

IDEAS-QA4EO

Cal/Val WS#5 Introduction and Meeting Objectives

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11 – 13 June 2024

Thessaloniki

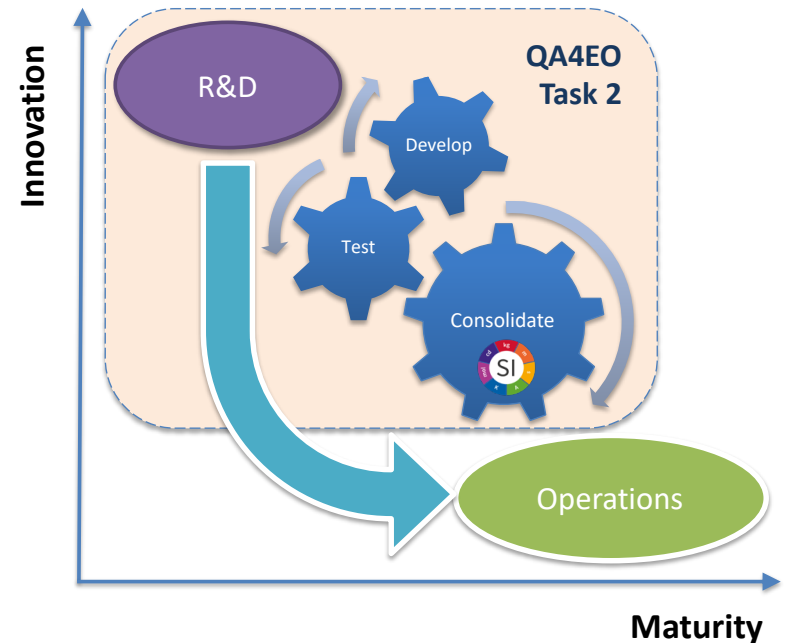
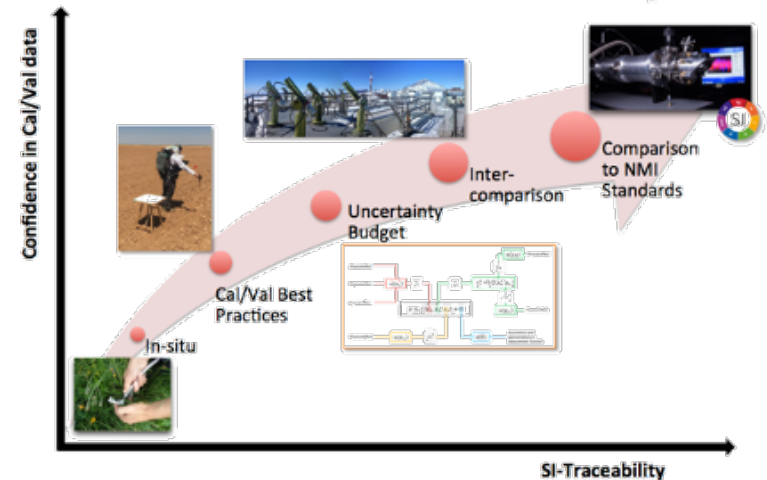
Background

- IDEAS contract started in 2008, evolving into different phases: IDEAS+ (2014-2019), QA4EO (2019-2024), ...
- Cal/Val framework implemented as a dedicated task in IDEAS+
- Led by Gareth and then Fabrizio (since 2016)
- Developed in alignment with ESA SPPA's overall Cal/Val strategy and contributed to shaping it

