

INTRODUCTION

Space-borne optical sensors can provide global coverage for a variety of surface parameters that are utilised by large scientific communities, and feed into a growing time series extending over several decades.

In order to provide optimal product performance and confidence, a stable and integrated approach to Quality Control (QC) is required. This presentation sets out a general overview of activities carried out by the Sensor Performance Product and Algorithm (SPPA) Teams under the VEGA-lead Instrument Data quality Evaluation and Analysis Service (IDEAS) consortium. The IDEAS SPPA service is provided for the MERIS, MODIS, SeaWiFS & Landsat instruments to the European Space Agency (ESA).

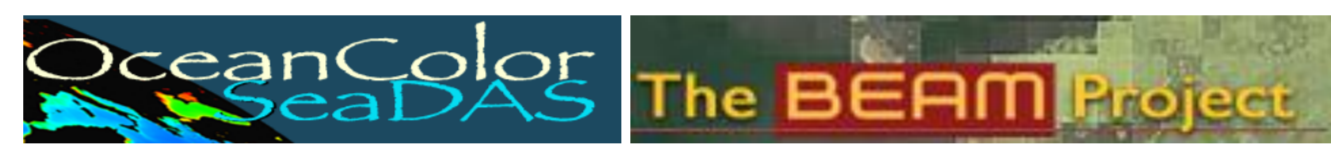
The IDEAS SPPA Teams are supported by instrument experts; for MERIS, MODIS & SeaWiFS, and Landsat, these are Ludovic Bourg (ACRI-ST), Samantha Lavender (ARGANS) and Sebastien Saunier (Gael Consultant) respectively.

The role of the SPPA Team is to perform a variety of QC activities including analysis and checking of products, long loop sensor analysis, software and hardware update validations, general monitoring of product catalogues, and support to User forums and FAQs.

Quality Control Tools

Through using open source tools such as **BEAM VISAT** and **SeaDAS**, the SPPA Teams have concurrent knowledge and expertise for User queries, and can relate QC reports to the interfaces used by Users; making the QC activities as fully transparent as possible.

As some QC activities are on product formats not available to Users, bespoke tools developed at ACRI-ST, Gael Consultant and ARGANS are also used. These include **MERISDOC** and **MERLOT** (ACRI-ST); **QUISS**, **FRAME** and **timEditProduct** (Gael Consultant); **M_PHAT**, **M_PARC**, and **MOAC** (ARGANS).



Automated QC tools operated by ESA Ground Stations also form part of the overall product QC. For example **AMALFI** is the offline MERIS QC system assessing all products as they are prepared for postal delivery to Users; failed products are Investigated to determine if suitable for distribution

