

IDEAS-QA4EO

Task 2 Cal/Val WS#3 Introduction and Meeting Objectives

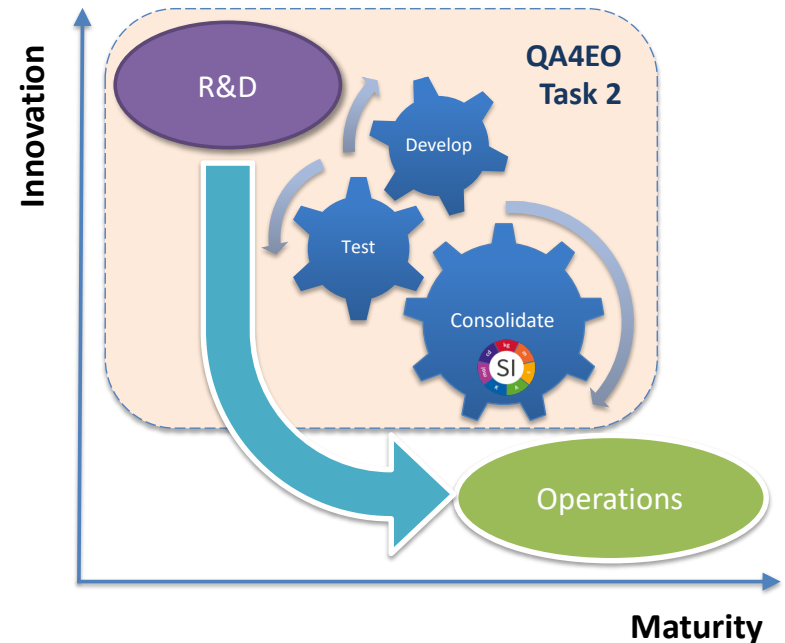
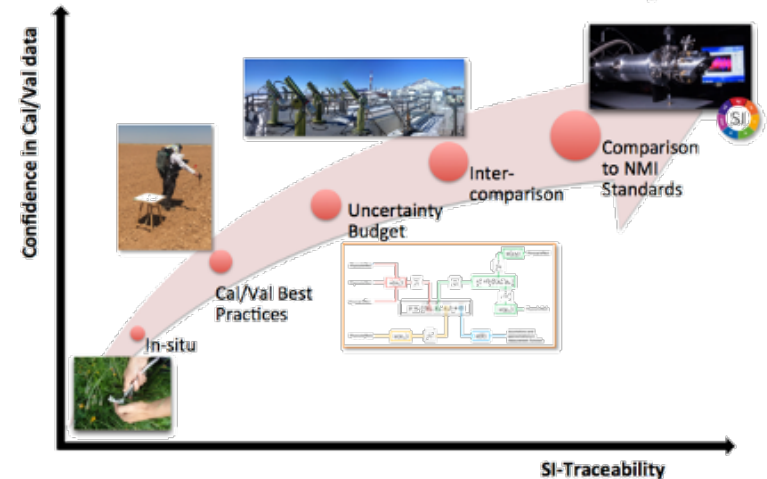
Fabrizio Niro and Gabriele Brizzi

