22/03/2013

PROBA-V Image Quality Center : vicarious calibration software system

CEOS IVOS 25, 19-21 March, ESRIN

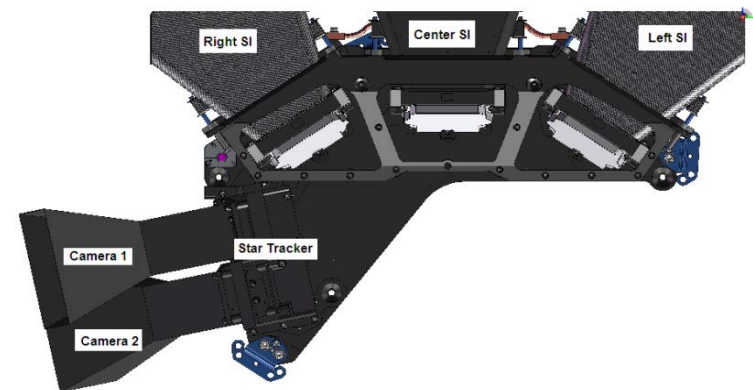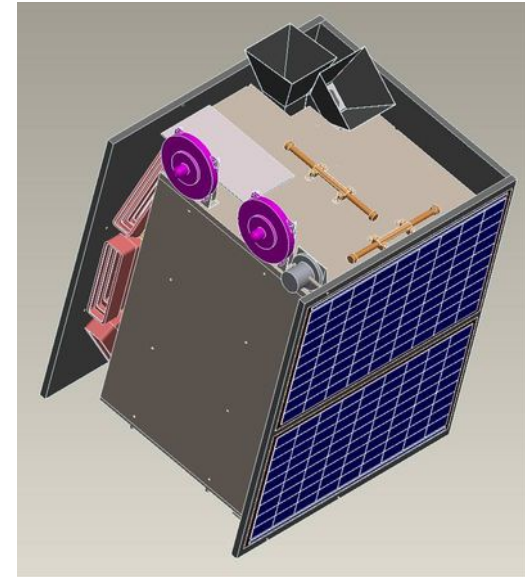Adriaensen Stefan, Sterckx Sindy, Van Roey Tom, Vanhoof Kris, Livens Stefan, Dierckx Wouter