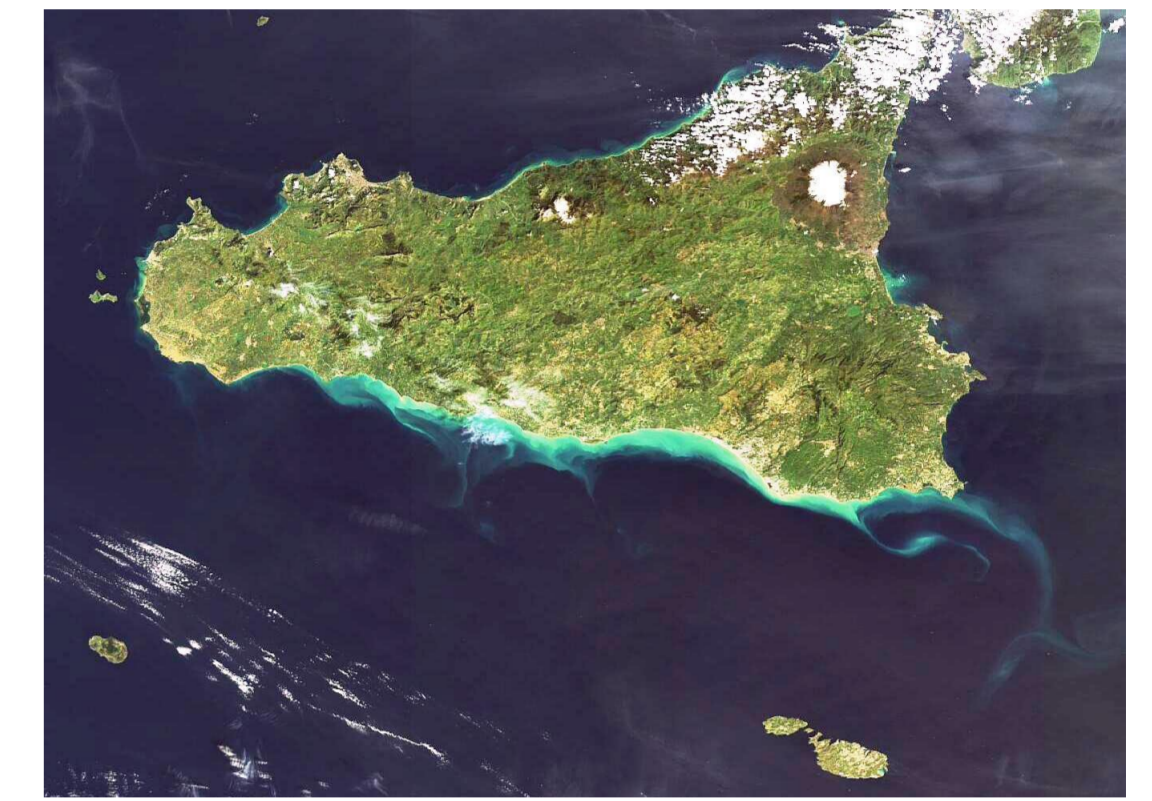


MERIS SPPA

Daily production status is monitored and summarised in a **Daily Report** generated at ACRI, whilst Browse Products are retrieved at ARGANS and form part of a daily Quicklook webpage allowing **NRT visual assessment of product quality**.

Validation activities have been performed to port the processing chain onto Linux – **increasing the processing performance**. In addition to European and North America NRT products, Full Resolution processing over Africa is now possible.

The SPPA Team are currently preparing QC activities for the forthcoming ENVI-SAT 2010+ change in Orbit scenario. Pre-maneuvre notifications and product disclaimers will be issued through EO Help and web forums



Sediment transport, Sicilian Coast (27/02/2010, MERIS, ESA)

