An Introduction to Quality Control

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QC Meeting: Introduction

Purpose of the QC

- The final purpose of the QC is to provide an “innocent user” with a full characterization of the observation. This includes whether:
  - The observation was successfully performed
    - Monitor the state of the spacecraft
    - Monitor the state of the instruments
    - Space weather information
    - and processed
    - Monitor the state of the pipelines
  - The intended science goals were achieved.
    - Was the observation executed with problems that could affect the science?
    - More than: Was the science goal achieved?

- All this information must be compiled in a “Quality Control Report” during the QC procedure and presented to the user in an understandable form “Quality Control Report Summary”
QC Procedure

- **QC Level 0** An automatic QCReport is generated by the QCPipeline which contains:
  - Spacecraft general information
  - Pointing problems information
  - Space weather information
  - Instrument malfunctions, out of limits, telecommand errors
  - Problems during the processing
  ➠ QC (Private/Internal) Flags

- **QC Level 1** The QCR is analysed by an operator who will deliver the observation for further analysis to level 2 or level 3 following very strict rules given by the internal flags.

- **QC Level 2** The observation is delivered by the operator to the calibration scientist for further analysis (related to instrument performance and processing).
  - Any problem should be translated to one or more QC (Public) Flags
  - Appropriate comments and explanations added to the QCR

- **QC Level 3** The observation is delivered by the operator to the Community Support Astronomer for further analysis (in relation with the science case).
  - Any problem should be translated to one or more QC (Public) Flags
  - Appropriate comments and explanations added to the QCR

- **QC Level 4** The owner of the observation found a problem and via Helpdesk ask for further analysis.
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QC Procedure Flow

All observations will be manually inspected at least once during the mission.
Under on-demand reprocessing, QC analysis will not be performed.

The result of the analysis in L2 and L3 always return to the SPA (L1).
Once the analysis is completed the summary report (QCRS) is generated.
Private/Internal flags

What are they?

Messages and/or metadata==flags coming from the AUX products
Messages and/or metadata==flags coming from the SPG and QCP

What are they for?

They are needed for the QC analysis at:
• L1 ➔ SPA to know when to deliver the observation to L2 and L3
• L2 ➔ CS to know whether the observation should be reprocessed
• L3 ➔ CSA to know whether the observation should be rescheduled
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Public flags == queriable flags

What are they?

They are self-explanatory and clear flags about the execution and processing of the observation.

What are they for?

They constitute the final assessment of the observation as it will be seen by the proposers/users. They can be complemented by free text messages with all the appropriated explanations/values. They go into the QCReport Summary.
QC Meeting
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ESAC 15/01/2008

++ OLF QUALITY CHECK LEVEL 2 LIQT ++
+-------------+---------------------+---------------------+-------------+
| TOTNR 28000450 | AOT L02             |
| START 96/235-18:24 | DURATION [min] 19   |
| TARGET NOC 4945 SW |
| OBS_ID: HSMMTH |
| PRGP_ID: INBOALS |
| Prepared by DP |
+-------------+---------------------+---------------------+-------------+

ISR INFORMATION

ISRWARN = OK

NOOSL = 0  NOOSHL = 0  NNSL = 1  NNSV = 1
NFTW = 0  NFTWL = 0  SQLA = 0
QL01 = 44  QL02 = 24  QL03 = 8  QL18 = 4  QCVE = 2  RM

PIPELINE INFORMATION

ERD

VOLP  OLFP.622  OLF software version number
EXIT DERIVE_ERD Normal termination

SDP

VOLP  OLFP.622  OLF software version number
VOLP  CALG.31  CAL-G files version number
EXIT Normal termination

AAR

VOLP  OLFP.622  OLF software version number
VOLP  CALG.11  CAL-G files version number
LCHA ADIT Value changes during scan
EXIT Normal termination
LEVEL-2 CHECK NEEDED - PLEASE INFORM LIQT

PREVIEW INFORMATION (see attached print-out)

IDT COMMENTS FOR THIS OBSERVATION

A problem occurred during the S1 stage which caused the Scan counter to reset when it should not have done. This has already been reported as SOP 3495, which has been fixed for OLF V7. The SPD and AAR results are valid, except that the scan counter is not correct. Reprocessing with OLF V7 will correct this.

