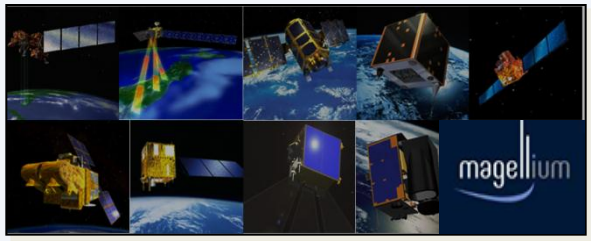
Coordinated Quality Control (CQC) :

Coordinating and monitoring quality information within the GMES/Copernicus Space Component Data Access System



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Presentation Outline

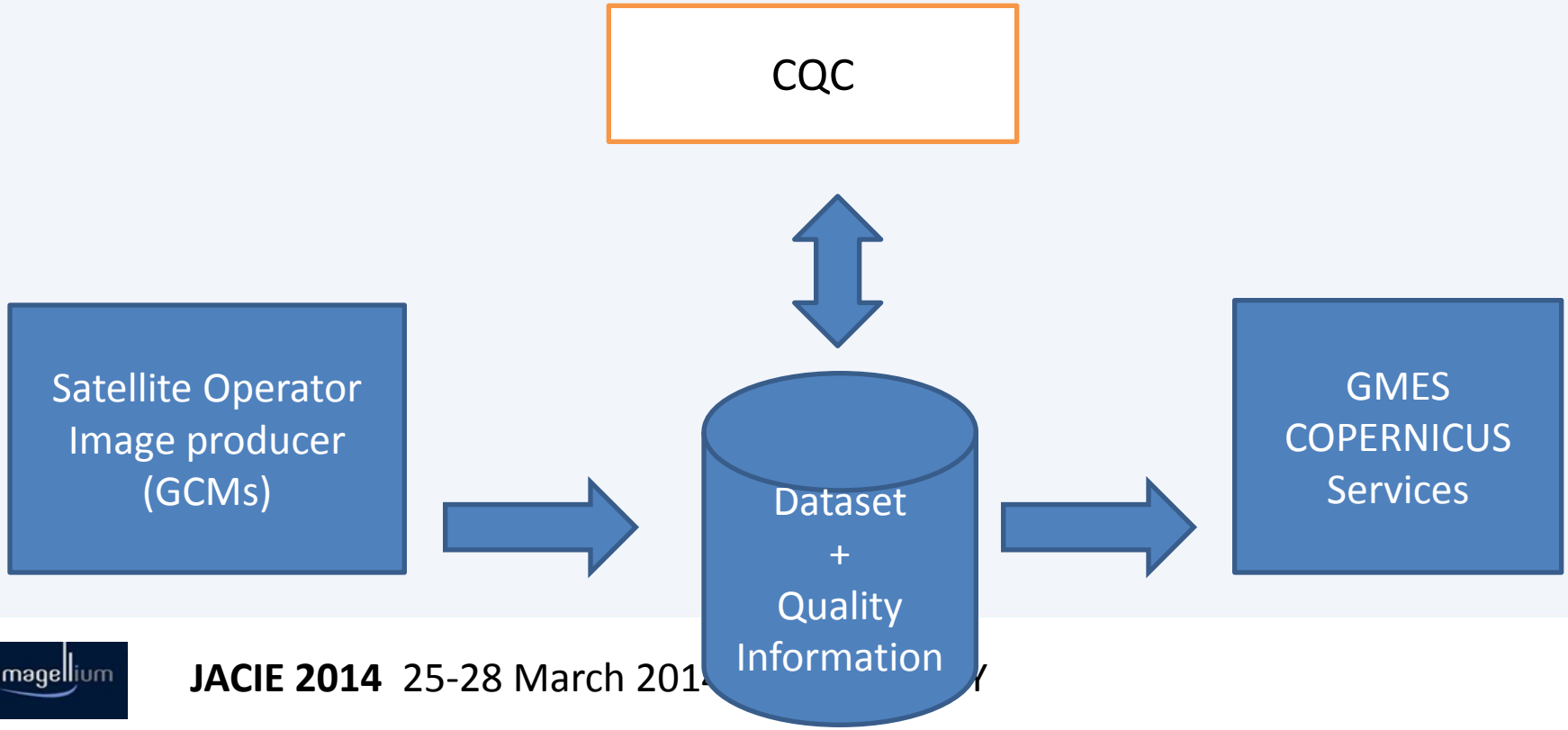
- Project objectives and background
- Quality information
- CQC Services
- Discussions on anomalies
- Harmonization efforts
- Key figures
- Conclusions

GMES/Copernicus - Key Figures

- GMES / Copernicus => 2nd EU space project after Gallileo
- 12 GCM Entities
  - (Deimos, DMCii, e-GEOS, ESA, Euromap, EUSI, Imagesat, Infoterra, MDA, RapidEye, SpotImage, VITO)
  - 60 Sensors (Optical, Radar, Atmospheric Sounders)
- 50 GSPs (eligible)
  - (GIO Emergency, EMSA, MyOcean, GIO-Land, GeoPictures, EUSC, NEREIDS, Sea_U, BIO-SOS, Cryoland, EUFODOS, FreshMon, Malareo, Recover ….)
- ~32 data types

Project objectives

- The CQC is the GSCDA component in charge of:
  - monitoring the quality of the GMES/Copernicus datasets
  - coordinating the provision of data quality information to the users.



Background

- Quality information can be sensitive and classified
- The manipulation of quality information can be very complex (e.g. scientific problem)
- Quality information can vary in content and format (e.g. calibration/flags/metadata).
- The concept of Quality Information Item (QII) has been adopted to ensure the full traceability and a standard for multisource products.

QII Type definitions

- Depending on the context, a QII type is :
  - Instrument Product Specification Report (IPS).
  - Background Documentation (BGD).
  - Product Quality Report (PQR).
  - A-posteriori Report (APR).
  - Mission Performance Report (MPR).
  - Synthesis Report (SYR).
  - Auxiliary data files (AUX).