Reporting Activities

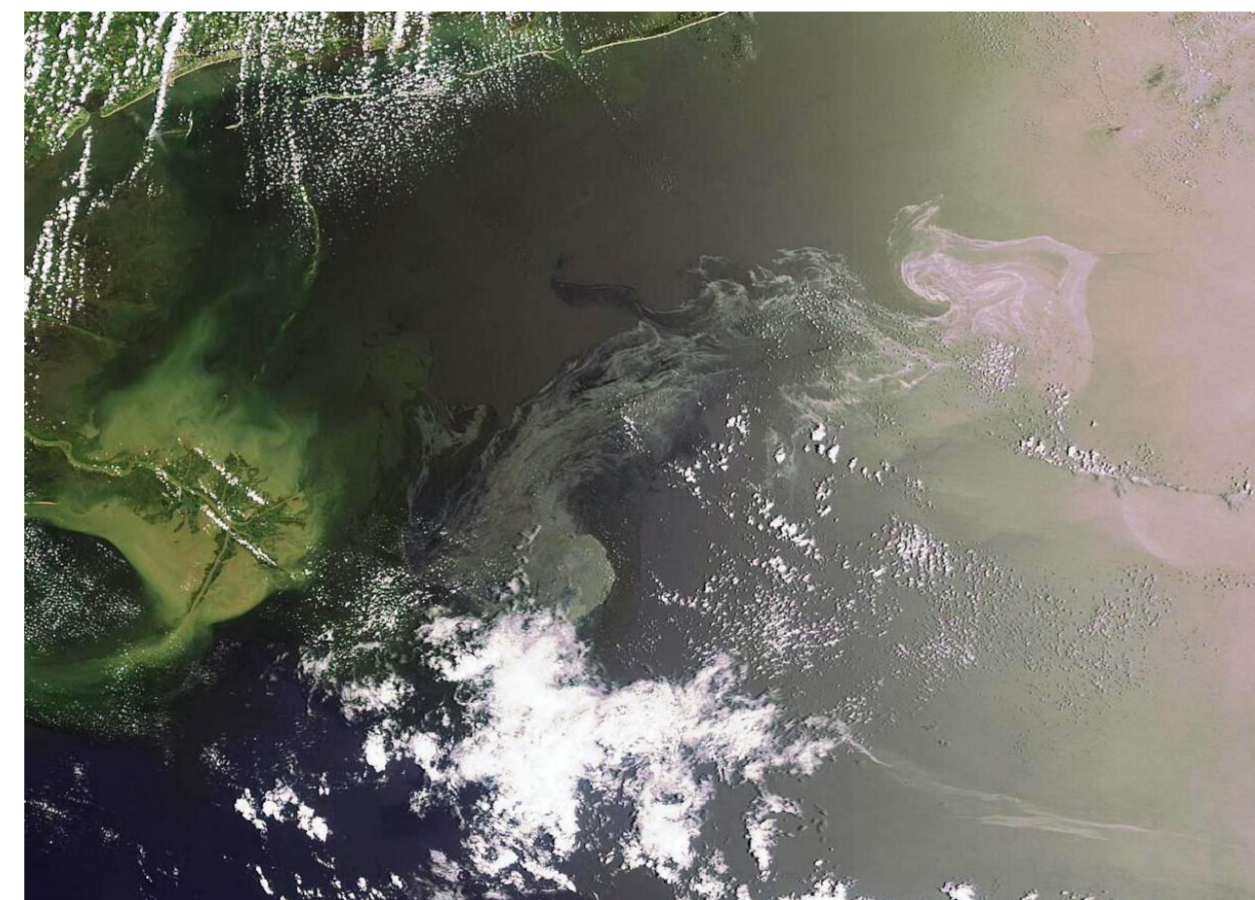
QC activities are documented through a series of regular reports, compiled on a daily, monthly, cyclic and yearly basis.

- **Daily Reports** document product quality information including product generation and instrument health; acquisition performance, geolocation discrepancies, missing data.
- **Monthly Reports** contain the status of QC activities, summarising the resolution of User queries, any ongoing or resolved investigations, and future service evolutions.

- **Cyclic Reports** contain information On auxiliary product or processor updates, Acquisition Or processing anomalies, and the status of Calibration, Validation, and QC activities.

- **Yearly Reports**: summarise the main Issues, events and results on an annual basis.

Reports are circulated internally/externally depending on the mission QC performed.