31 Mar – 1 Apr 2022

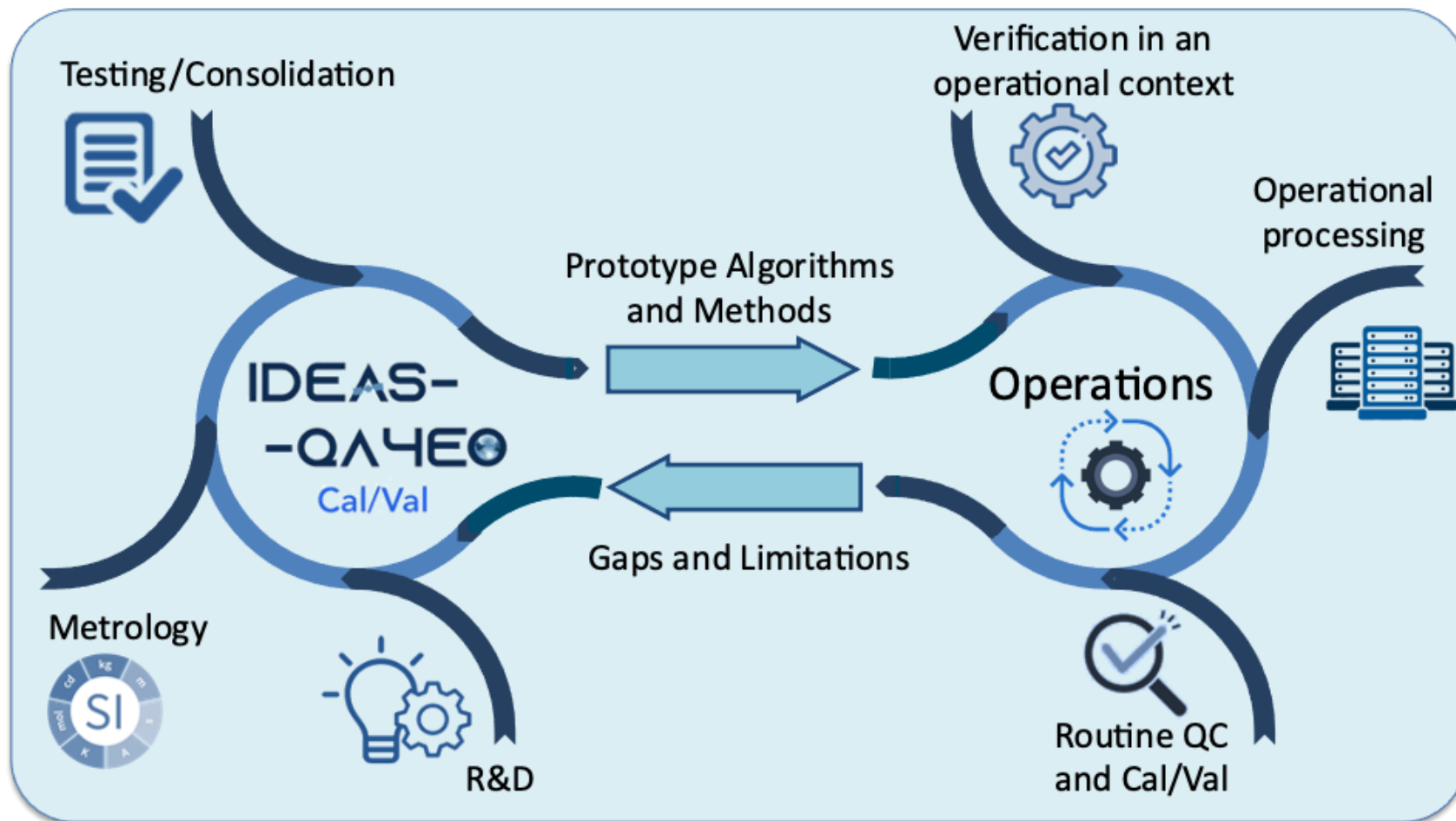
ESA/ESRIN

Vision

- The IDEAS-QA4EO contract is the follow-on of IDEAS+ sharing the same 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 is that R&D activities of today are potentially the operations of tomorrow



