



QA4EO

A Quality Assurance Framework for Earth Observation



QA4EO Background

- The Global Earth Observation System of Systems (GEOSS) must deliver “timely, quality, long-term, global information ” to meet the needs of its nine “societal benefit areas”.
- This will be achieved through the synergistic use of data derived from a variety of sources (satellite, airborne and surface-based) and the coordination of resources and efforts of the members.
- Accomplishing this vision, starting from a system of disparate systems that were built for a multitude of applications, requires the establishment of an internationally coordinated framework to facilitate interoperability and harmonisation.
- The success of this framework is dependent upon the successful implementation of a single key principle:
 - ◆ all EO data and derived products shall have associated with it a documented and fully traceable quality indicator (QI).
- Success also necessitates the means to efficiently communicate this attributes to all stakeholders.



A QUALITY ASSURANCE
FRAMEWORK FOR
EARTH OBSERVATION



QA4EO

- The Quality Assurance framework for Earth Observation (QA4EO) was established and endorsed by the Committee on Earth Observation Satellites (CEOS) as a direct response to a Group on Earth Observations (GEO) Task DA-06-02 (now Task DA-09-01a).
- It has been endorsed by CEOS as a contribution to facilitate the GEO vision for GEOSS. The aim of GEOSS is to realize a future wherein decisions and actions are informed by coordinated, comprehensive and sustained Earth observations and information.
 - ◆ See GEOSS 10-Year Implementation Plan and in particular sections
 - 5.3 Architecture and Interoperability,
 - 5.5 Research Facilitation,
 - 6.1 (Governance) Functions

QA4EO Essential Principle

- In order to achieve the vision of GEOSS, Quality Indicators (QIs) should be ascribed to data and products, at each stage of the data processing chain - from collection and processing to delivery.
 - ◆ A QI should provide sufficient information to allow all users to readily evaluate a product's suitability for their particular application, i.e. its “fitness for purpose”.
 - ◆ To ensure that this process is internationally harmonised and consistent, the QI needs to be based on a documented and quantifiable assessment of evidence demonstrating the level of traceability to internationally agreed (where possible SI) reference standards.

QA4EO Essential Principle

QA4EO
Essential Principle

Quality Indicators

Traceability

QA4EO Definitions

- **Quality Indicator**

- ◆ A mean of providing “a user” of data or derived product, (i.e. which is the results of a process) sufficient information to assess its suitability for a particular application.
- ◆ This “information” should be based on a quantitative assessment of its *traceability* to an agreed *reference* measurement standard (ideally SI) but can be presented as numeric or text descriptor providing the quantitative linkage is defined

- **Traceability**

- ◆ Property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations each contributing to the measurement *uncertainty*.

Further Definitions

- **Reference (measurement) Standard:**

- ◆ Realization of the definition of a given quantity, ideally with stated quantity value and associated measurement uncertainty, used as a reference.
- ◆ Can be individual or community defined.

- **Uncertainty:**

- ◆ Non-negative parameter characterising the dispersion of the quantity values that are being attributed to a measurand (quantity), based on the information used.
- ◆ Where possible, this should be derived from an experimental evaluation but can also be an estimate based on other information, e.g. experience.

QA4EO Executive Summary

- It is critical that data and derived products are easily accessible in an open manner and have associated with them an indicator of their quality traceable to reference standards (preferably SI) to enable users to assess its suitability for their application i.e. its “fitness for purpose”.
- This Quality Indicator needs to be unequivocal in its interpretation and derivation , yet sufficiently flexible, to be implemented across the full range of EO activities which are coordinated through GEO.
- This is the purpose of the Quality Assurance framework for Earth Observation (QA4EO) established to achieve this task.

QA4EO Executive Summary

- QA4EO implementation is supported by a framework document and a set of key guidelines to assist in its interpretation and implementation .
- Organizations that fund and oversee the development and execution of Earth Observation programs are responsible for implementing the QA4EO key guidelines to their delivered data products
- A GEO Oversight Panel, composed of diverse members throughout the EO community, are responsible for managing QA4EO documents, clearly communicating QA4EO concepts to data providers and users alike, and mediating QA4EO disputes between data providers and users