

Project Management Board

Name	Role	Contact
Holger Baars	Project leader	
Eleni Marinou	Project leader deputy	
Stephanie Rusli	Representative of the stakeholder	
Rob Koopman	Representative of the stakeholder deputy	
Ann-Mari Fjæraa	Expert	
Lucia Mona	Expert	
Ewan O'Connor	Expert	
Doina Nicolae	ATMO-ACCESS pilot coordinator	



ATMO ACCESS
 Access to Atmospheric Research Facilities

**ESA EARTHCARE CAL/VAL SUPPORT
 AS PART OF THE ATMO-ACCESS PILOT FOR
 INTERNATIONAL STAKEHOLDERS**



The framework of the ATMO-ACCESS pilot

ATMO-ACCESS project = Sustainable Access to Atmospheric Research Facilities

- A pilot project to experiment better access to research infrastructures for international stakeholders, like ESA



How to make the TNA (Trans National Access)

- More efficient
- More attractive
- Usable for international stakeholders



How to make the Research Infrastructure more useful for the society

<https://www.atmo-access.eu/>

>>>

ACTRIS

ICOS

IAGOS





The way towards the project



Concept note

International stakeholder

Name: ESA EarthCARE Project

Address (headquarter): Keplerlaan 1, Noordwijk, The Netherlands

Short description of the mission of the stakeholder and its main responsibilities

The mission of the European Space Agency (ESA) is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. As part of this remit, ESA programmes consider the services required to support satellite missions and promotes European industry and facilities to implement developments required to ensure their readiness to respond to global market needs.

Within ESA, the EarthCARE Project supervises the development of the EarthCARE space and ground segment, ensures compliance with the EarthCARE mission requirements and delivery of validated data products.

Contact person

Name: Dirk Bernaerts

Position: EarthCARE project manager

Contact (email, phone): Dirk.Bernaerts@esa.int , +31 71 565 8378



Pilot project implementation plan ESA EarthCARE Cal/Val support

Authors: Holger Baars⁽¹⁾, Eleni Marinou⁽²⁾, Rob Koopman⁽³⁾, Stephanie Rusli⁽³⁾, Lucia Mona⁽⁴⁾, Constantino Munoz Porcar⁽⁵⁾, Alejandro Rodríguez⁽⁵⁾, Ewan O'Connor⁽⁶⁾, Martial Haeffelin⁽⁷⁾, Michael Sicard⁽⁸⁾, Patric Seifert⁽¹⁾, Vassilis Amiridis⁽²⁾, Ann Mari Fjæraa⁽⁹⁾, Doina Nicolae⁽¹⁰⁾

1) Leibniz Institute for Tropospheric Research (TROPOS), Leipzig, Germany

2) National Observatory of Athens, Athens, Greece

3) European Space Agency (ESA – ESTEC), Noordwijk, the Netherlands

4) National Research Council of Italy, Institute of Methodologies for Environmental Analysis (CNR-IMAA), Potenza, Italy

5) Dept. of Signal Theory and Communications, Remote Sensing Lab. (RSLab), Universitat Politècnica de Catalunya, Barcelona, Spain

6) Finnish Meteorological Institute, Helsinki, Finland

7) Institut Pierre Simon Laplace (IPSL), CNRS, École Polytechnique, Institut Polytechnique de Paris, France

8) Laboratoire de l'Atmosphère et des Cyclones (LACy), University of La Reunion, France

