCDs

identify potential objects, for each of the 36 CCDs

create list of fitlered objects, for each of the 36 CCDs

determine objects centroid, for each of the 36 CCDs

determine objects flux, for each of the 36 CCDs

determine, for each of the 36 CCDs, mean PSF image quality

determine WCS, for each of the 36 CCDs

determine pointing parameters, for each of the 36 CCDs

Bias Exposure Checks

flag new hot columns, for each of the 144 quadrants

determine the electronic offset value in each of the 144 quadrants

Flat Field Exposure Checks

set different thresholds depending on the LED used

identify saturanted pixels in each of the 144 quadrants

check how many pixels has less than TBD and compare to a given threshold, in each of the 144 quadrants

determine the flat field fluence

determine small area PRNU, in each of the 144 quadrants

determine serial CTI from trailing, in each of the 144 quadrants

check the gain & offset consistency across quadrant boundaries, in each of the 36 CCDs

determine the particulate contamination

Dark Exposure Checks

identify pixels affected by cosmics for each of the 144 quadrants

determine the average dark signal for each of the 144 quadrants

derive some statistics/information regarding the spatial distribution of cosmics: are they clustered or spread on the FPA? derive some statistics/information regarding the energy deposited by cosmics

Charge Injection Exposure Checks

identify saturanted pixels in each of the 144 quadrants

determine the charge injection pattern for each of the 144 quadrants

determine the charge injection level for each of the 144 quadrants

determine parallel CTI from first pixel response for each of the 144 quadrants

determine parallel CTI from trailing for each of the 144 quadrants

determine serial CTI from trailing for each of the 144 quadrants

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Trap Pumping Exposure Checks

identify saturanted pixels in each of the 144 quadrants

determine dipole contrast

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List Of NISP QDT Checks



Common Checks

identify the NISP observing mode

compare commanded to executed/downloaded data

run a series of checks on exposures taken in all modes

identify all overflow pixels in each of the 16 detectors

identify all underflow pixels in each of the 16 detectors

apply bad pixel, dark, and reference correction for each of the 16 detectors

convert to FLOAT each of the 16 detectors

Flat Field Exposure Checks

determine image statistics

Dark Exposure Checks

determine image statistics

Linearity Exposure Checks

determine image statistics

check correct number of ramps are downloaded

Nominal Exposure Checks
apply linearity correction
subtract dark frame
determine, the sky background statistics: mean, median, stddev,
identify cosmics
determine objects centroid
determine mean PSF image quality
run noise pixel statistics on objects to check for blurring
determine photometry
determine WCS
determine pointing parameters
identify spectra (check the grism PA)
identify lines (TBD)
All Ramp Data Checks
run on-board processing algorithm
measure read-out noise

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QLA Diagnostic Report Example





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HMS Web Interface (ARES For SMOS)





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- Another main release of the system foreseen for Q4/2016, and then another prior to the DR in 2017
 - Consolidation of the QPF and QDT functions
 - QPF orchestrator as per user request (currently per product type)
 - Full integration between QPF and QDT
- VIS processing functions enlarged with test data coming from ground testing and OU-SIM simulations
- NISP processing functions:
 - Data description and diagnostics document under discussion with IPAC
 - Development of the processing algorithms will be part of an ongoing agreement with IPAC for collaboration in the QLA development
- AOCS processing functions:
 - consolidation and conversion of diagnostic tools into Python
 - full integration with QPF and QDT (for the pointing extraction from VIS linearity data)

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