PROBA-V IQC : Main partners

» Qinetiq Space :
  » prime
  » satellite platform
» OIP
  » camera
» Vito
  » PI
  » user segment
    » Data ingestion (DIF)
    » Production (PF)
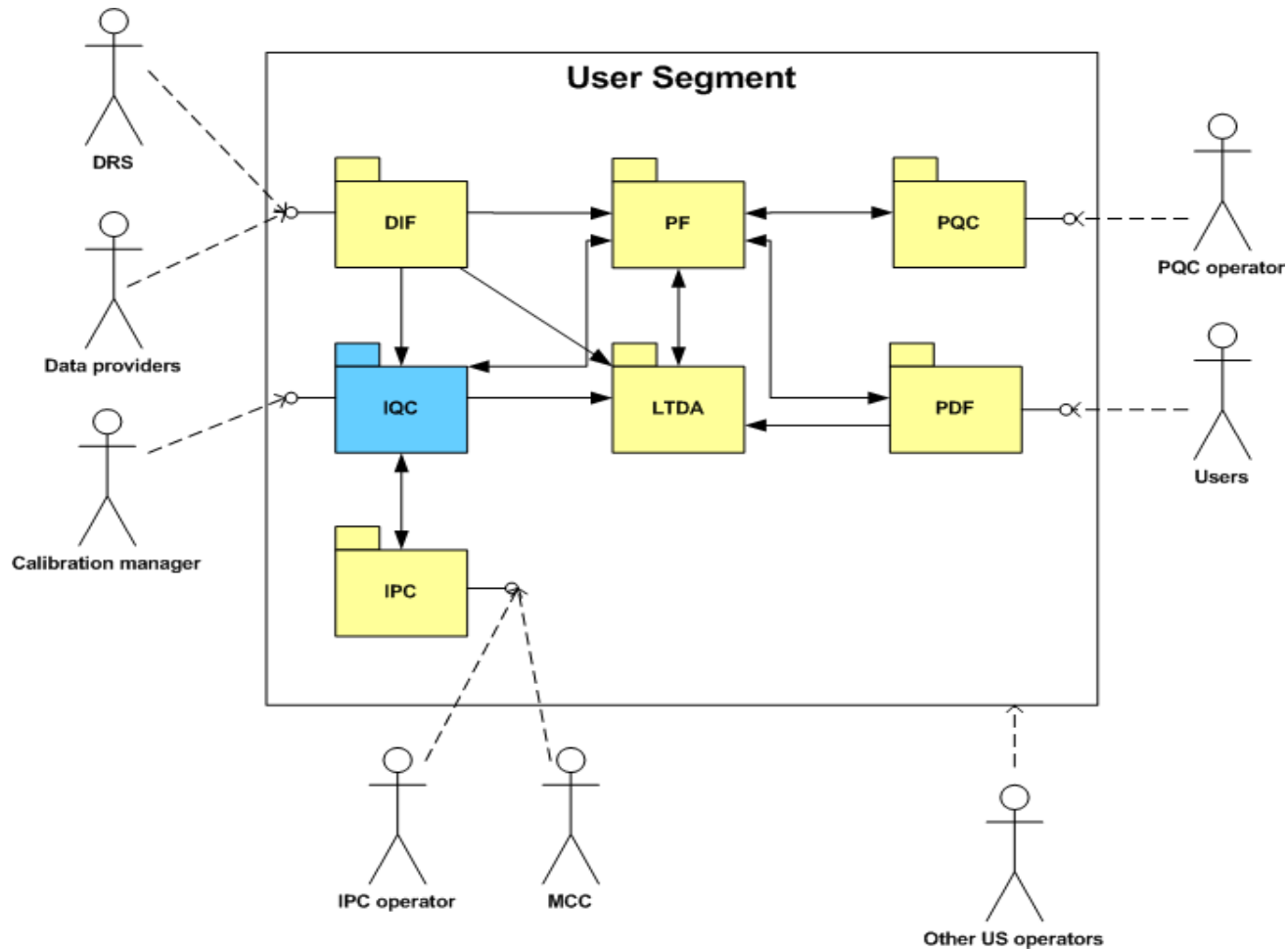   » Image Quality (IQC Radiometric)

PROBA-V IQC : Mission

» ESA mission

» SPOT VGT replacement/gapfiller

» Small satellite platform (Proba)

» 1 sensor

» 3 cameras

» 1 VNIR and 3 SWIR detectors per camera

» 4 spectral bands : blue, red, nir and swir

» Swath approx. 2000km

» Max Spatial resolution 330m (100m)

» Launch date 19/04/2013

» VEGA launcher (Kourou)