9) Norwegian Institute for Air Research (NILU), Norway

10) National Institute of R&D for Optoelectronics (INOE), Romania

Date: 2023-05-15

ATMO: 46 Participating stations + TCs/DCs

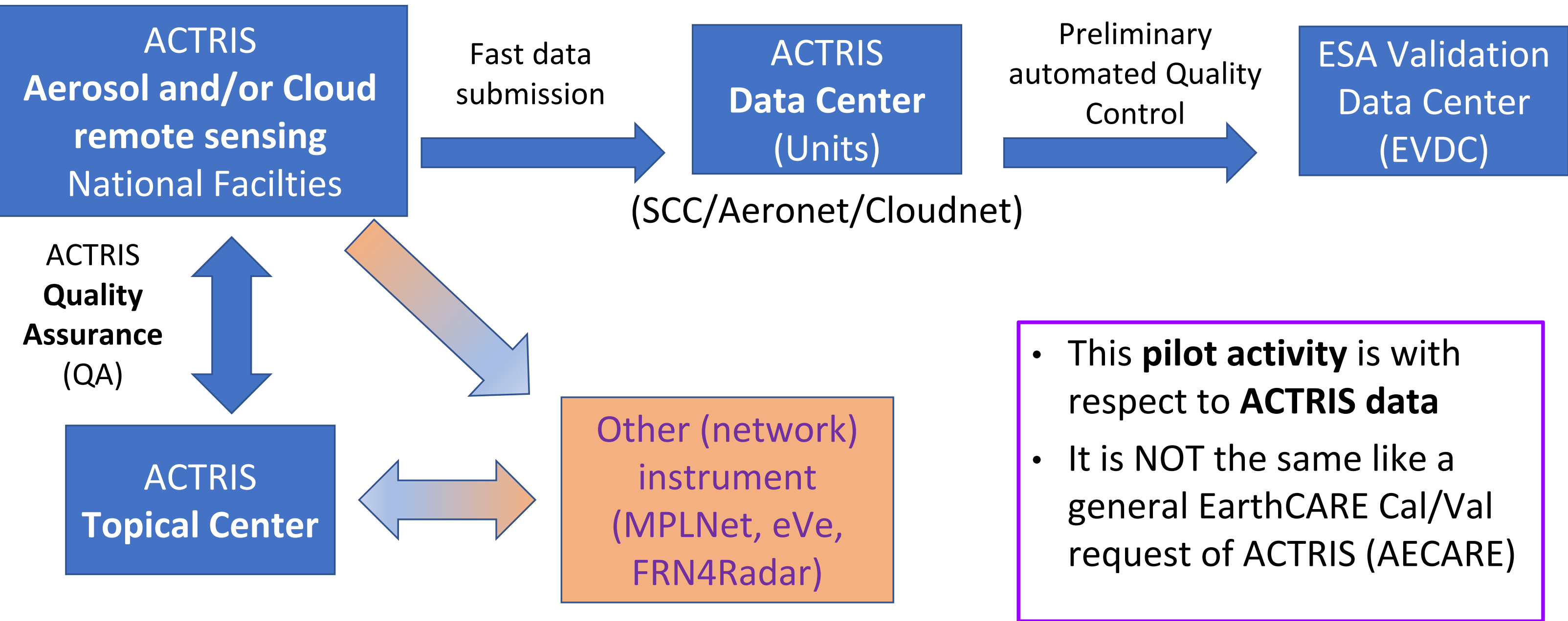
No	Site	Country	Facility/Institution	Component	Latitude (°)	Longitude (°E)	Altitude (m)	Contact
1	Antikythera	Greece	PANGEA-EARLINET	ARS	35.86	23.31	193	
2	Barcelona	Spain	Barcelona lidar station	ARS	41.393	2.12	115	
3	Bucharest	Romania	RADO-Bucharest	ARS+CRS	44.344	26.012	83	
4	Bujassot	Spain	University of Valencia	ARS	39.5	-0.42	30	
5	Cabauw	Netherlands	Cabauw	ARS+CRS	51.968	4.927	-1	
6	Chilbolton	United Kingdom	Chilbolton Observatory	CRS	51.144	-1.439	85	
7	Cluj	Romania	RADO-Cluj	ARS	46.766	23.583	352	
8	Dushanbe	Tajikistan	Dushanbe, Tajikistan	ARS	38.55939	68.856086	864	
9	El Arenosillo	Spain	Atmospheric Sounding Station El Arenosillo, ARN	NO	37.1	-6.7	59	
10	Eriswil	Switzerland	LACROS	ARS+CRS	47.07051	7.872918	921	
11	Evora	Portugal	EVASO	ARS	38.576	-7.911	290	
12	Galați	Romania	RADO-Galati	CRS	45.435	28.037	40	
13	Granada	Spain	AGORA	ARS+CRS	37.164	-3.605	680	
14	Hohenpeißenberg	Germany	Observatory Hohenpeissenberg	ARS	47.8	11	974	
15	Hyytiälä	Finland	SMEAR II, Hyytiälä	CRS	61.844	24.288	174	
16	Izaña	Spain	ISAF	NO	28.3	-16.5	2370	
17	Jülich	Germany	JOYCE Observatory Jülich	CRS	50.906	6.413	111	
18	Karlsruhe	Germany	KLOCX	CRS	49.02	8.42	110	
19	Kenttäröva	Finland	Pallas	CRS	67.988	24.243	342	
20	Kosetice	Czech Republic	National Atmospheric Observatory Košetice - NAOK	ARS	49.573	15.08	536	
21	La Reunion	France	OPAR-Moufia	ARS	-20.902	55.485	84	