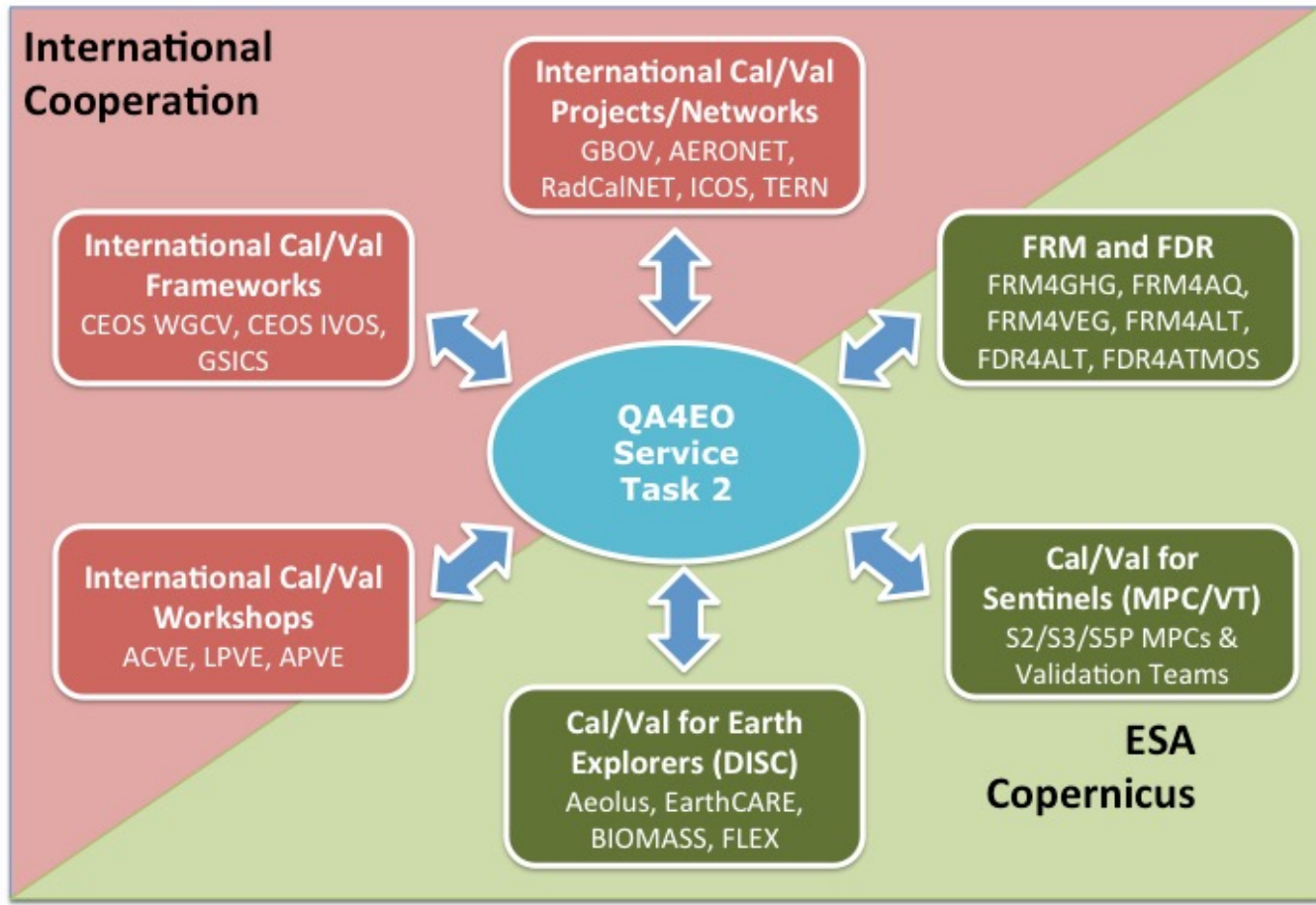
Innovation flow



Domains

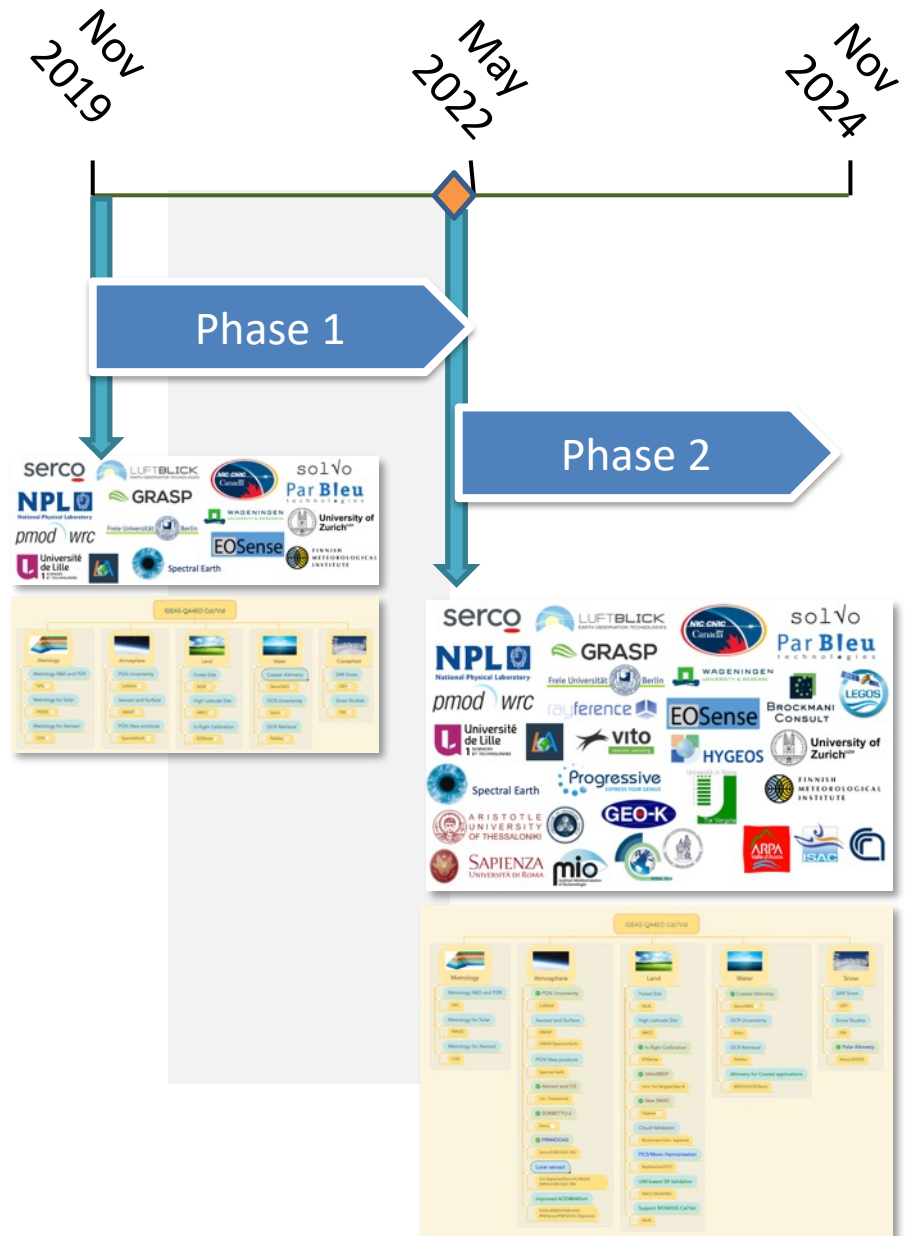


Context



Where we are?

- The last 2 years have been extremely **challenging**, several Cal/Val projects were strongly impacted by the pandemic
- Yet, most of the campaigns and R&D projects successfully **recovered** the delays and meet their goals
- Phase 1 has been successful in demonstrating the added value of **metrology** in Cal/Val
- Moreover, we fostered collaborations within the teams, largely **extending** the number of partners and activities (from 18 WPs to 51 WPs)
- New challenges remain to be tackled → Proposal for **Phase 2** sent to ESA for start on 1st May 2022



Phase 2 proposal

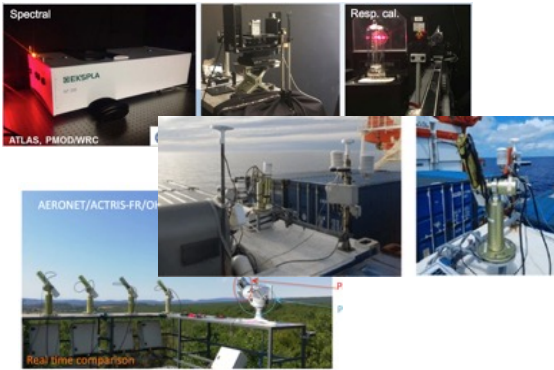
- Large majority of the Phase 1 Cal/Val partners are part the Phase 2, exceptions:
 - WP terminated: Hygeos, VITO
 - New partnership and WPs with GFZ, and TPZ-FR
- Rationale of the Ph. 2 proposal
 - Ensure **continuity** to current activities and maintain collaborations with key metrology and Cal/Val partners
 - Still, **all** proposed WPs have some elements of **innovation**
 - **Stimulate** new activities and partnerships to address upcoming challenges in EO Cal/Val (e.g., SR Val, hyperspectral, ...)