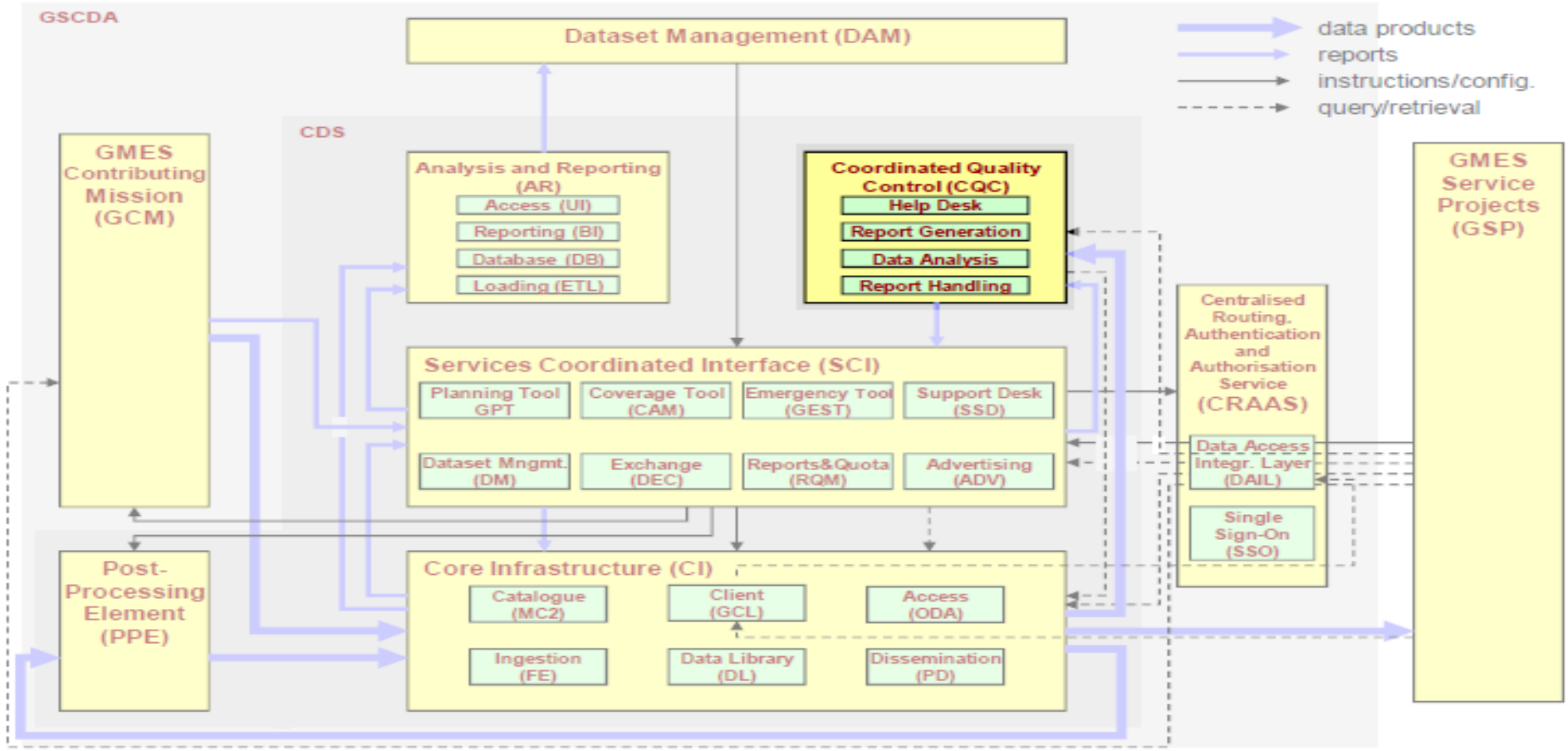
QIIs Origin

- QII is delivered either by the GCME or the CQC, initially at GCME integration with CDS or at regular intervals during operations

QII Type	Provider
Instrument Product Specification *	GCME
Background Documentation	GCME, CQC , Scientific Publications.
Product Quality Report	GCME
A-posteriori Report	CQC (with GCME involved when needed)
Mission Performance Report	GCME
Synthesis Report	CQC
Auxiliary data files	GCME

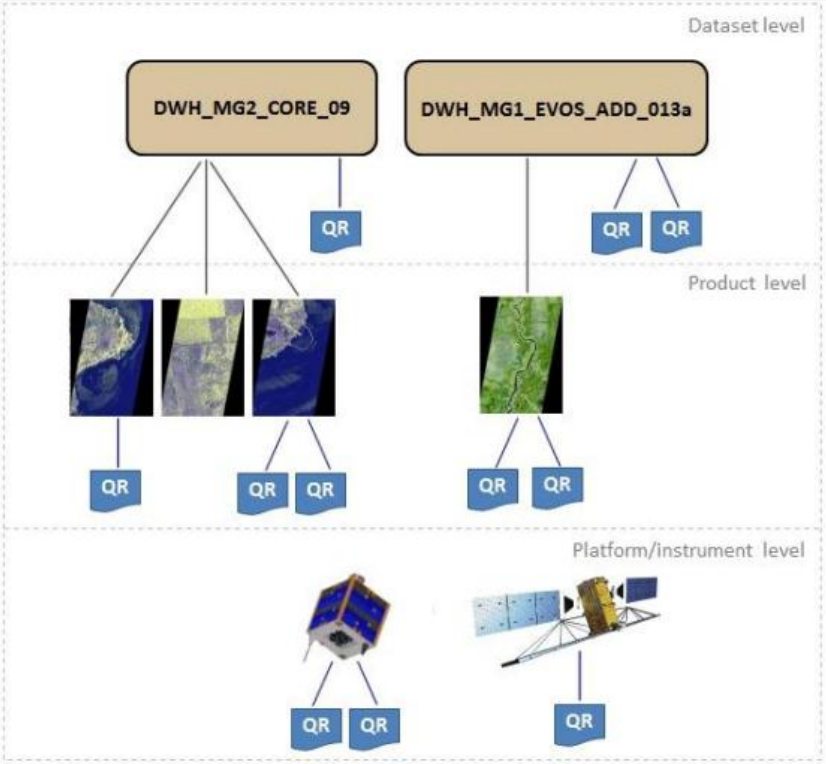
QIIs and data Flow

- Data flow between the Data Provider (GCME) and the user (GSP) is accompanied by associated quality information.



QIIs Availability and Access

- The user searches QIIs in the CQC Catalogue based on Dataset, Product, or Platform/Instrument.



Visit CQC web page :

https://cqc.eo.esa.int/axis2/services/CqcExternalWeb/searchQiiForm

QIIs Availability

These results correspond to the main search for quality reports related to the target product

This block corresponds to a single result. It provides:
- essential metadata on the quality report
- download links

These results correspond to the search expansion to include also quality reports related to the platform/instrument