22	La Reunion	France	OPAR-Maïdo		-21.079	55.383	2160	
23	Leipzig	Germany	Leipzig, Germany	ARS	51.353	12.435	126	
24	Leipzig LIM	Germany	LIMMACO	CRS	51.33326	12.38867283	125	
25	Lille	France	ATOLL	ARS	50.612	3.142	32	
26	Limassol	Cyprus	CARO-Limassol	ARS+CRS	34.67667	33.04417	3	
27	Lindenberg	Germany	Meteorological Observatory Lindenberg	CRS	52.208	14.118	104	
28	Madrid	Spain	CIEMAT	ARS	40.456	-3.726	669	
29	Melpitz	Germany	Melpitz	ARS+CRS	51.52551	12.927753	83	
30	Mindelo	Cabo Verde	CVAO, Mindelo, Cabo Verde	ARS+CRS	16.8778	-24.995	13	
31	Neumayer III	Antarctica	OCEANET in Antarctica	ARS+CRS	-70.6391	-8.267115	20	
32	Nicosia	Cyprus	CAO Remote Sensing, Cyprus	NO	35.141	33.381	180	
33	Norunda	Sweden	Norunda	CRS	60.086	17.479	46	
34	Ny-Ålesund	Norway (Svalbard)	Ny-Ålesund	CRS	78.92329	11.92215	19	
34	Ny-Ålesund	Norway (Svalbard)	Ny-Ålesund	ARS				
35	Orounda	Cyprus	USRL, Cyprus	UAV	35.095	33.081	330	
36	Palaiseau	France	SIRTA	ARS+CRS	48.716	2.212	156	
37	Payerne	Switzerland	PAY	ARS+CRS	46.812	6.942	491	
38	Potenza	Italy	CIAO	ARS+CRS	40.601	15.724	760	
39	Puy de Dôme	France	COPDD	ARS	45.761	3.111	410	
40	Rome	Italy	Atmospheric RomE joint Supersite	ARS	41.88	12.68	107	
41	Rome	Italy	AEROLAB (mobile) & CIRAS (fixed)	NO	41.9	12.51	75	
42	San Pietro Capo?	Italy	CMN-PV	ARS	44.193	10.701	2165	
43	Sofia	Bulgaria	Sofia, Bulgaria	ARS	42.6537	23.3873	620	
44	Thessaloniki	Greece	Thessaloniki, Greece	ARS	40.63	22.95	60	
45	Vehmasmäki	Finland	FComLab	ARS+CRS	62.738	27.543	190	
46	Warsaw	Poland	Warsaw Observatory Station	ARS	52.21	20.98	112	