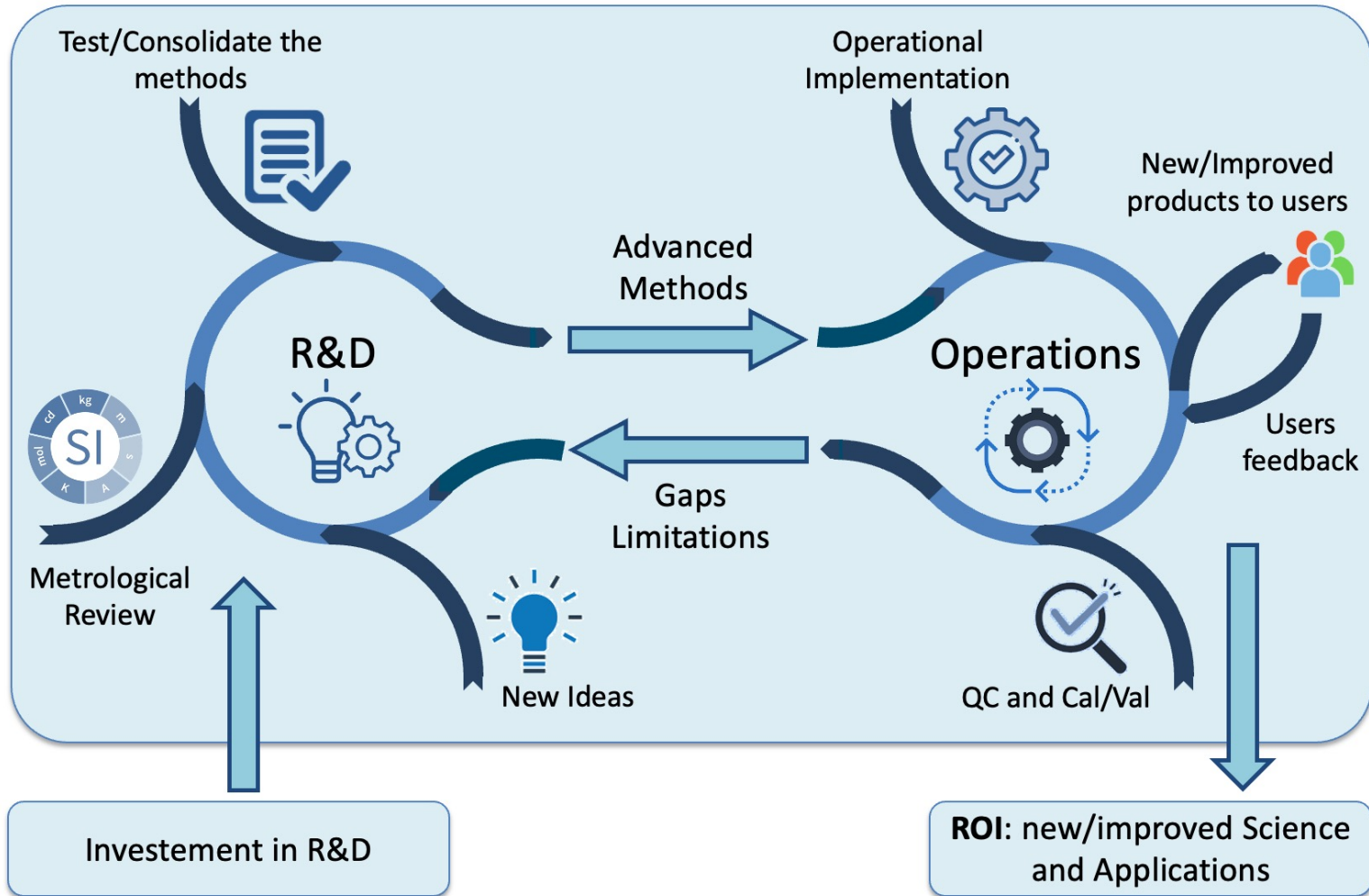


Vision

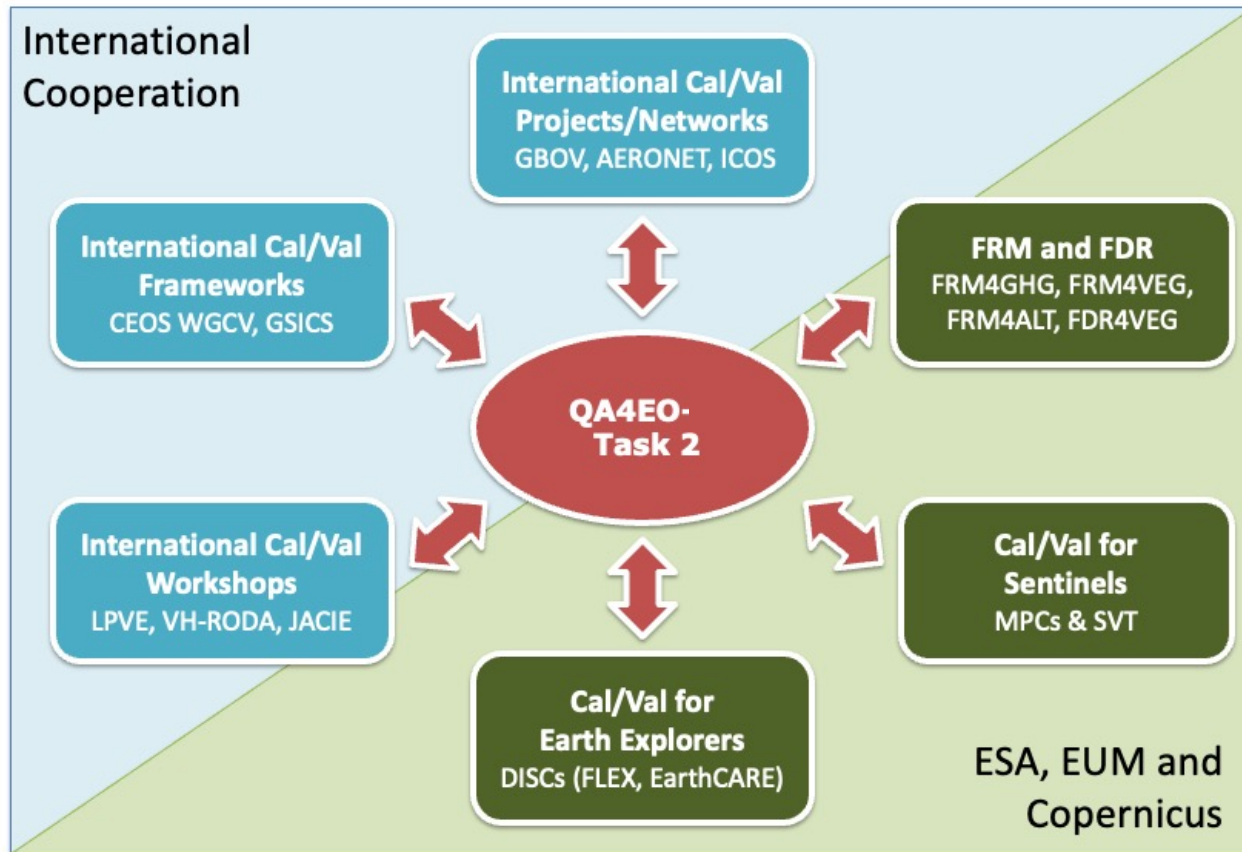
- IDEAS-QA4EO service contract has overarching objectives:
 - To ensure, on behalf of ESA-SPPA section, the best possible **quality** of ESA EO mission currently in operations
 - To develop and **prototype** advanced Cal/Val methods and algorithms
 - To foster adoption of **metrological** practices across Cal/Val community
- Within IDEAS-QA4EO, Task-2 is the place where innovative ideas are developed and their maturity level enhanced to meet operational needs
- The underlying principle: R&D activities of today are potentially the operations of tomorrow



Innovation flow



Context



Task 2

Domains:

- Metrology and Calibration
- Atmosphere Cal/Val
- Land Cal/Val
- Water and Cryosphere Cal/Val

Mission:

- Drive innovation through cutting-edge R&D
- Validate novel ideas and concepts through proof-of-concept projects
- Bridge the gap between Cal/Val and operational implementation
- Develop new applications and services to meet emerging needs
- Move new activities towards dedicated contracts

...



Many achievements (here some)

- Fostering exchanges of know-how
- Synergies between different Task 2 projects
- New measurement sites, tools and improved methodologies
- Contribution to existing EU Research Infrastructure, networks and CEOS activities



CoMet Toolkit

The CoMet Toolkit (Community Metrology Toolkit) is an open-source software project to develop Python tools for the handling of error-covariance information in the analysis of measurement data.

```

import numpy as np
import datetime
from numpy import MeasurementFunction, MeasurementFunction

# read digital effects table
dt = datetime.datetime.strptime("2014-01-01T00:00:00", "%Y-%m-%dT%H:%M:%S")

# Define your measurement function (inside a subclass of MeasurementFunction)
class ExampleMeasurementFunction(MeasurementFunction):
    def __init__(self, name, meas, q):
        super().__init__(name, meas, q)

    # Create a Monte Carlo Propagation object, and create MeasurementFunction class
    # (this class requires parameters such as names of input quantities in its
    # constructor)
    def __init__(self, name, meas, q):
        super().__init__(name, meas, q)

    # propagate the uncertainties in the input quantities in the measurement
    # function
    def propagate(self, meas, q):
        # ...
    
```