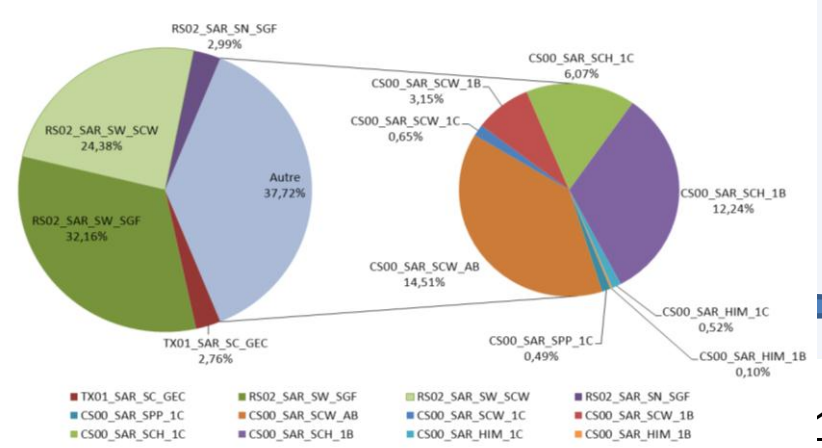
Service organisation and purposes

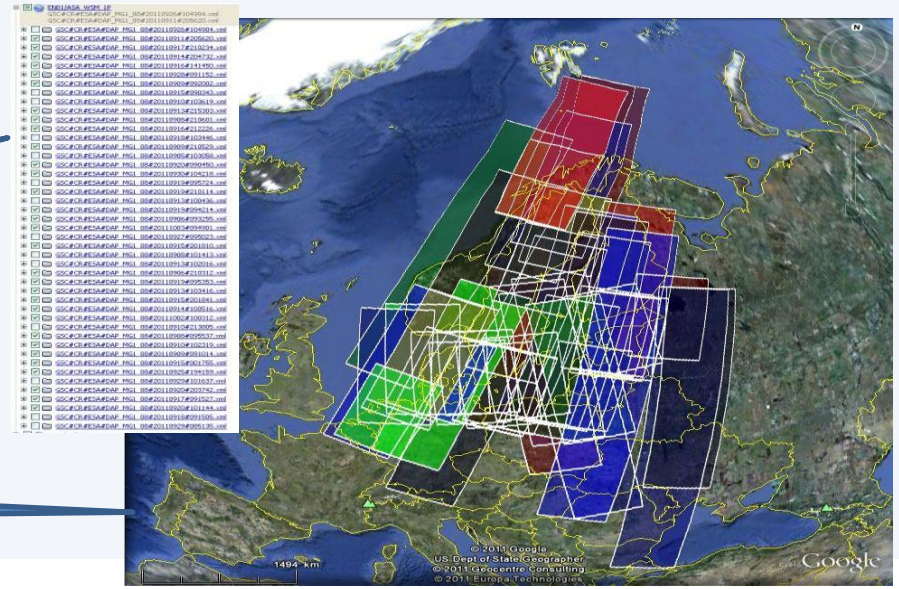
- The CQC performs various services

Service Id	Service Name
Service 1	Management and traceability of Quality Information Items (QII)
Service 2	Analysis and Monitoring of QIIs
Service 3	Analysis of EO products and sample datasets
Service 4	Anomaly Analysis
Service 5	Reporting Activity
Service 6	Harmonisation Activity

Team & Infrastructure

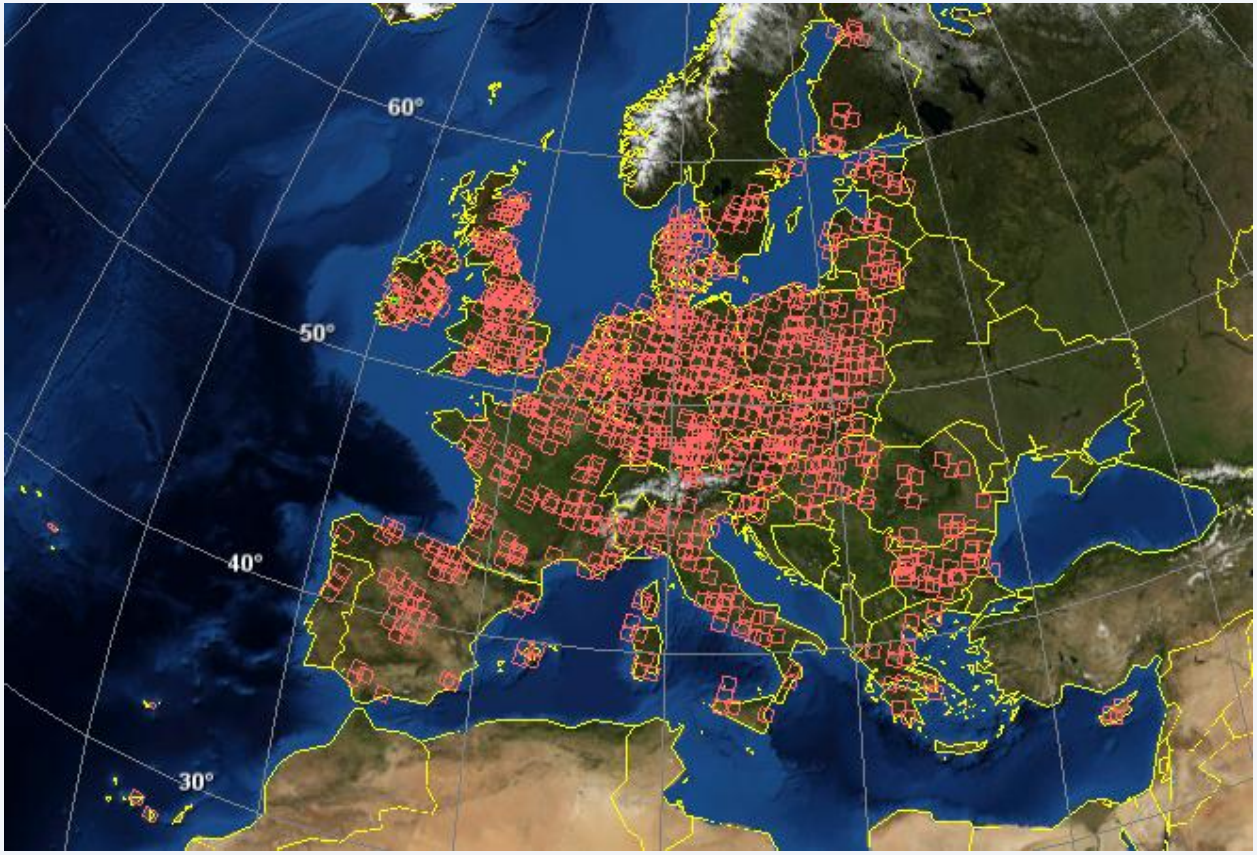
- The CQC service relies on a pool of thematic experts in data from Optical, Radar, Atmospheric instruments.
- In addition to the CQC system, the CQC service operates an **EO Data processing infrastructure.**
- DAP MG1_08 coverage assessment





Team & Infrastructure

- DS Example: Urban Atlas Dataset, DAP_MG2b_01



Anomaly definition – non conformance

- An anomaly leads to a non conformance in the two following cases
  - Product/instrument is not in agreement with the specifications defined into the Instrument and Product Specification Document
  - Dataset is not in agreement with the requirements written into DataWarehouse document (defining dataset specification)
- The CQC implements an anomaly recovery loop with the GCMEs up to non conformance closure.
- A final APR is released summarizing all the investigations steps with conclusions.

Anomaly definition – recommendations

– Some anomalies are not “non-conformances” :
  - There is no deviation with regards to specification but the product is not fit for purpose for the User point of view.

– These cases are interesting because leading to recommendations for improvements of the product itself, for refining requirements of the next DataWarehouse phases. These are written into a final APR.

Discussion on Anomaly: Format

- Cause of Anomaly attributed to the Format:
  - Metadata Completeness
  - Value Inconsistencies, Missing information
  - Traceability issues
  - Quality indicators

Discussion on Anomaly: Geometry

- Cause of Anomaly attributed to the Geometry:
  - Ortho processing
    - Accuracy of reference data used (Raster, Elevation data – dtm / dsm)
    - Implemented Algorithms (GCP chip selection, pixel convention, sampling)
  - General geometric processing
    - Accuracy of the Interband registration process
    - Implementation of projection conventions (EEA).
  - Instrument geometric calibration parameters

Discussion on Anomaly: Radiometry

- Cause of Anomaly attributed to the radiometry:
  - Atmospheric corrections not applied
    - Environmental effect not modeled (pointing angle)
  - Detector Equalization
  - Quick Look quality
  - Image Compression
  - Cloud coverage algorithms
  - Instrument calibration parameter.