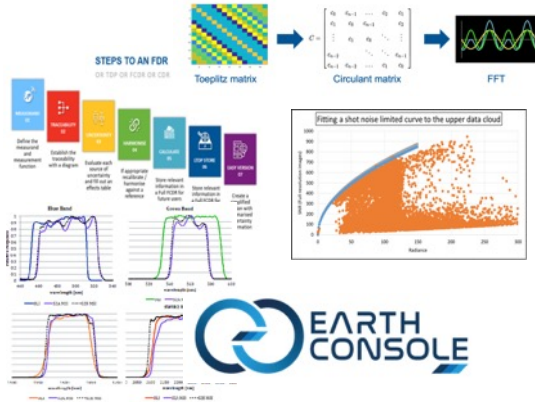
Phase 2 proposal

Metrology and Calibration

Advanced Cal/Val Systems



Advanced Protocols & Tools



NPL National Physical Laboratory
NPL – Metrology toolkit, training, support Cal/Val, Hypernets

pmod
PMOD – SI-traceable systems and calibration

Université de Lille
LOA – Metrology for Aerosol + Advanced aerosol Cal/Val system

EOS
EOSense – Methods for in-flight calibration of optical sensors

TPZ-FR – SBAF advanced methods and tools **NEW**

Pro
Progressive/Serco – Cal/Val interoperability platform

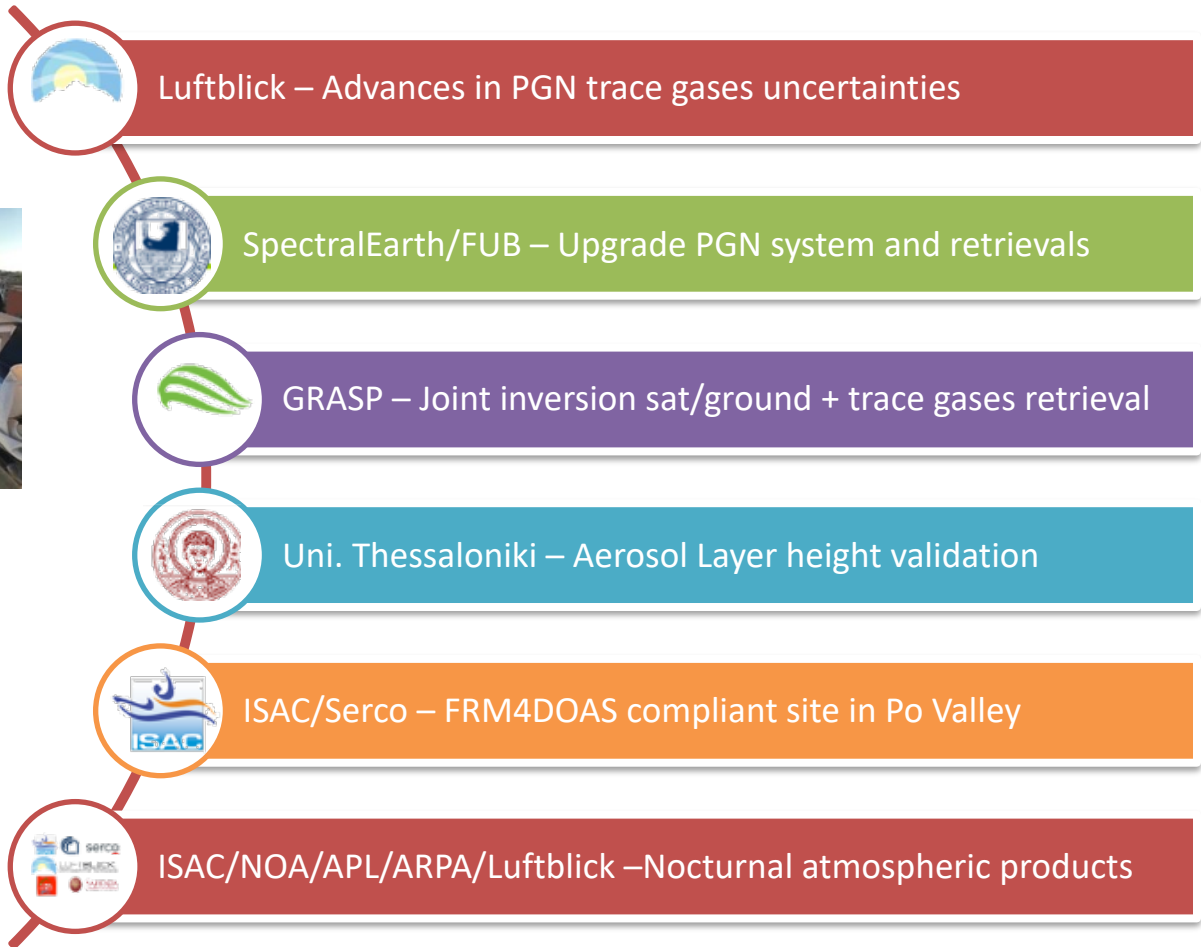
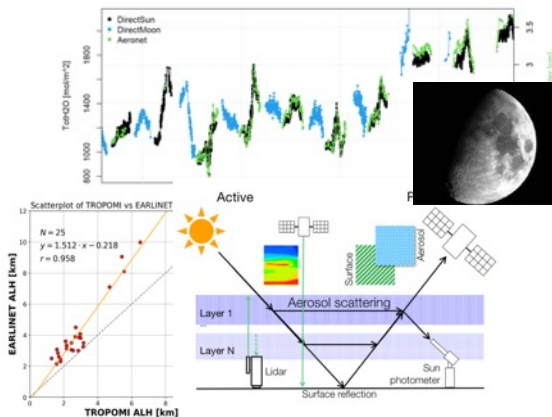
Phase 2 proposal