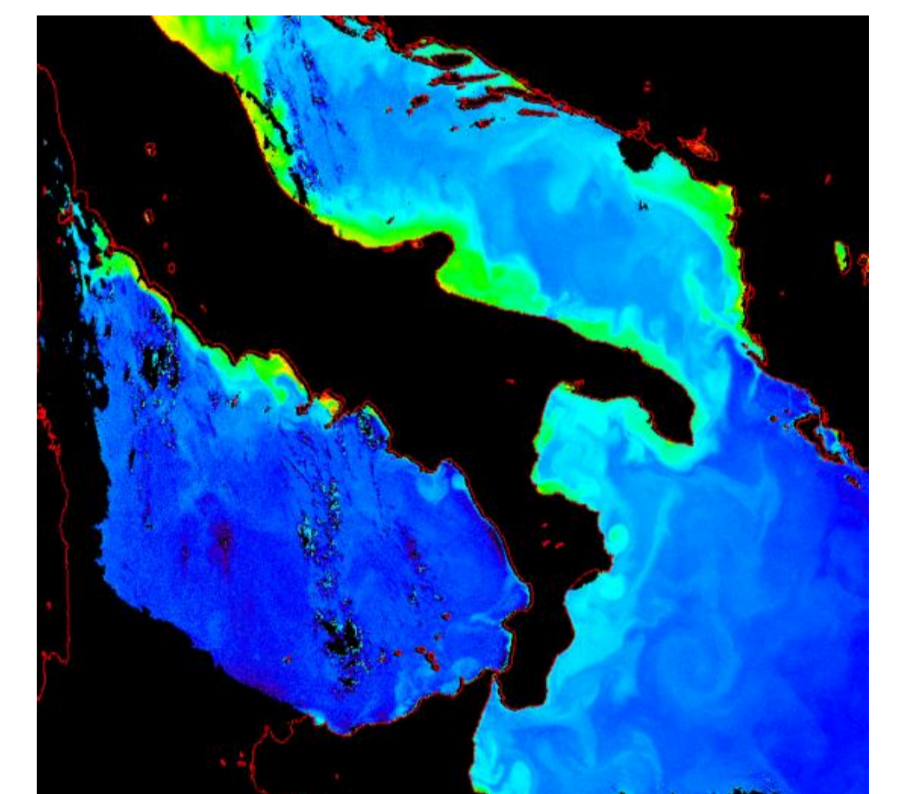
BP Oil Spill, Gulf of Mexico (21/05/2010, MERIS, ESA)

SeaWiFS & MODIS SPPA

SeaWiFS & MODIS Products are monitored on two ESA Archives:

- The **GMES MyOcean FTP Rolling Archive**: MODIS Level 1A and SeaWiFS Level 0 HRPT. All products are processed at ARGANS to determine product quality.
- The **MERCI MODIS** online catalogue provides systematic Level 1B products. These are assessed via Quicklooks, and any erroneous products interrogated using bespoke software developed at ARGANS.

Daily monitoring by the MODIS SPPA Team found a high occurrence of missing frames in data products. Investigations resulted in a change of acquisition angle for the receiving antennae and processing procedure, and a large increase in product quality.



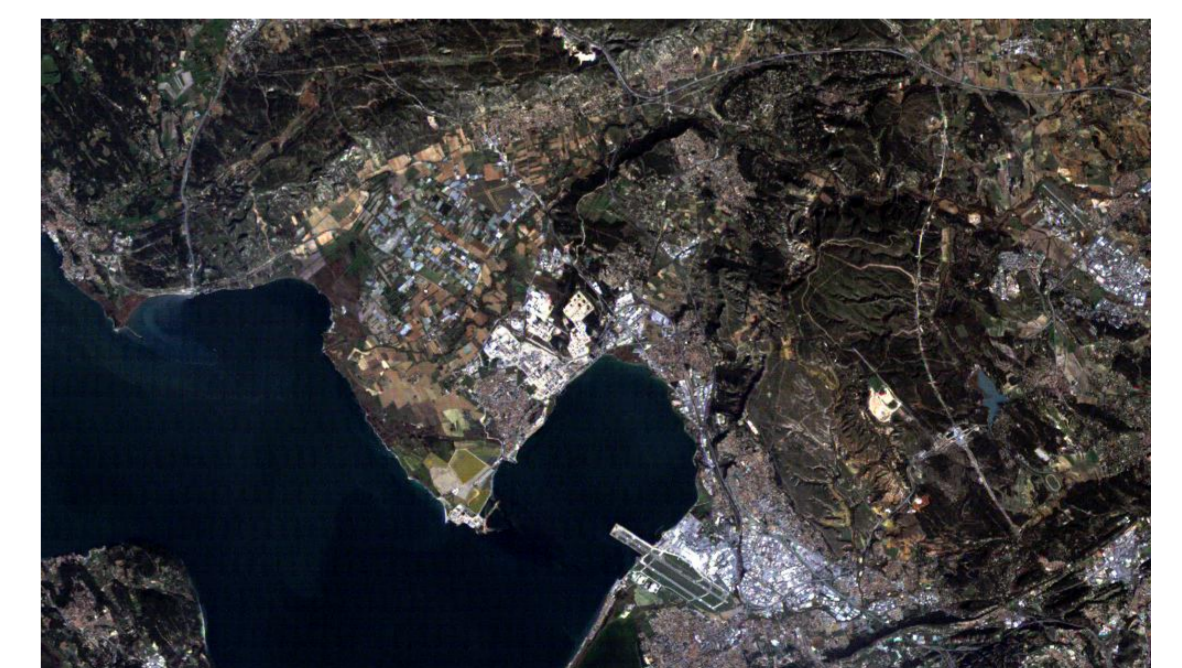
Chlorophyll-a off the Italian Coast (09/06/2010, SeaWiFS, ESA)