ESA TNA towards ACTRIS – Main goal:

Fast access to high quality data for EarthCARE cal/val



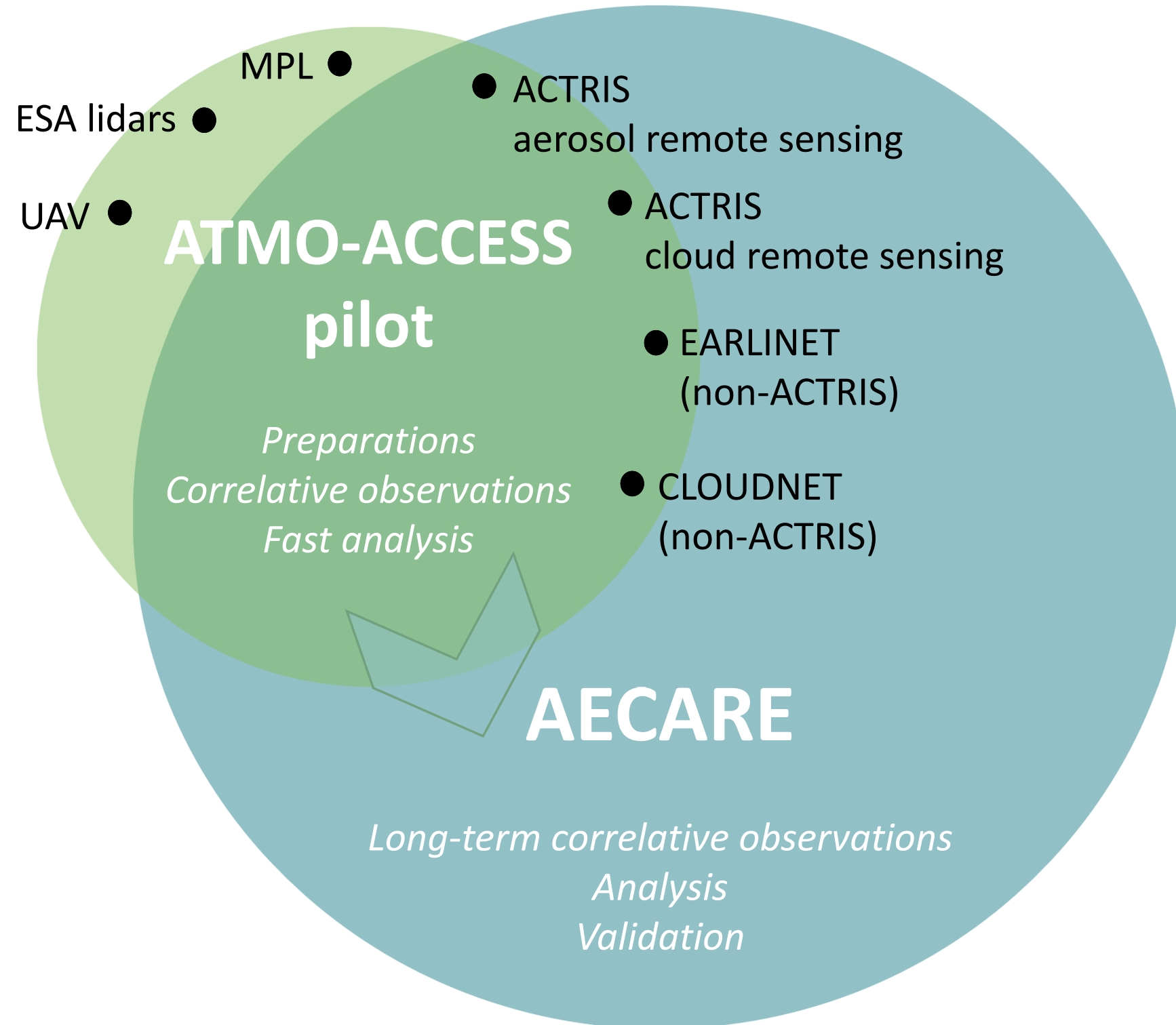
Aerosols, Clouds and Trace gases
Research Infrastructure



- This **pilot activity** is with respect to **ACTRIS data**
- It is NOT the same like a general EarthCARE Cal/Val request of ACTRIS (AECARE)