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PROBA-V IQC : Challenge

» No active thermal control system

» No onboard calibration devices

» 3 different cameras

which may show different performance degradation patterns

» Relatively large differences in viewing geometry for the different detectors, especially for the SWIR detectors compared to the VNIR detectors
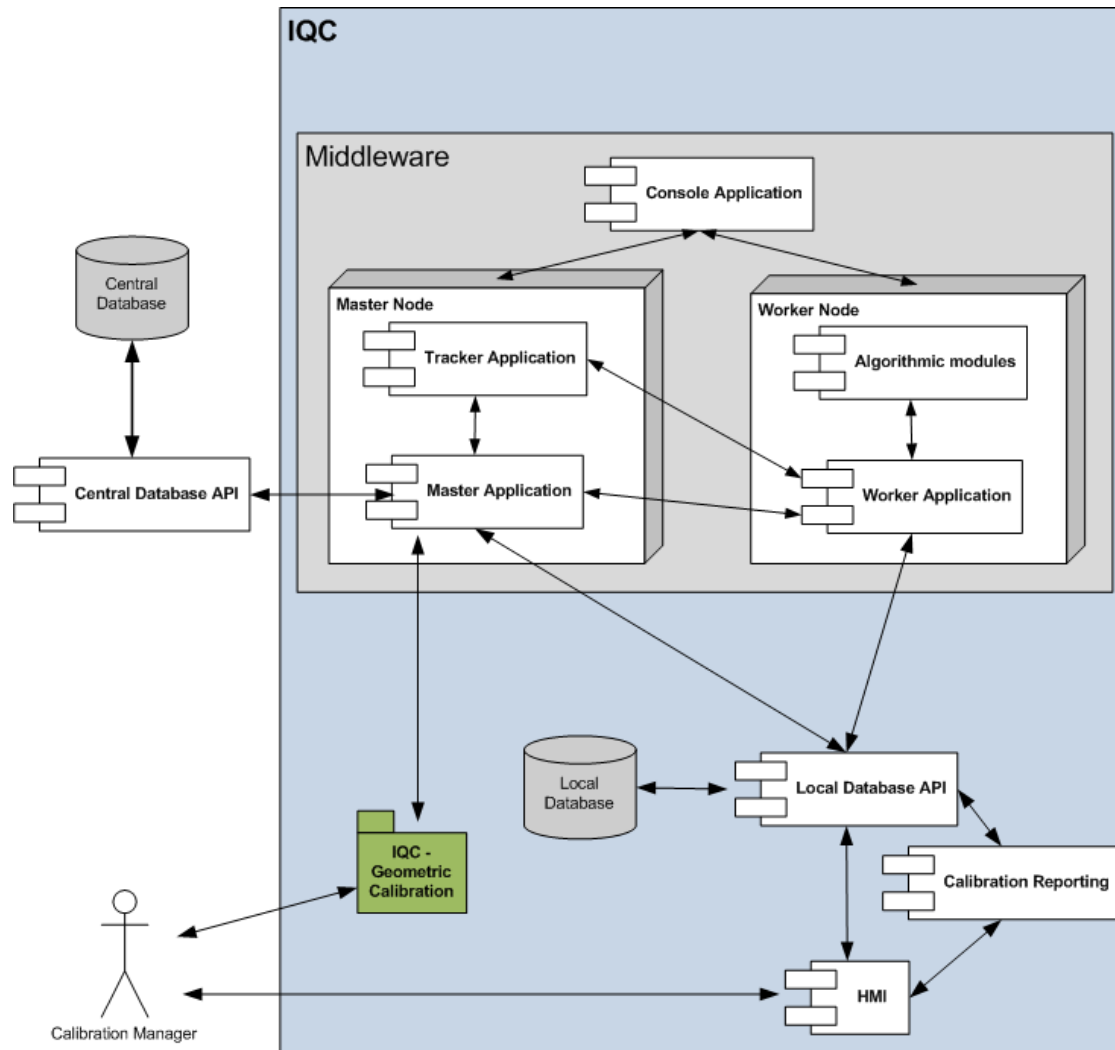
PROBA-V IQC : User Segment

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PROBA-V IQC : Design principles

» Independent from other subsystems

» Parallel processing with automated workflows

  » L1B data upto calibration result

  » All results inserted in local database

» Graphical User Interface

  » View on database

  » Plotting results

  » Statistical processing based on the database content and input from GUI

» New Instrument calibration parameter updates

  » traceability (database)

  » GUI

  » Automated distribution towards other subsystems

PROBA-V IQC : Design principles (cont)

» Reprocessing simple and traceable
  » All products automatically processed default settings
  » After evaluation, one or more products can be reprocessed
  » New set of processing parameters stored and versioned
  » Results of versions can be compared
  » Versions can be made new default