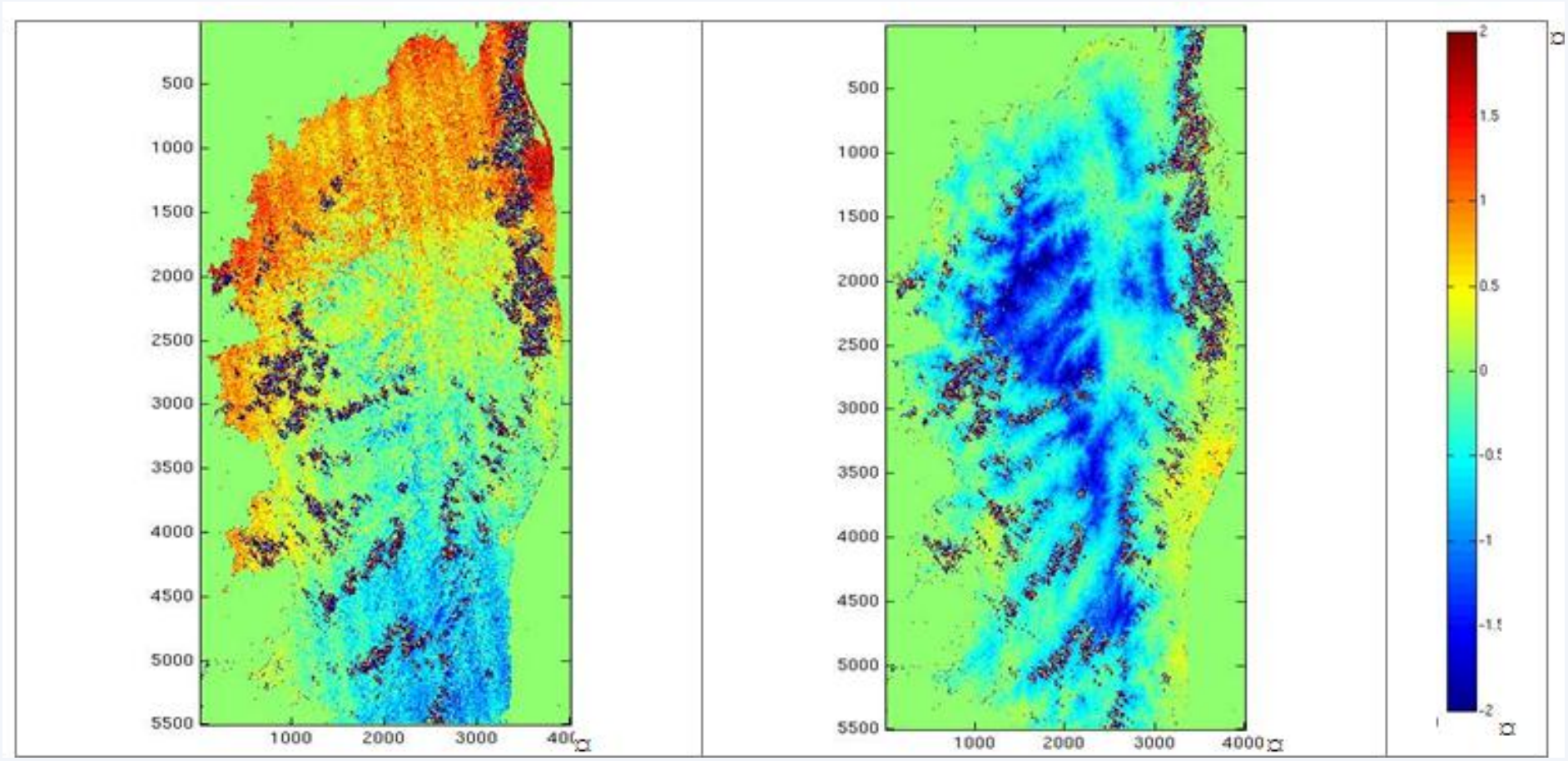
Harmonization Activities

- The objective of this activity is to converge towards a common understanding of the different measures and similar (or rather comparable) quality control procedures between different Contributing Missions (GCME).
- **It leads to a better understanding of the data quality by the users and will therefore enhance the overall GSCDA service and the data interoperability for the various applications.**

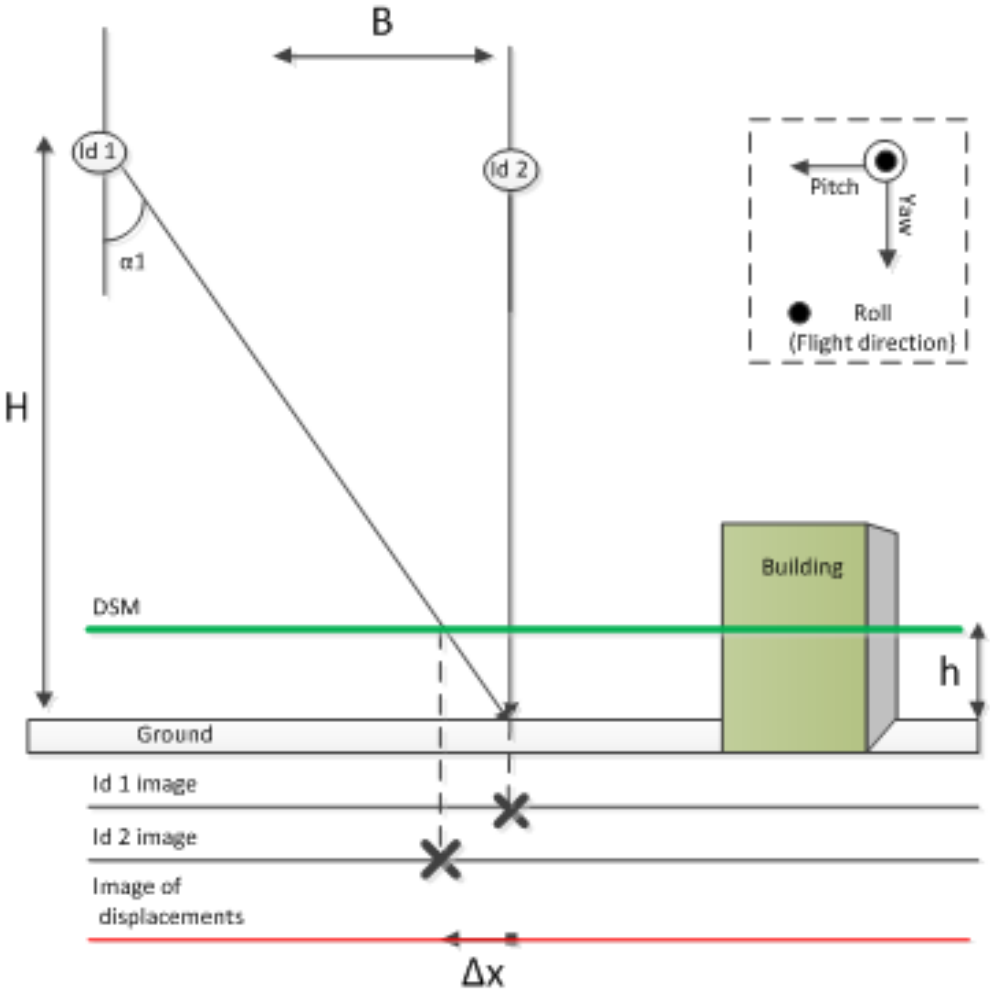
Harmonization Activities

- Discussions with several GCMEs are on going in order to harmonize the product format and more particularly the content.
- IPS has been reviewed by the CQC to recommend the use of a common framework (method, metric) in order to inter compare specification (Radar, Atmo and optical)
- S/W application created (web) to compare accuracy specification across GCME.