Last successful pipeline step? (TPS ERO SPD / AAR)
Reprocessing? (Y) 2nd version? (Y)
Reoscheduling? (Y) 2
QC LI needed? (N)

Date: 1/2/98  IDT Signature /A Harrison
# Data Quality Report

**Observation number:** 521009040

## Observation flags:

- **High glitch rate**

## Pipeline data reduction flags and caveats:

- **Caveats**

## Highly Processed Data Products

Highly Processed Data Products are the result of further processing beyond the pipeline and/or using new, refined algorithms for which some of the pipeline data reduction flags and caveats may no longer be applicable:

- **Recommended HPDP (Default Dataset)**
- **List of all HPDP available for this observation**

## Comments:

High glitch rate. ~50% saturation level due to space weather leading to noisy data. The source detection is on a 1-2 sigma level only.
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**QCR product == Quality Context**

<table>
<thead>
<tr>
<th>Field</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation Id</td>
<td>Reference to the observation this instance belongs to</td>
</tr>
<tr>
<td>Software version</td>
<td>HCSS version, pipeline's version, ... (TBD)</td>
</tr>
<tr>
<td>State</td>
<td>Possible states are:</td>
</tr>
<tr>
<td></td>
<td>- PENDING</td>
</tr>
<tr>
<td></td>
<td>- PASSED</td>
</tr>
<tr>
<td></td>
<td>- FAILED</td>
</tr>
<tr>
<td>Action</td>
<td>Legal actions depend on the value of the QualityContext's state.</td>
</tr>
<tr>
<td></td>
<td>When the state value is “PENDING” the possible actions are:</td>
</tr>
<tr>
<td></td>
<td>* DELIVERED FOR QCL1</td>
</tr>
<tr>
<td></td>
<td>* DELIVERED FOR QCL2</td>
</tr>
<tr>
<td></td>
<td>* DELIVERED FOR QCL3</td>
</tr>
<tr>
<td></td>
<td>When the state value is “FAILED” the possible actions are:</td>
</tr>
<tr>
<td></td>
<td>* DELIVERED FOR RESCHEDULING</td>
</tr>
<tr>
<td></td>
<td>* DELIVERED FOR REPROCESSING</td>
</tr>
<tr>
<td></td>
<td>* DISCARD</td>
</tr>
<tr>
<td></td>
<td>When the state value is “PASSED” the only possible action is NONE.</td>
</tr>
</tbody>
</table>
QCR product == Quality Context

| Quality Flags | Most of the quality information generated during the SPG processing should fall under this category. A pre-defined list of quality flags should be defined per instrument. These flags will be stored as METADATA into the QualityContext as they should be composed of simple types (strings, numbers and booleans), but also allowing them to be part of the searching fields in any possible query.

Two possible solutions are proposed:

First proposal:

* All the quality flags are defined as string METADATA parameters.
* The METADATA tag constitutes the actual quality flag, i.e: “SAT_TEMP_OUT_OF_RANGE”
* The METADATA value will be a string with an optional comment, i.e: “temp value X for a range of [a, b]”

Second proposal:

* Quality flags can be declared of any of the legal METADATA types
* The METADATA tag is just a flag identifier, i.e: “SAT_TEMPERATURE”
* Quality information is included as a string, number or boolean into the METADATA value, in this example: LongParameter(18).

Also common to the two proposals (TBC):

* Only the flags that are meaningful for the current observation are included into the QualityContext.
* Quality flags can be declare public or private.
QCR product == Quality Context

| Pipeline's logs | A table containing all the logs produced during the pipeline's execution, including those in the pre and post-processing SPG phases. The HCSS framework provides also additional categories to use into the Loggin subsystem. This gives the developer the means to filter the information available through a new criterion apart from the source or the log's level: the log type (quality/others). |
| pre |  |
| Previews | Previews or snapshots of the scientific data. TBD |
| Users' comments | Comments on the quality data written by the different actors involved into the Quality Control of the observation. As the unique actor allowed to modify the QualityContext, the SPA is the responsible of updating the QualityContext whenever a new input must be included. The fields stored for every comment are:  
  * Time stamp: when the comment was created  
  * User: Identifier of the person writing the comment  
  * Text: the comment itself as a string  
  As for the quality flags, these comments can be tagged as public or private. |