Quality assurance framework for Earth observation (QA4EO)

Validation of satellite data products for peatlands

Mer Bleue Peatland
L'V SuperSite

DOAS-BO

IDEAS-QA4EO project WP 2250-2251 "DOAS-BO: Towards a new FRM4DOAS site in the Po valley"

The main purpose of the Instrument Data Quality Evaluation and Analysis Service - Quality Assurance for Earth Observation (IDEAS-QA4EO) project WP 2250-2251 "DOAS-BO: Towards a new FRM4DOAS site in the Po valley" is the creation of the first Italian Multi-Axis - Differential Optical Absorption Spectroscopy (MAAS-DOAS) measurement site compliant to the Fiducial Reference Measurement for DOAS (FRM4DOAS) requirements. This goal is achieved by exploiting the SkySpec-20 ground-based MAAS-DOAS instrument, developed by Kyoto and acquired by the Italian research institute Geotipia Nazionale delle Ricerche - Istituto di Scienze dell'Atmosfera e del Clima (ISAC).

The first stage of the project consisted of the assessment of the SkySpec-20 performance. This target has been pursued through two measurement campaigns, one against the TROPospheric Gas Analyser Spectrometer (TROPOGAS), a custom-built MAAS-DOAS instrument owned by the CNR-ISAC, and the other one against the Pandora#117, a reference instrument installed at the Boundary Layer Air Quality Analysis Using Network of Instruments (BQA4U) super-site in La Sapienza University (Rome). Since October 2021, the SkySpec-20 has been installed at its permanent position at the "Giorgio Fiesi" observatory, where it is continuously measuring MAAS-DOAS Visible (VIS) and Ultra-Violet (UV) diffuse solar spectra.

FMIPROT & Camera Network Portal

Operational Monitoring

Vegetation Indices

Snow Depth

Snow Cover Fraction

QA4EO

Quality Assurance Framework for Earth Observation

QUALITY ASSURED DATA FOR EARTH OBSERVATION COMMUNITIES

SORRETTO

Solar Radiation Based Established Techniques for aTmospheric Observations

INTERNATIONAL WINTER SCHOOL

ABOUT

REGISTRATION

VENUE

ACCOMMODATION

SOCIAL PROGRAMME

MATERIALS

CONTACTS

International Winter School

IDEAS-QA4EO Cal/Val teams



Workshops

Lille, Mar 2017



WS#1 Feb 2020
(Uni. Sapienza)

ESRIN, Dec 2017



WS#2 Dec 2020
(Virtual)

Davos, Oct 2018

WS#3 Apr 2022
(ESRIN)



Wageningen, Jun 2019



WS#4 Feb 2023
(Potsdam)



Cal/Val WS#4 Recs. 1/3

Rec#	Owner	Actions	Status
 REC-1	QA4EO/NPL	The CoMet toolkit should be further promoted as a valuable means for supporting new product development and a comprehensive approach to uncertainty management.	<ul style="list-style-type: none"> • CoMet toolkit presented at various meetings (ESA FLEX MAG, VH-RODA, CEOS/IVOS, CalCon). • Used within HyperInSPACE, soon used in SatelliteVu processing chain. • All teams are encouraged to actively test the toolkit within their respective activities.
 REC-2	QA4EO	Lunar irradiance is crucial to extensively involve and actively engage stakeholders. It is essential to establish coordination with concurrent activities within GSICS and LIME.	<ul style="list-style-type: none"> • Participation at 4th Joint GSICS/IVOS Lunar Calibration Workshop (Dec. 2023)
REC-3	QA4EO	Extending the collaboration between LISA and LOA is of utmost importance, and the installation of a Lidar system in Gobabeb will be crucial. Likewise, contribution to RadCalNet is also encouraged, by evaluating the accuracy of radiative transfer modeling to TOA level.	