Landsat SPPA: TM and ETM+

The TM (Thematic Mapper) sensor onboard LANDSAT 5, and the ETM+ (Enhanced Thematic Mapper) sensor onboard LANDSAT 7 are still active, providing up to 26 years of data. The SPPA Team provide support for ESA European coverage products as an **ESA Third Party Mission (TPM)**.

In 2009 the Landsat SPPA Team at Gael Consultant performed validation of a new radiometric calibration model known as the **Lifetime Model (LTM)**.

Based on **in-flight** (instead of pre-flight) radiometric calibration this represents a large increase in radiometric quality; it became operational in June 2009.



Lacrau, France (Path: 196, Row: 30) (24/11/2009, Landsat 5 TM, ESA)

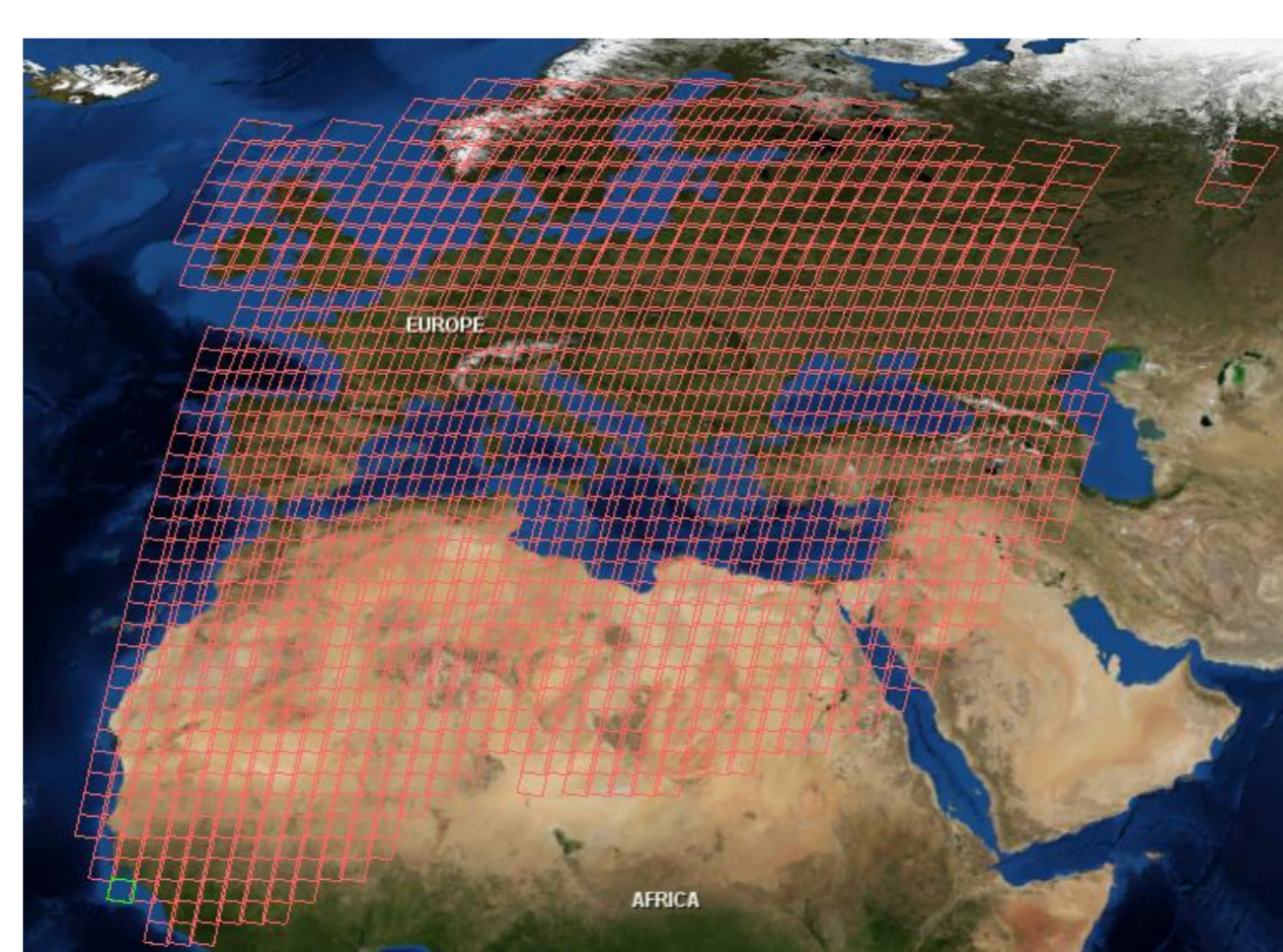
Scientific Community Support

QC Teams provide expertise & support to scientists and other users, to assist in data usage data and ensure confidence in ESA products:

- **Support Documentation**: FAQs, Product Handbooks and scientific documents (e.g. ATBDs).
- **Responding to Helpdesk Requests**; user requests sent to EOHELP@ESA.INT.
- **Monitor and feed into online forums** such as ODESA and BEAM for MERIS, and the Ocean Color Forum for SeaWiFS and MODIS.
- **Provide access to high-quality data** via the ESA Webportal information and links.
- **Routine daily monitoring** of product catalogues and archives.
- **Issuing Product disclaimers** and information notifications.