Atmosphere Cal/Val

Advanced Cal/Val Systems



Advanced Products & Methods



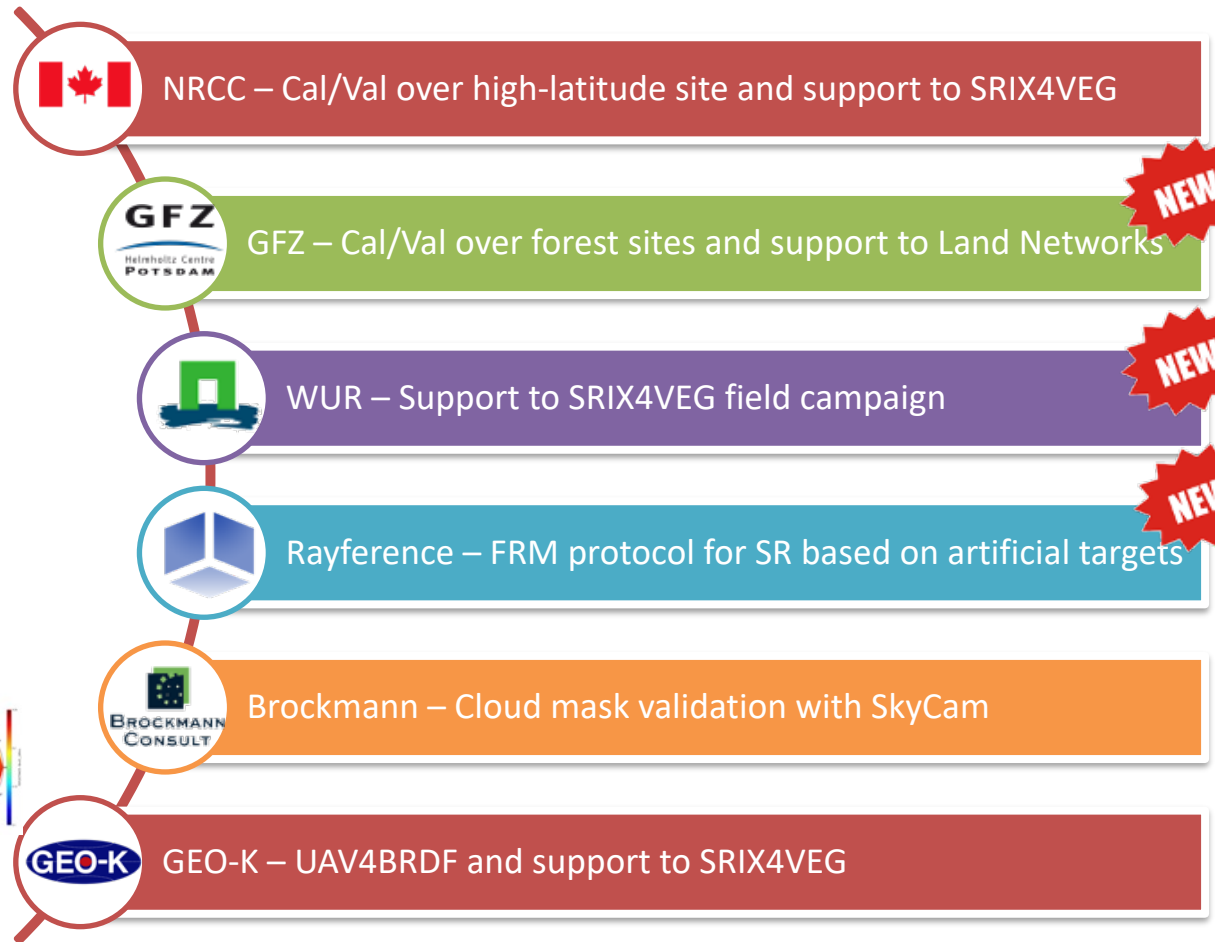
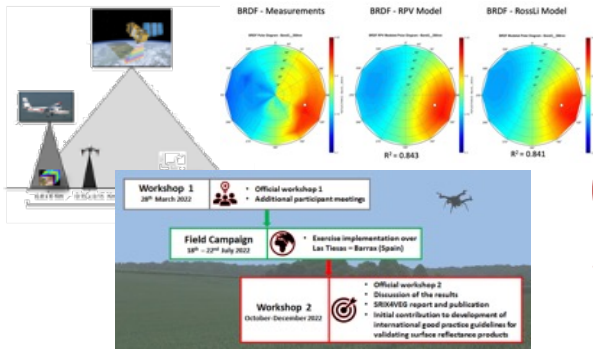
Phase 2 proposal