Geometry: ortho & DEM



Geometry: ortho HR & DSM



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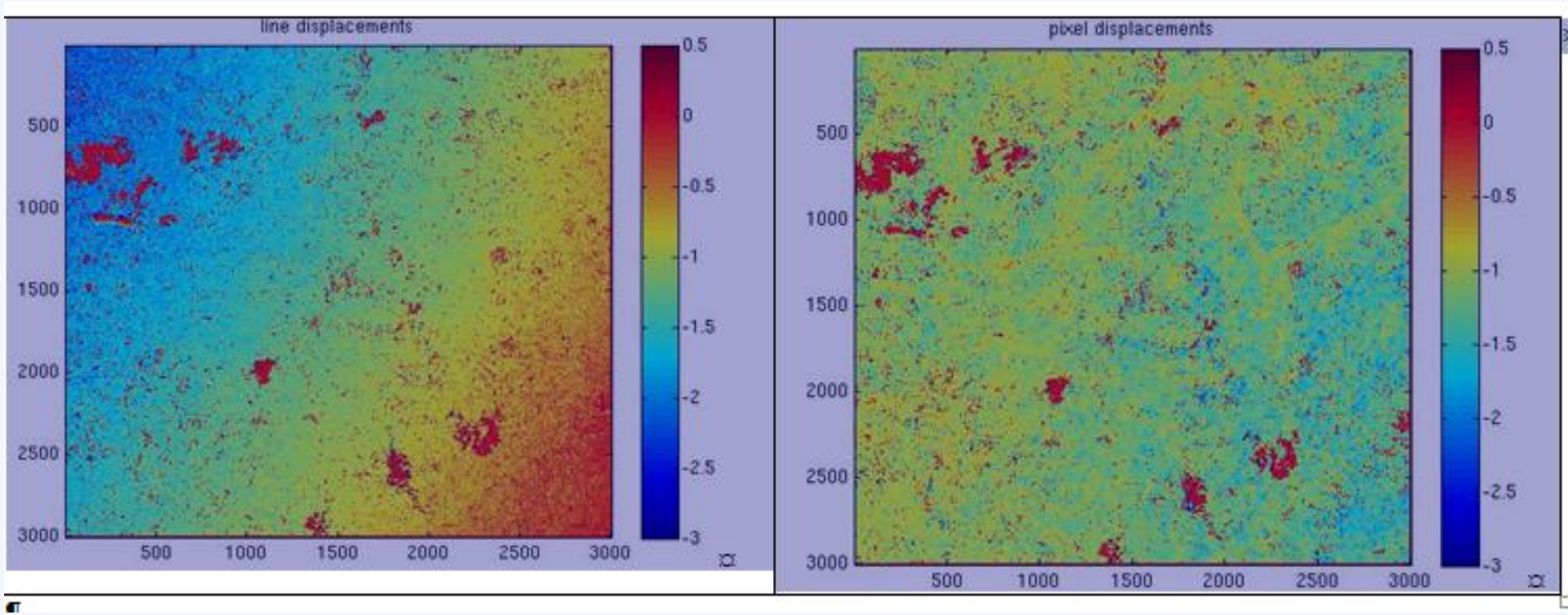
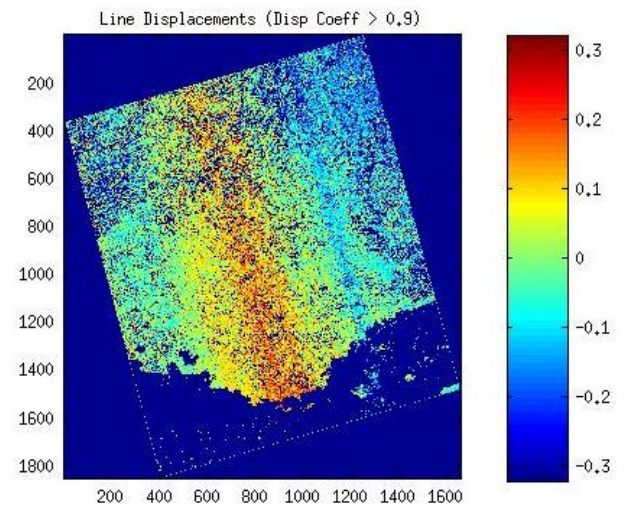
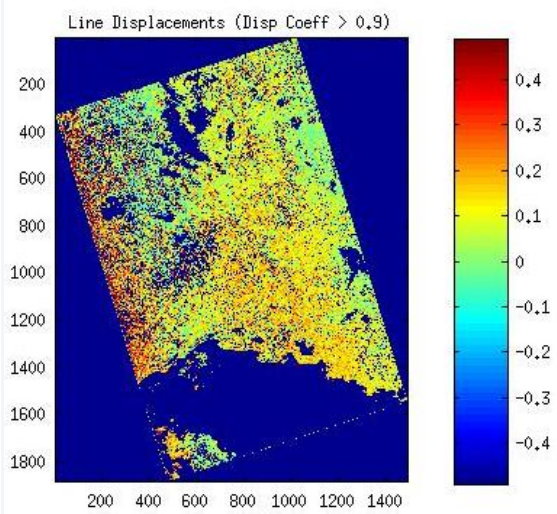
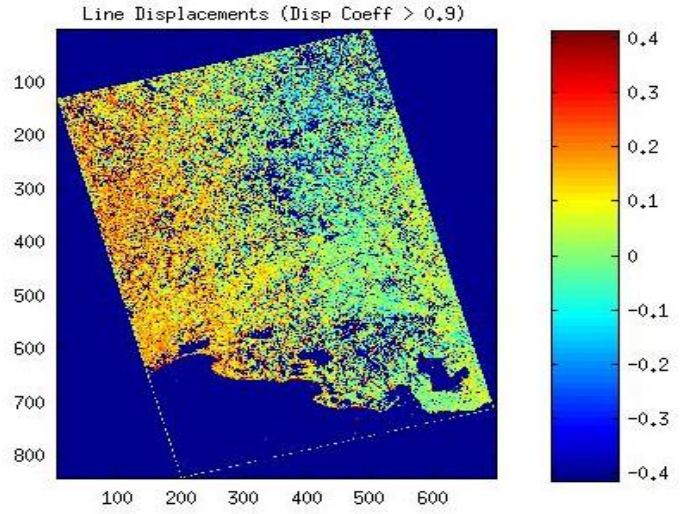
Geometry: ortho and GCP distribution