Assessment of general data quality: Sensor performance is monitored via online portals to forestall any gaps in product dissemination, and is subsequently reported in performance reports.

The SPPA Teams are also part of instrument Quality Working Groups (QWGs), and attend scientific meetings such as the MERIS Validation Team and NASA Ocean Color Research Team meetings.



EOLI-SA Landsat European Coverage (ESA)

Service Evolution: GMES and QA4EO

Within **Global Monitoring for Environment and Security (GMES)**, ESA is developing a harmonised system that facilitates access to Earth Observation (EO) data; this is through the GMES Space Component Data Access (GSCDA) system.

The **Coordinated Quality Control (CQC) team** ensure full traceability and accessibility of the Quality Information Items (e.g. documents, reports, auxiliary information) and coordinate anomaly investigations, and detailed quality control and analysis for GMES Contributing Missions (GCMs); this is achieved through coordination with SPPA Teams.

QA4EO has been established by the **Committee on Earth Observation Satellites (CEOS)** to facilitate the Group on Earth Observations (GEO) vision for a Global Earth Observation System of Systems (GEOSS). It aims to provide near-real-time environmental data, information and analysis. **QA4EO** is based on the adoption of guiding principles, which are implemented via guidelines derived from best practices. Evolution activities are currently ongoing to ensure all **GCMs are QA4EO compliant**.