Land Cal/Val

Advanced Cal/Val Systems



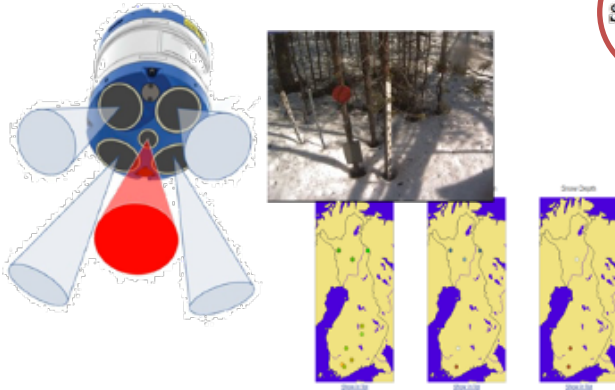
Advanced Cal/Val Protocols



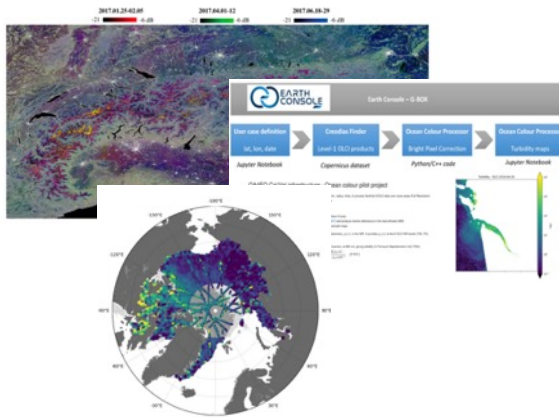
Phase 2 proposal

Water and Cryosphere Cal/Val

Advanced Cal/Val Systems



Advanced Algorithms & Products



solvo

Solvo – OCR L2 products uncertainty assessment

ParBleu

ParBleu – OCR retrieval algorithms

mio
serco

MIO/Serco – Satellite altimetry for Coastal monitoring



UZH – Satellite SAR for snow monitoring



FMI – Ground-based network for snow products validation

serco



Serco/Legos – Satellite altimetry for Polar Sea Ice monitoring

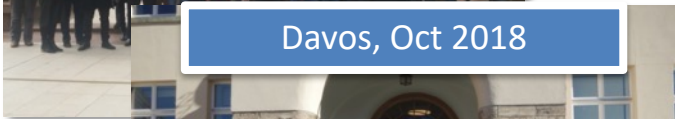
Workshops



Lille, Mar 2017



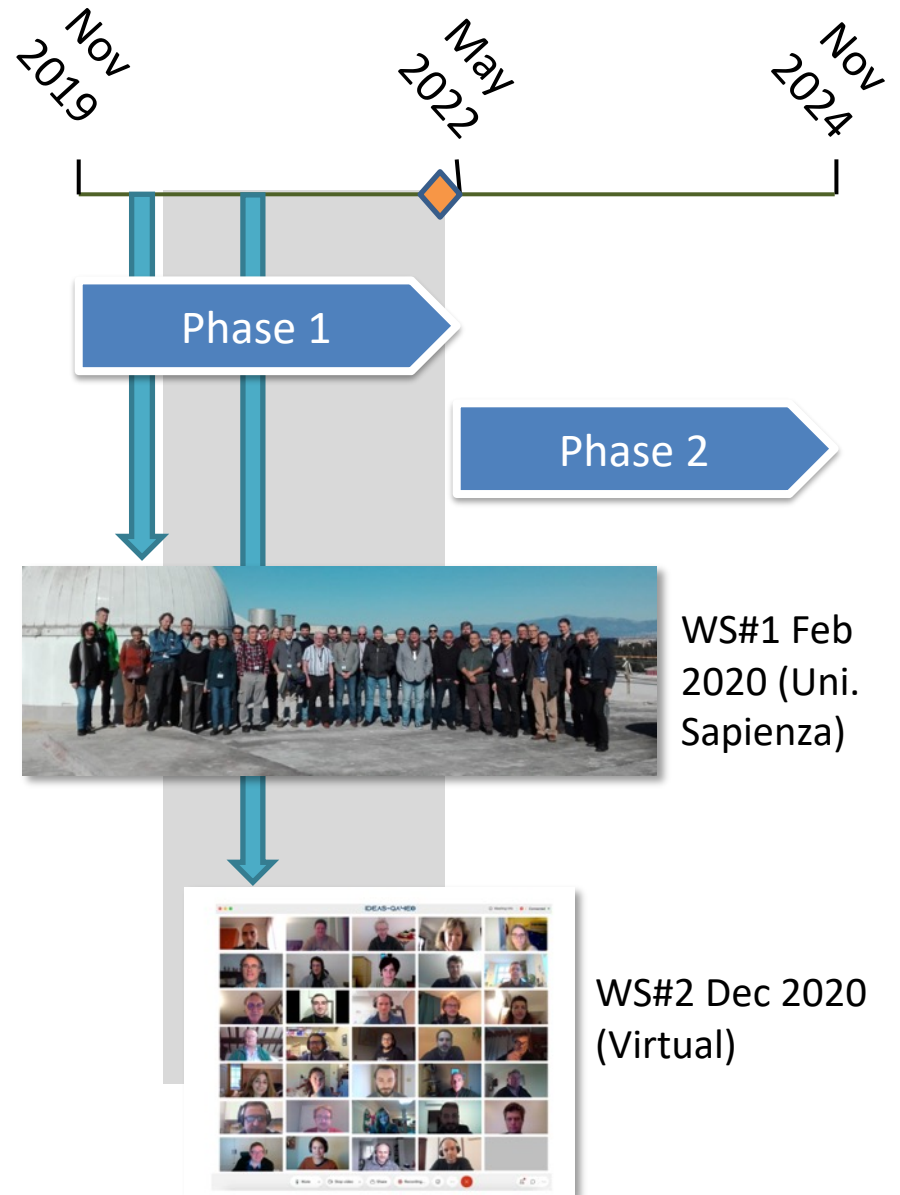
ESRIN, Dec 2017







Davos, Oct 2018







Wageningen, Jun 2019





Cal/Val WS#1 Recs. 1/2

Rec#	Owner	Actions	Status
 REC-1.1	QA4EO	Strengthen the focus on metrology with more active involvement of NPL within Task 2 coordination.	Implemented – NPL delivered FDR Webinar, preparing E-learning, actively involved in PGN uncertainty estimate and future FRM4SM
 REC-1.2	QA4EO	Further review the need and interest for Cloud base platform devoted to Cal/Val applications and the potential use of DIAS platforms for the purpose of Cal/Val	Implemented – Cal/Val Platform Survey allows to gather valuable needs requirements for the platform, pilot study proposed
 REC-1.3	ESA/VITO	Follow up the issues observed in Proba-V SWIR band, the observed non-linearity effects will be compared with the VITO results	Implemented – Interaction EOSense-VITO initiated, to be continued with another TC and involvement in re-calibration and Cubesat
REC-1.4	QA4EO	Provide input to the CEOS Cal/Val portal, such as campaigns data, documents, and protocols.	Continuous – This is a continuous activity to be maintained along the course of QA4EO project
 REC-1.5	ESA/MPC	Investigate the interest of Cal/Val data collected within the FIREX-AQ field campaign for validation of S3 operational L2 products, mainly FRP and AOD.	Implemented – Interaction LOA-ESA-NOAA facilitated, availability of AOD and FRP products will be considered for S3VT activities, mainly S3-FRP

Cal/Val WS#1 Recs. 2/2

Rec#	Owner	Actions	Status
REC-1.6	QA4EO	Actively support the adoption of a common terminology for uncertainty following metrological guidelines.	Continuous – This is on-going work at NPL in the frame of CEOS
REC-1.7	ESA/QA4EO	Facilitate the evolution of MBASSS Cal/Val capabilities with CIMEL and LST	On-going – Interaction with Uni. Leicester and LOA initiated