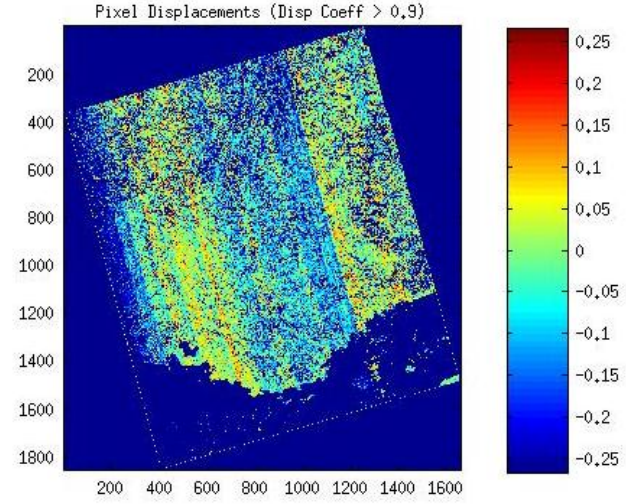


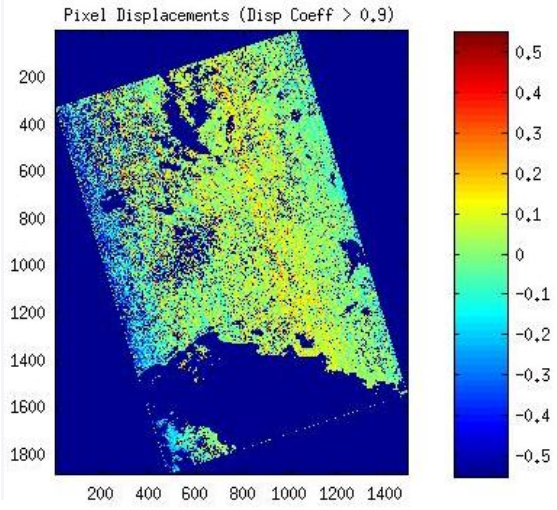
Geometry: Interband Registration

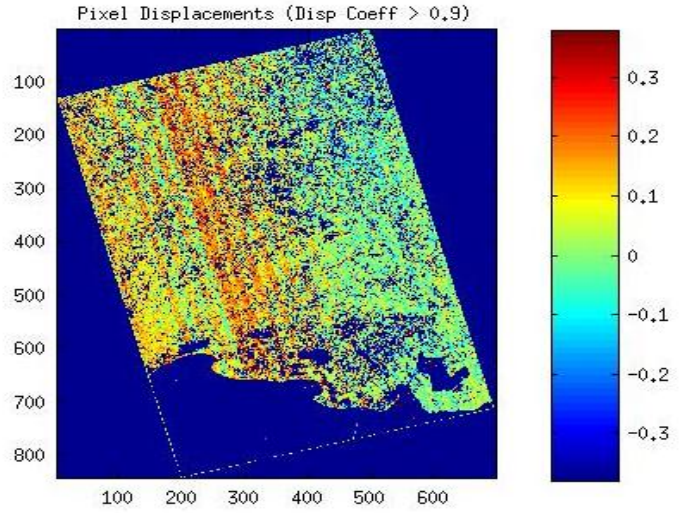




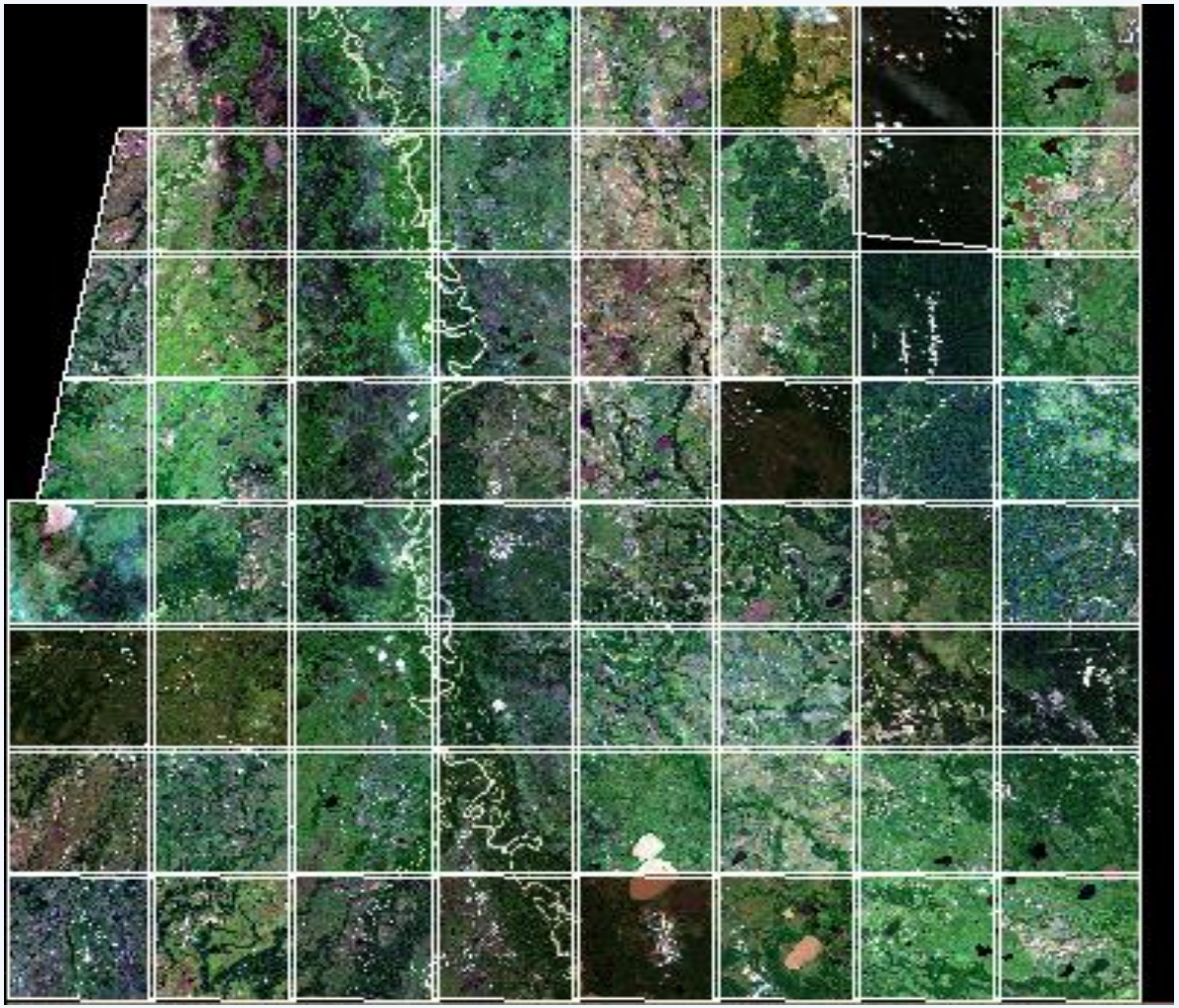


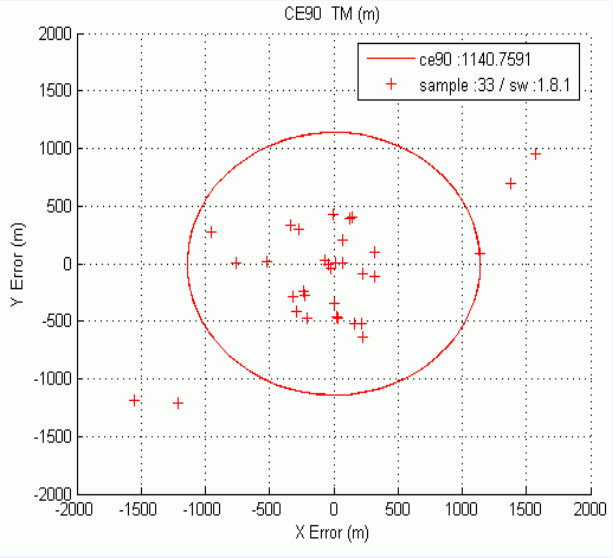




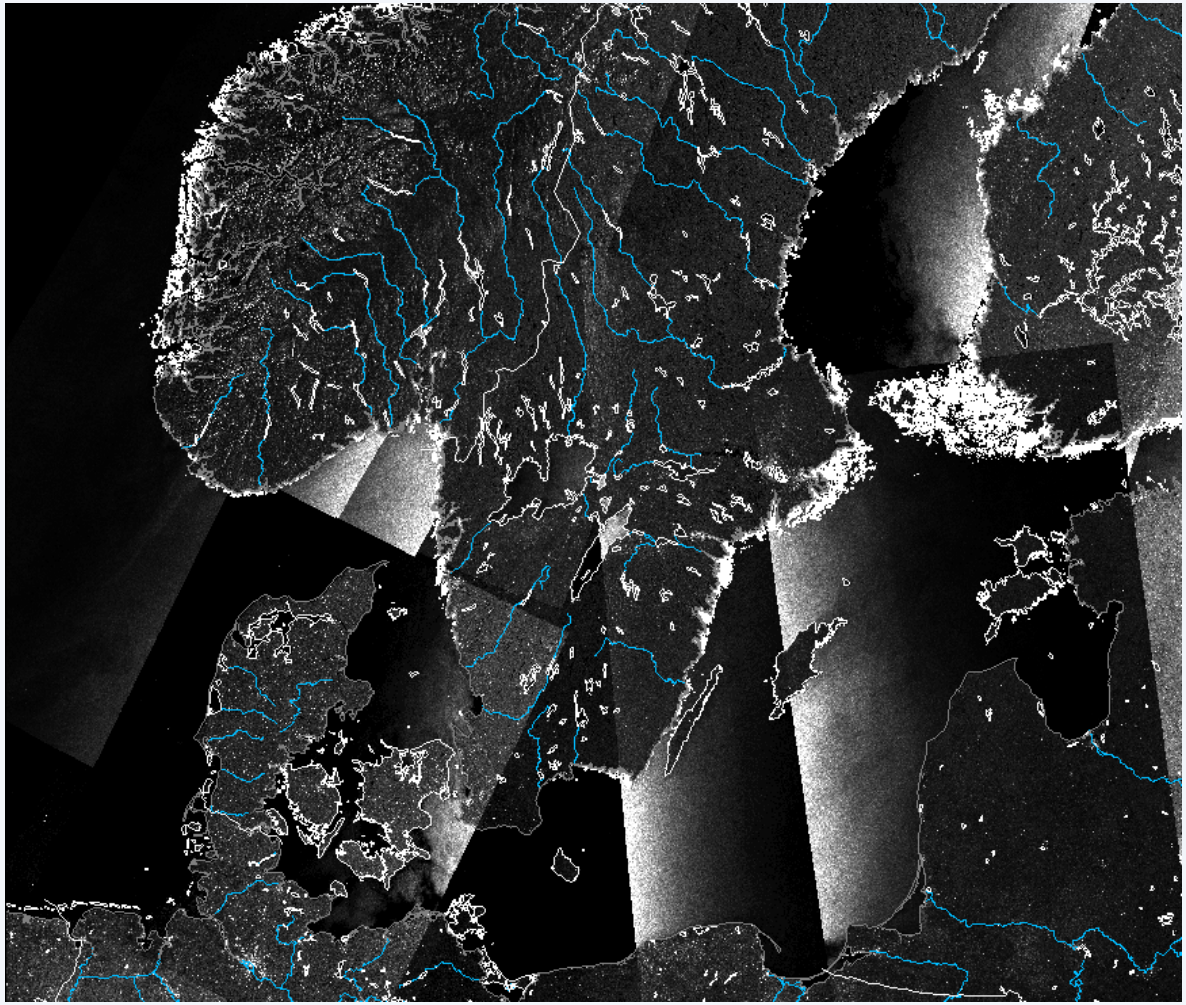


Geometry: mosaicking control 1/2

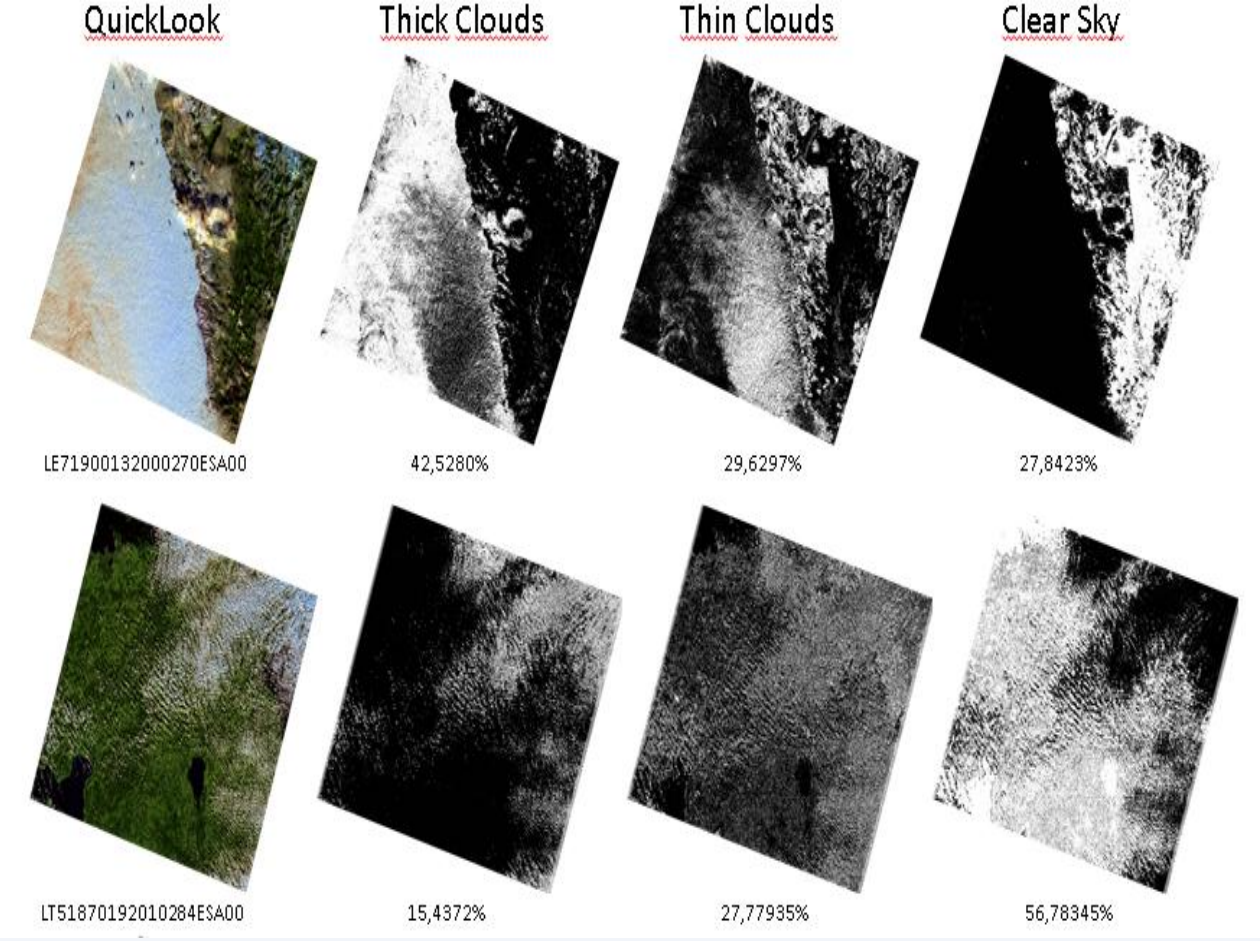