Cal/Val WS#4 Recs. 2/3



Rec#	Owner	Actions	Status
REC-4	QA4EO	Several tools were developed in the frame of QA4EO, which are valuable to the EO Cal/Val community. Yet, there is a need to increase awareness about these tools.	Started inventory of Task2 tools and achievements. Upload on Zenodo requested. End of contract used to consolidate material into a
REC-5	QA4EO	The connection of StrucNet with other international initiatives (e.g., HYPERNETS, ICOS, GGBOV) should be strengthened, and the number of sites within Europe should be increased. Coordination with CEOS-WGCV-LPV is also recommended to engage the relevant land Cal/Val community.	
REC-6	QA4EO	The QA4SM activity has significant relevance in the context of CEOS-LPV. The package may contain functionality that could be valuable for establishing a similar validation platform focusing on other ECVs. It is recommended to ensure coordination with CEOS-LPV efforts to improve the validation stage of the ECVs under consideration	

Cal/Val WS#4 Recs. 3/3

Rec#	Owner	Actions	Status
REC-7	QA4EO	In order to support ongoing advancements in UAV system validation for land applications, it is recommended to establish a collaborative working group within QA4EO, in partnership with FRM4VEG. The active involvement of NPL, NRCC, and GFZ within this working group is essential for enhancing and refining methodologies and practices for UAV-based validation.	

Where we are?

Nov 2019

May 2022

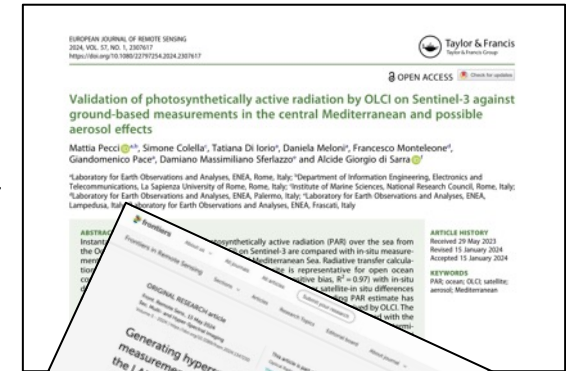
Nov 2024

IDEAS-QA4EO: 4 months left

Phase 1

Phase 2

Time to consolidate deliverables (due & unsolicited)



→ Check your due dates

Promoting Task 2 outcomes



Upload deliverables (Documents/Datasets) on Zenodo



@qa4eoCalVal Twitter/X account

<https://zenodo.org/communities/qa4eocalval>



Summary

- Objectives of the current meeting are:
 - Meet and showcase results and achievements
 - Provide a comprehensive update to ESA on the whole spectrum of activities
 - Gather recommendations to further improve ESA's Cal/Val strategy for the years to come

Cal/Val Workshop#5

11 - 13 June 2024

in Thessaloniki (Greece) @AUTH



ARISTOTLE
UNIVERSITY
OF THESSALONIKI

Day 1: Tuesday 11 June	Day 2: Wednesday 12 June	Day 3: Thursday 13 June
13:00 – 17:40 *	9:30 – 17:40 *	9:30 – 12:30 *
<ul style="list-style-type: none">• Introduction• Metrology and Traceability• Atmosphere Cal/Val I	<ul style="list-style-type: none">• Atmosphere Cal/Val II• Land Cal/Val	<ul style="list-style-type: none">• Water Cal/Val• Cryosphere Cal/Val• Discussion and wrap-up

* Local Time = Eastern European Summer Time (EEST) UTC +3

Key points:

- **5th** WS for the IDEAS-QA4EO contract
- **2** full days for discussions
- **29** presentations
- **~38** people attending on-site
+ participants joining remotely

&

ESA Service Review

13 - 14 June 2024

Workshop #5 - Agenda

(Revised_20240605)

Day 1

Introduction
13:00 – 13 :30

Metrology and Traceability
13:30 – 14:30

Atmosphere Cal/Val (part I)
14:30 – 17:40

Drink

Day 2

Atmosphere Cal/Val (part II)
9:30 – 12:00

Land Cal/Val
12:00 – 13:00

LUNCH – 13:00 – 14:30

group photo

Land Cal/Val
14:30 – 17:40

Social dinner

Day 3

Water & Cryosphere Cal/Val
9:30 – 11:00

Discussion and Wrap-up
11:00 – 12:30

Presenters:
Please stay in your time.

Remote attenders:
Please keep microphones muted
Use chat to submit questions or
wait Q&A.

All presentations uploaded on web