 REC-1.8	ESA/QA4EO	Review the increasing trend in using network of low-cost sensors for Cal/Val applications and consider them in the overall Cal/Val strategy	Implemented – Taken into account as part of WUR activities of low-cost LAI sensors and FMI activities on webcam network for snow products Cal/Val
 REC-1.9	ESA/QA4EO	Prepare the ground for future ACIX-III; sustaining international efforts in gathering advanced ground-based measurements for SR.	Implemented – ACIX-III and CMIX-II are being defined, 1 st WS will be held in ESRIN Jun 2022
 REC-1.10	ESA	Sustain the effort in building a global network for cloud mask validation	Implemented – This is included as part of CCN2 activities in collaboration with BAQ/NASA/Brockmann
 REC-1.11	ESA/QA4EO	Exploit synergies between QA4EO and SnowPex exercise working towards common validation practices	Merged – This is currently merged with REC-2.4.

Cal/Val WS#2 Recs.

Rec#	Owner	Actions	Status
REC-2.1	QA4EO/NPL	Investigate feasibility and identify technical solutions to host NPL Python metrological Notebooks within CEOS Cal/Val portal.	On-going – A discussion is on-going between NPL and PC/FN to understand the best way to proceed, to be continued in Ph. 2.
REC-2.2	QA4EO	To work towards a standardized methodology for providing a DOI associated to Cal/Val data generated in the frame of QA4EO projects.	On-going – A potential solution could be Zenodo, although there are some limitations if we use it as a centralized repository for the whole QA4EO
 REC-2.3	QA4EO	To work on promoting the recent achievements from LOA in advancing in aerosol traceability and Cal/Val campaigns	Implemented – Two web stories published and advertised with twitter account
REC-2.4	FMI	FMI to explore the interest of FMIProt tool as source of reference data in the frame of the SnowPex-II exercise.	On-going – FMIProt data is still on prototype phase, interest within SnowPex will be explored within Phase 2.
 REC-2.5	QA4EO	To support communication activities and enhance awareness about the CryoSat-2/ICESat-2 polar campaign	Implemented – Two web stories published and advertised with twitter account

Outreach and Promotion



IDEAS-QA4EO cal/val
2 Tweets

IDEAS-QA4EO Cal/Val

IDEAS-QA4EO cal/val
@qa4eoCalVal

#CalVal activities in support to #ESA #EarthObservation missions 🌍🚀

qa4eocalval.wordpress.com Joined November 2020

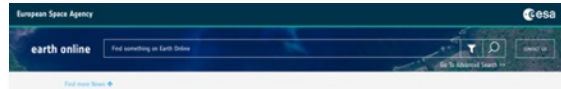
IDEAS-QA4EO cal/val @qa4eoCalVal · Oct 21, 2021

🔥 #GRASP allows the joint retrieval of aerosol and surface properties from inversion of remote sensing measurements from ground-based and spaceborne sensors. The latest advances are provided in the paper by Dubovik et al. on Front. Remote Sens.