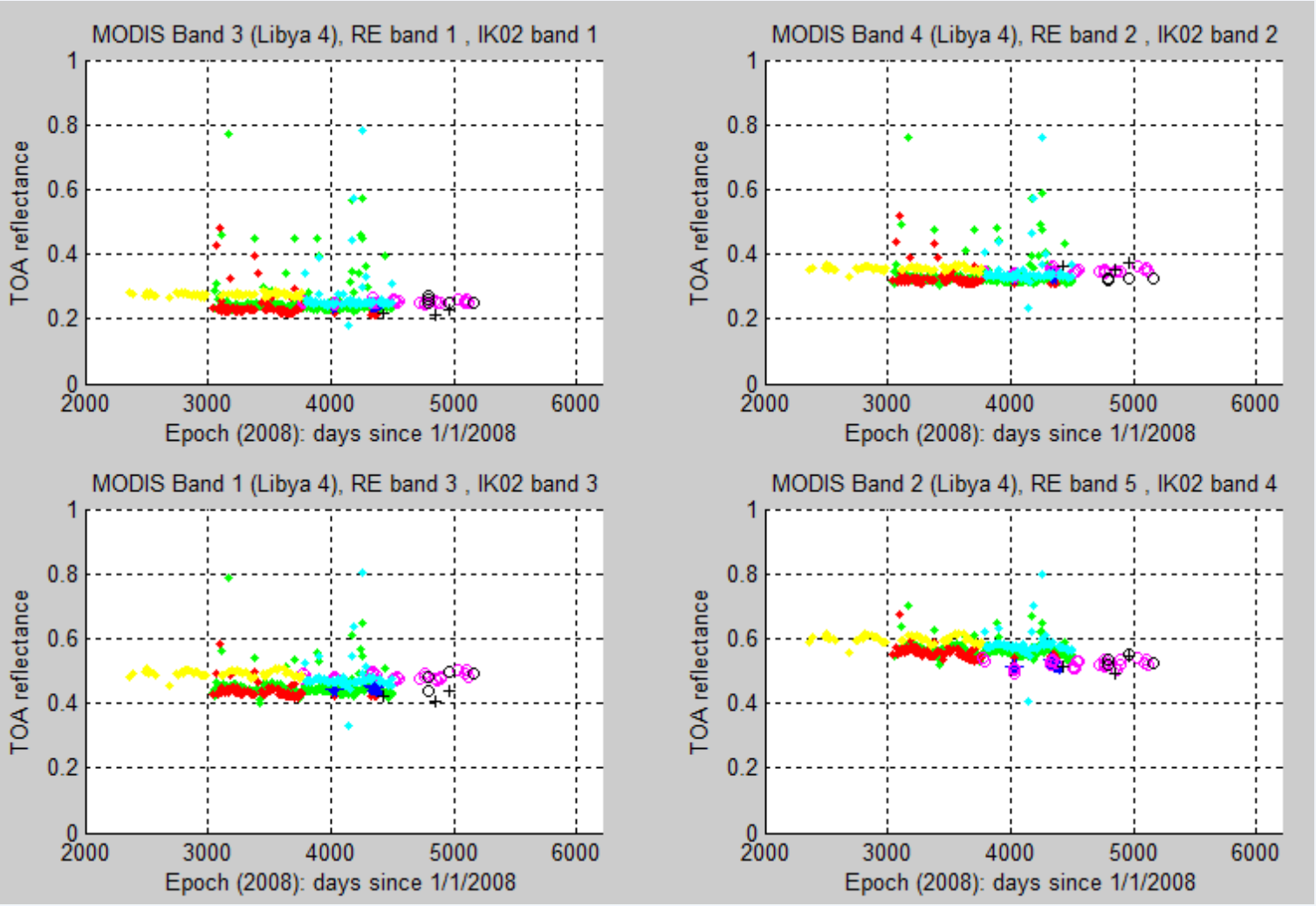
Geometry: mosaicking control 2/2



QI: Cloud Coverage score



Radiometry: calibration

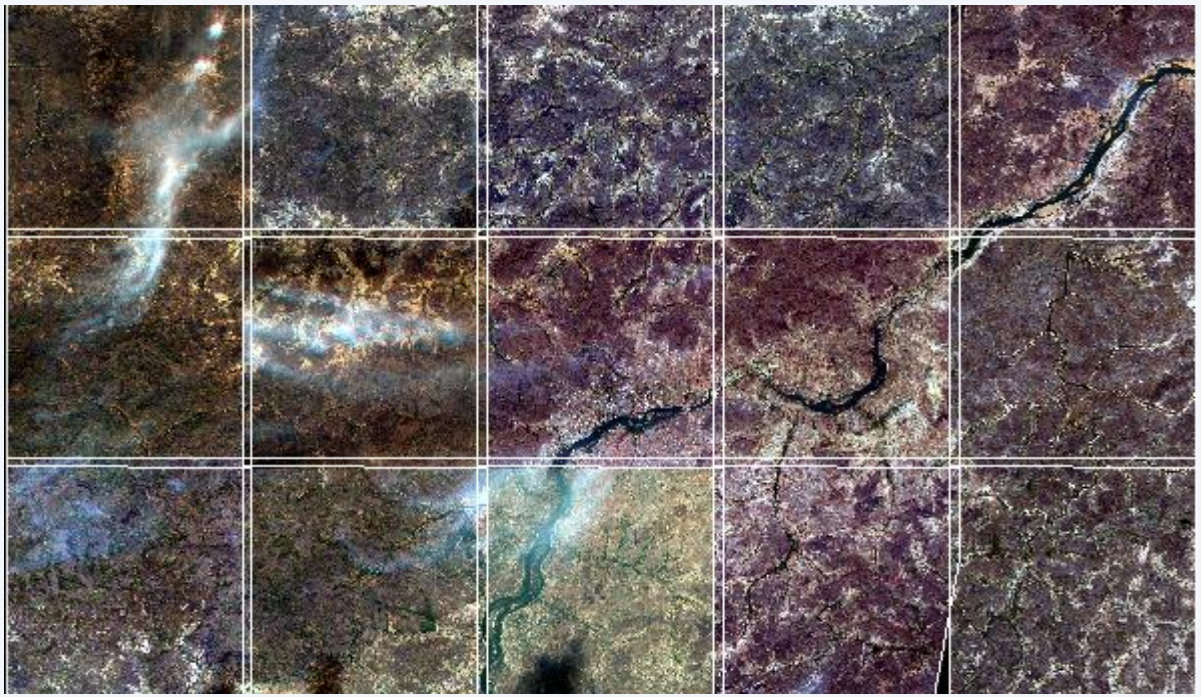


Conclusions

- The GSCDA/CQC Framework has been presented,
- The CQC service is in its operational phase since 2011, the QII catalogue is working as expected, the processing of high data volume with multi source product is challenging.
- The collaboration with the GCMEs is fruitful,
- A good knowledge of the available quality information and data quality has been reached.
- The CQC system is now offering to the audience a significant number of QIIs

End

- Thanks you for your attention
- **& Visit https://cqc.eo.esa.int/axis2/services/CqcExternalWeb/searchQiiForm**



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