PROBA-V IQC : Layout

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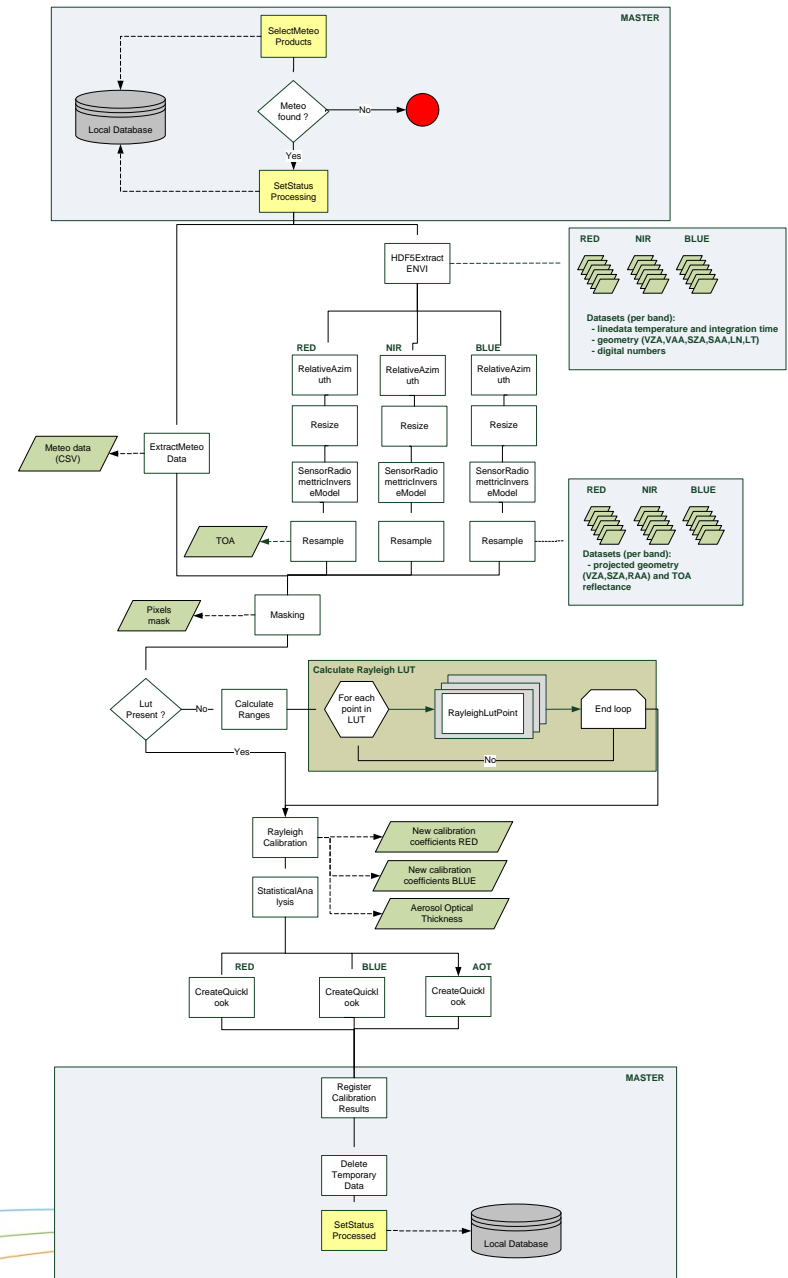vision on technology

PROBA-V IQC : Implemented methods

» Absolute and Interband (OSCAR facilities)

  » Rayleigh

  » Sunglint

  » DCClouds

  » Desert (absolute / multi temoral / cross sensor)

  » (Sterckx S, Livens S and Adriaensen S, "Rayleigh, Deep Convective Clouds, and Cross-Sensor Desert Vicarious Calibration Validation for the PROBA-V Mission," in IEEE Trans. Geosci. Remote Sens., vol. 52, no. 3, pp. 1437–1452, March 2013)

» Dark Current

» Multi Angular - equalisation over fov

» Camera to Camera Overlap

» Badpixeldetection

» Linearity Check

» Lunar calibration (under development)

