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 (SBAs)

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 Group on Earth Observations (GEO) 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 harmonization

The QA4EO was established and endorsed by the Committee on Earth Observation Satellites (CEOS) as a direct response to a GEO Task DA-09-01A (GEOSS Quality Assurance Strategy)

What is QA4EO?

Measurement/processes are only significant if their "quality" is specified

All data and derived products must have associated with them a Quality Indicator (QI) based on documented quantitative assessment of its traceability to community agreed (ideally SI) reference standards

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"

QA4EO encompasses a framework and set of guidelines, derived from best practices and with example templates included to aid implementation

Key Principle

Data and derived products must have associated with them an indicator of their quality to enable users to assess its suitability for their application "fitness for purpose"

Quality Indicators (QI)

should be ascribed to all data and products. A "QI" should provide enough information to allow all users to readily evaluate its 'fitness for purpose'

Traceability

QI should be based on a documented and quantifiable assessment of evidence demonstrating the level of traceability to internationally agreed (where possible SI) reference standards

Standards can take any form to meet the needs of a specific 'community'

it's a general **framework**

based on **1 essential principle**

and composed of **7 key guidelines**

These are "living documents" and they offer a **flexible approach** to allow the **effort for the tailoring** of the guidelines to be **commensurate with the final objectives**

It is a **user (costumer) driven** process

…it's **not** a **certification** body

…it's **not** a set of **standards** for QC/QA activities & processes that would limit competitiveness or innovation/evolution of technology /methodologies

…it's **not** a framework developed with a **top-down** approach

…the QA4EO process and its implementation should **not be judgmental and bureaucratic**

QA4EO Workshops

CEOS Working Group on Calibration and Validation (WGCV) worked with many agencies/organizations to develop the QA4EO principles and operational implementation details during four workshops

Workshop I. Geneva, WMO, Oct. 2007
Guiding principles

Workshop III. Antalya, TÜBİTAK, Sep. 2009
Facilitating Implementation

Workshop II. Gaithersburg, NIST, May 2008
Establishing an operational framework

Workshop IV. Oxfordshire, UK, RAL, Oct. 2011
Providing Harmonized Quality Information in EO Data

QA4EO Documents

QA4EO framework and key guideline documents were peer-reviewed by representatives from different Earth Observation communities

Approved by WGCV (28th Plenary Meeting, Oct. 2008)

Endorsed by CEOS (22nd CEOS Plenary, Nov. 2008)

Reviewed by World Meteorological Organization (WMO) and Global Space-based Inter-Calibration System (GSICS) (early 2009)

A guide was issued in order to provide a new user with an overview and guidance on getting started with QA4EO

QA4EO documents including the framework, key guidelines, and the guide can be found on the QA4EO web site: http://qa4eo.org/documentation.html

The QA4EO principles provide the framework and introduce the key guidelines:

- **QA4EO-QAEO-GEN-DQK-001** A guide to establish a Quality Indicator on a satellite sensor derived data product
- **QA4EO-QAEO-GEN-DQK-002** A guide to content of a documentary procedure to meet the Quality Assurance requirements of GEO
- **QA4EO-QAEO-GEN-DQK-003** A guide to "reference standards" in support of Quality Assurance requirements of QA4EO
- **QA4EO-QAEO-GEN-DQK-004** A guide to comparisons – organization, operation and analysis to establish measurement equivalence to underpin the QA requirements of QA4EO
- **QA4EO-QAEO-GEN-DQK-005** A guide to establishing validated models, algorithms and software to underpin the Quality Assurance requirements of QA4EO
- **QA4EO-QAEO-GEN-DQK-006** A guide to expression of uncertainty of measurements
- **QA4EO-QAEO-GEN-DQK-007** A guide to establishing quantitative evidence of traceability to underpin the Quality Assurance requirements of QA4EO

QA4EO Implementation

Datasets provided to GEO will require information with Quality Indicators in order to support decision and policy makers

QA4EO builds upon 'best practice' from all sectors, not just Earth Observation

The use of key guidelines within QA4EO should allow all stakeholders to have confidence in any assigned Quality Indicator (QI)

Harmonization and implementation is aided by a set of seven key guidance documents. These guidelines are living documents and will evolve and/or be added to over time

QA4EO is cross-cutting and is evolving to meet the needs of all SBAs by establishing case studies and training, currently, international partners are working this process via GEO/CEOS

A questionnaire is under-development to help providers/users assess their QA4EO compliance

Perform GEO/CEOS intercomparisons and intercalibrations campaigns

QA4EO Future Activities

Each entity is responsible for implementing QA4EO in its program

e.g. European Space Agency (ESA) carrying out many activities and QA4EO is now referenced in the Global Monitoring for Environment and Security (GMES) statement of work

International efforts and coordination for joint activities

e.g. intercomparisons, intercalibrations/Long term data preservation

GEO/CEOS is developing showcases highlighting the need for QA4EO

e.g. showcases on Forest Carbon Tracking (FCT), Atmospheric Composition (AC), and Global Digital Elevation Models (DEM)

GEO QA4EO Workshop IV roadmap of key objectives that will cover technical, coordination, and governance aspects of QA4EO

- GEO work to establish a dedicated oversight group in the GEO structure to be the mechanism to take QA4EO forwards and seek implementation throughout GEOSS beginning at GEO-VIII
- Prepare an implementation plan for GEO plenary 2012 to officially seek GEO adoption and implementation of QA4EO throughout GEOSS
- Embed QA4EO into the workings of the SBAs by establishing, and working on, links from QA4EO into specific GEO SBA tasks
- Elevate cross-cutting activities of QA4EO developed within CEOS to the GEO level
- Promote QA4EO at GEO-level workshops (capacity building, etc.) to enhance outreach to stakeholders and as a way to assess progress made in targeted areas

QA4EO Information

For questions, please contact the QA4EO secretariat – sec@QA4EO.org

For documentation, please visit the QA4EO website – http://QA4EO.org/

GEO GROUP ON EARTH OBSERVATIONS

CEOS

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