AECARE vs. ATMO-ACCESS Pilot

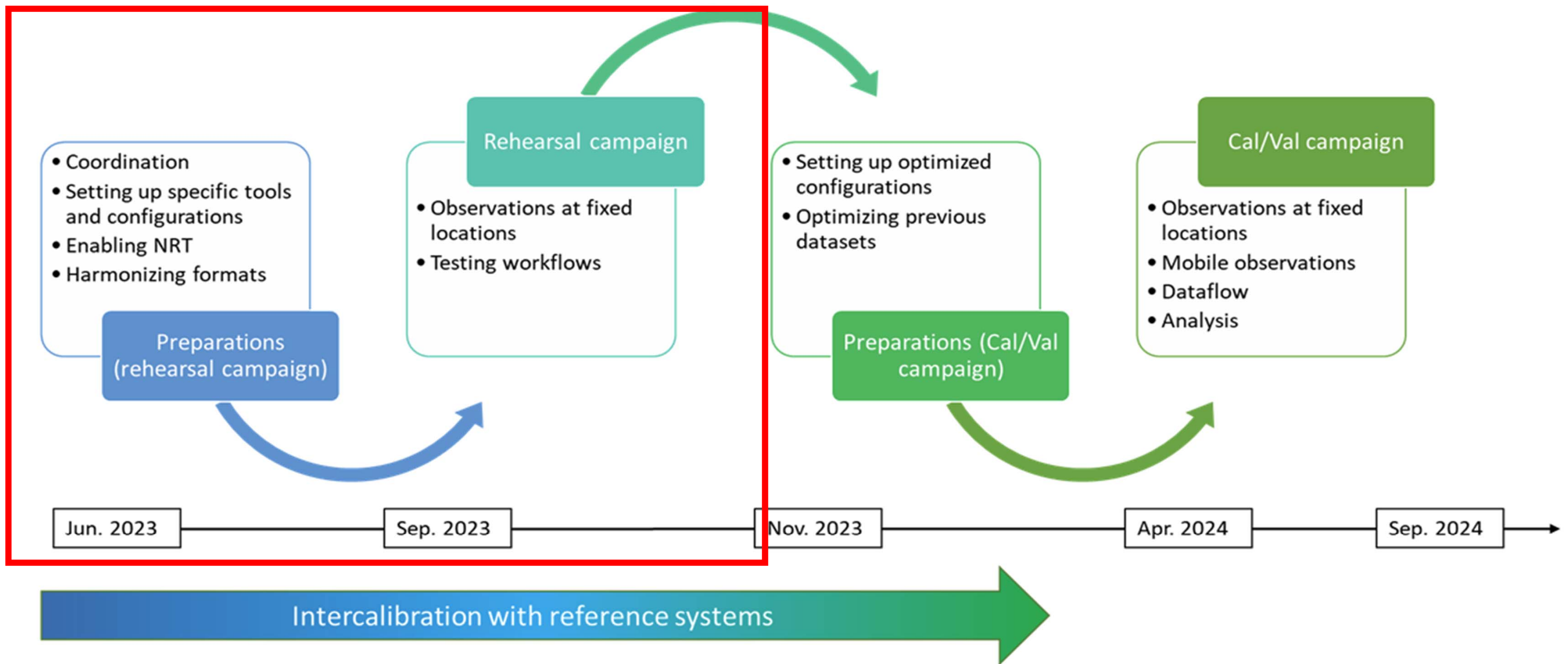


- Short: **ATMO ACCESS Pilot** ≠ **AECARE**
- BUT strong overlap



The pilot project for Cal/Val

Project in a nutshell





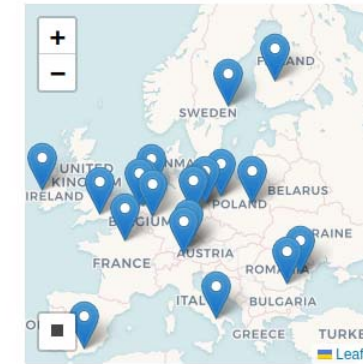
Preparation activities for rehearsal

Objective	Task	Start month	End month	Deliverable(s)	Provider(s)*
Preparation of network rehearsal campaign	😊 Implementation of specific Cal/Val QA procedures	Jun. 2023	Sep. 2023	ATLAS implemented CCRES QA/QC procedures fulfilled	Observational platforms Mobile platforms
	😊 Implementation of NRT Cal/Val data submission	Jun. 2023	Sep. 2023	OBIWAN (or equivalent) implemented CloudNET data stream established	Observational platforms Mobile platforms
	😊 Hands-on training on specific Cal/Val procedures	Jun. 2023	Sep. 2023	Procedures for Cal/Val	TC Units
	😊 Remote training on specific Cal/Val procedures	Jun. 2023	Sep. 2023	Procedures for Cal/Val (follow-up)	TC Units
	😊 QA of instruments for the participating platforms (rehearsal campaign)	Jun. 2023	Sep. 2023	Proposed SCC configurations for rehearsal campaign	TC Units
	😊 Implementation of the ECMWF model data for the retrievals	Jun. 2023	Sep. 2023	NRT full processing	DC Units
	😊 Harmonising the data formats	Jun. 2023	Sep. 2023	EVDC required format	DC Units
	😊 Setup of the specific processing configurations at the retrieval units	Jun. 2023	Sep. 2023	Implemented SCC configurations	DC Units
	😊 Setup a centralised QA/QC for the fast data delivery to EVDC	Jun. 2023	Sep. 2023	Implemented data QA/QC	DC Units