IDEAS-QA4EO cal/val @qa4eoCalVal · Feb 24

🔥 The next IDEAS-#QA4EO #CalVal workshop is confirmed 📅 31st March - 1st April 2022. An opportunity to gather with teams from different institutes/companies, and discuss ongoing activities in the last run of the IDEAS-QA4EO #ESA_EO contract. More details in the coming days

Cal/Val WS#10
Coming soon ...



A new study entitled "Coastal current intrusions from satellite altimetry" has just been published in the journal Remote Sensing. This study comes from an international collaboration between the European Space Agency (ESA), MED (IS), CNR (IS) and Sorba (IS) with the goal of monitoring coastal intrusions into the Gulf of Lion by analyzing multi-mission Satellite Altimetry data with Machine Learning methods.

The Gulf of Lion is open to the Mediterranean Sea and bordered by the North Current, which runs along its continental slope. The North Current can enter the plateaus of the Gulf of Lion during so-called "intrusion events", which can have a strong impact on marine life, and important consequences on regional fishing.

Satellite altimetry measures the time a radar pulse takes to travel from the satellite antenna to the ocean surface and back. Several applications have been developed from these measurements. One of

Monitoring aerosol properties in the Indian Ocean

5/5 Mar 2021

A ship-borne photometer of CIMEL CE318T-1 type was permanently installed in early January 2021 aboard the French research vessel Marion Dufresne in the frame of the MAP-30 (Marion Dufresne Atmospheric Program - Indian Ocean) research programme [1].

The ship-borne instrument was developed at Laboratoire d'Optique Atmosphérique (LOA), Lille (France) to enable measurement of atmospheric aerosols from mobile platforms, and to expand and automate the Aerosol Robotic Network (AERONET) coverage to the vast ocean [2], an area which is currently manually operated within the Maritime Aerosol Network (MAN) branch of AERONET [3].

The instrument will be engaged mainly in the Hemisphere/Indian Ocean to measure Aerosol Campaign that just started is the result of this and validated [4].

The CIMEL CE318T ship photometer on deck of the Marion Dufresne

Ground-based campaigns support NO2 monitoring in Po Valley

27 Jan 2022

In polluted regions in Europe, high NO₂ concentrations often occur due to topography of the Po River basin, where the Alps and Apennines limit the dispersion of pollutants. To improve the monitoring of NO₂ in this region, ground-based campaigns are organized to acquire data over Po Valley, which will help calibrate and validate satellite measurements that help accurately monitor pollution levels.

The DOAS (Differential Optical Absorption Spectroscopy) technique is used to monitor NO₂ abundance and therefore instruments are located in the most polluted areas of Europe. However, until now, ground-based measurements for NO₂ were limited to in-situ data measured by an Aerosol, Ozone and Trace Gases Research Infrastructure (AOTAS) compliant NO_x chemiluminescence analyzer, revealing good agreement.

Figure 1: TROPOGAS and SkySpec-2D MAX-DOAS systems on the roof of ISAC-CNR building in Bologna



IDEAS QA4EO Cal/Val

Recent uploads

UAV for BRDF characterization: Validation report and scientific roadmap
Barbara Lattar, Sara Petrucci, Fabio Del Frate

Report on the inter-comparison campaign within the BAQUIN supersite in Rome
Castell, Elisa Petrucci, Paolo Papadimitrakis, Eleni Christoforou, Paolo Buerki, Maurizio Di Liberto, Luca...

Validation of ESA EO Aerosol Height products with EARLINET Lidar observations
Konstantinos Michailakis, Maria Loukou, Dimitris Balis

PGN Products Quantitative Uncertainty
Martin Tiefenbacher, Karin Krieger, Alexander Cade

OpenAIRE

118 views, 58 downloads

26 views, 17 downloads

Summary and Objectives

- In spite of all difficulties encountered during the last two years, the QA4EO Task 2 teams managed to meet the objectives set out in the original proposal with remarkable results in all Cal/Val domains
- After so many virtual meetings, it is now the first time we have the occasion to meet in person, at least with some of the team members
- The objectives of the current meeting are:
 - To showcase Phase 1 results and achievements
 - To illustrate and discuss the plans for Phase 2
 - To gather recommendations on how to further improve ESA Cal/Val strategy for the years to come
 - To meet in person (finally) and have face-to-face discussion

Agenda

Introduction and Metrology
9:00 – 10 :40

Coffee break – 10:40 – 11:00

Atmosphere Cal/Val (part I)
11:00 – 13:00

LUNCH – 13:00 – 14:00

Atmosphere Cal/Val (part II)
14:00 – 15:20

Coffee break – 15:20 – 15:40

Land Cal/Val (part I)
15:40 – 17:40

Land Cal/Val (part II)
9:00 – 10:50

Coffee break – 10:50 – 11:10

Water and Cryosphere
Cal/Val
10:20 – 13:00

LUNCH – 13:00 – 14:00

Discussion and Wrap-up
14:00 – 15:30