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PROBA-V IQC : Software components

» Algorthmic modules :
  » C++ including Interfaces to Modtran, libRadtran and 6SV
» Workflows logic
  » Java framework Jodi developed at Vito
  » Master-Worker pattern
  » Job pulling : automatical load balancing
» Database (ORACLE SPATIAL)
  » L1B products ingested automatically
  » Workflows triggered based on the content of the database
  » Instrument Calibration Parameters stored in database + updates
» Statistical calibration reporting library (Java)
» Graphical User Interface (Java)

PROBA-V IQC : Workflow

» Data extraction / conversion
  » HDF5 -> ENVI

» Resample

» Overlap

» Pixel masking

» LUT generation

» Method

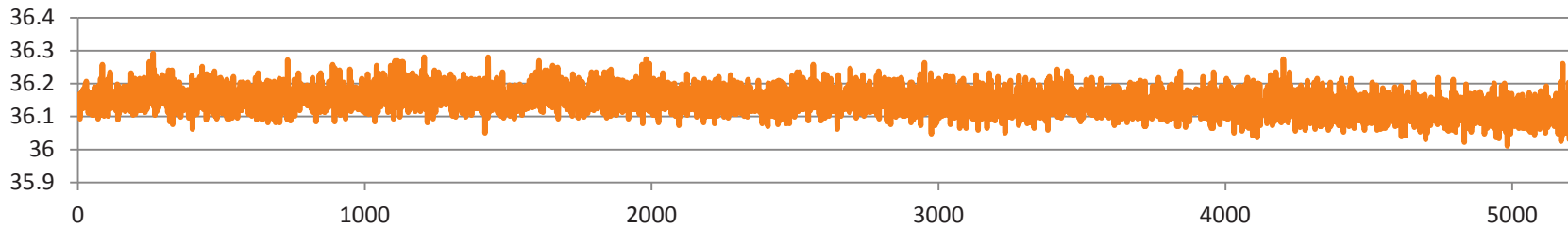» Store in database

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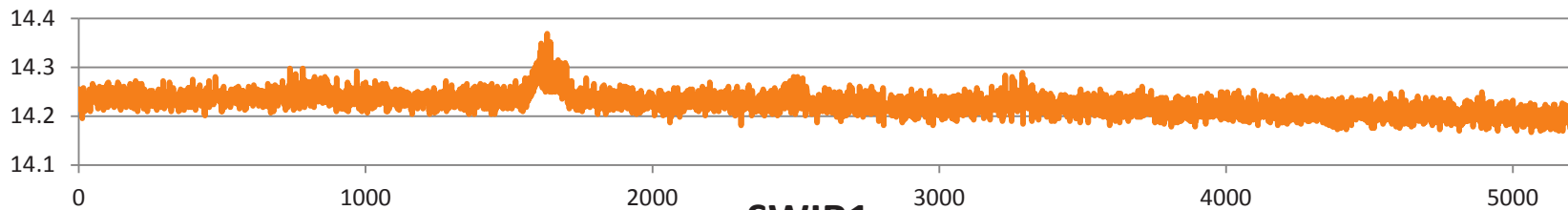vision on technology