Cloud profiling status

- Real-time automated delivery
- Operating at most stations
 - RRT delivery (< 3 hours) at 9-10 stations
 - NRT delivery (< 3 days) at 14 stations



Location:
Select

Show all sites

Date:
2023-09-05

Product:
Radars x

Show experimental products

Variable:
Radars reflectivity factor x

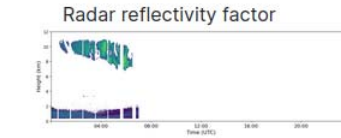
[View in data search →](#)

[Reset filter](#)

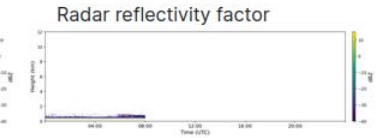
Visualizations for 5 September 2023

comparison view:

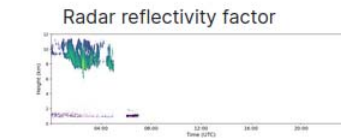
Bucharest / Radar [🔗](#) volatile



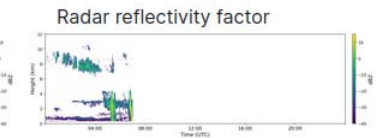
Chilbolton / Radar [🔗](#) volatile



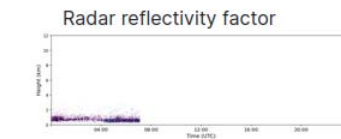
Granada / Radar [🔗](#) volatile



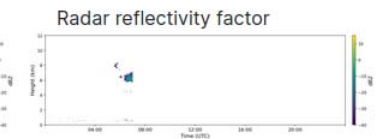
Hyytiälä / Radar [🔗](#) volatile



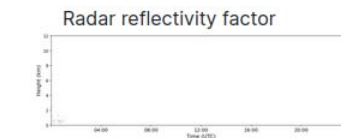
Jülich / Radar [🔗](#) volatile



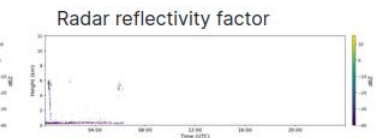
Kenttärova / Radar [🔗](#) volatile



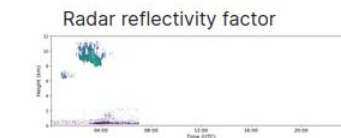
Leipzig / Radar [🔗](#) volatile



Mace Head / Radar [🔗](#) volatile



Norunda / Radar [🔗](#) volatile





Cloud profiling status

- **Real-time automated delivery**
 - Operating at most stations
 - RRT delivery (< 3 hours) at 7-8 stations
 - NRT delivery (< 3 days) at 14 stations
 - Status page for each site
- **Full processing chain automated**
 - In principle < 1 hour after data delivery
 - In practice < 1 day
 - requires model data delivery