PROBA-V IQC : User interface

PROBAV IQC : SVT results DARK CURRENT

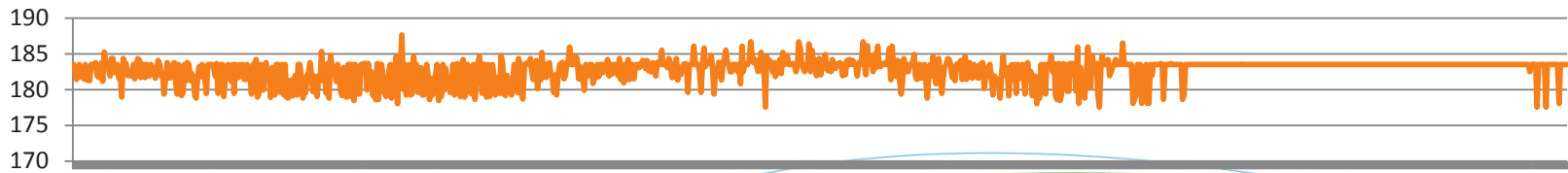» Dark current values from SVT test data (camera covered)
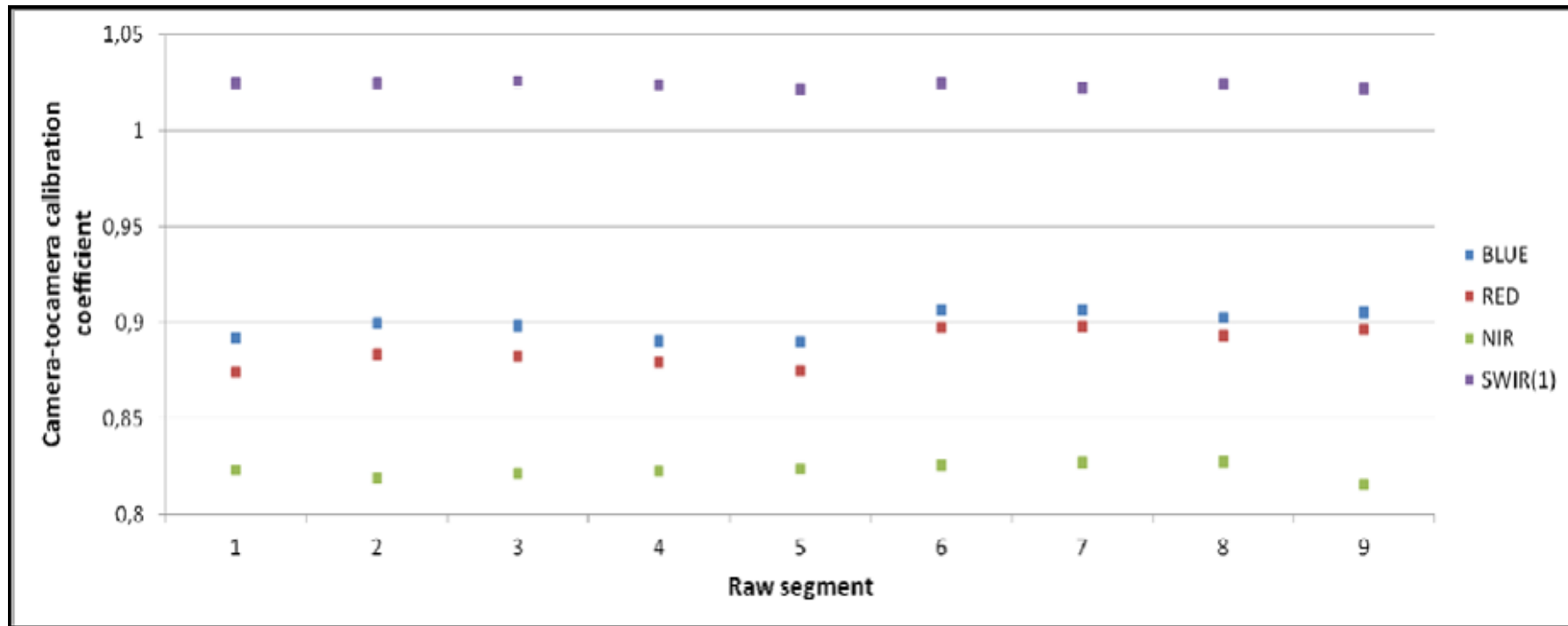
BLUE

RED

SWIR1

PROBA-V IQC : SVT results Cam2Cam

» Comparison overlapping pixels of the right to center camera

PROBA-V IQC : Conclusion

» Developed a fully fledged and highly autonomous software system for the calibration of PROBA-V

» Finished SVT tests in December 14 2012

» Lets launch !

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