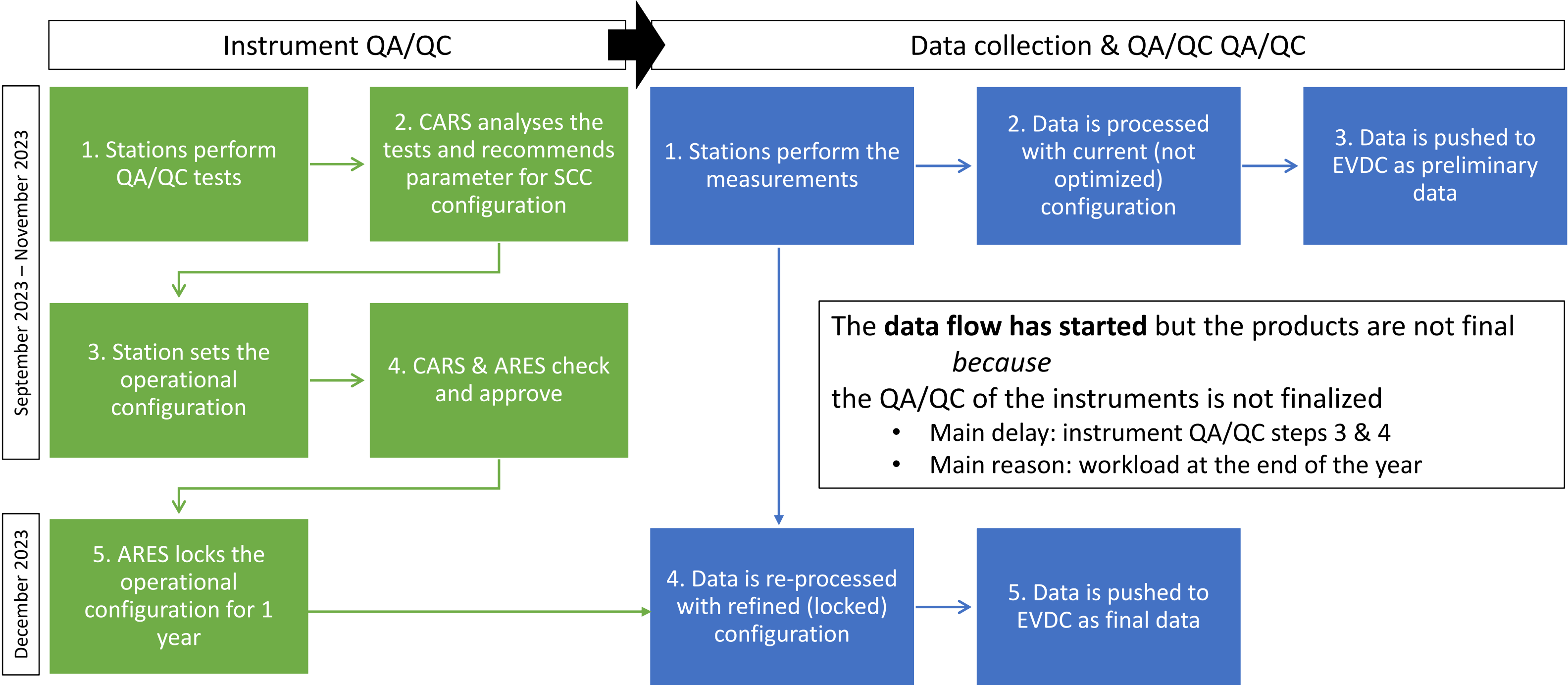
Measurement sites

Cloudnet sites

Site	Country	Latitude	Longitude	Altitude	GAW ID
● Bucharest	Romania	44.348°N	26.029°E	93m	INO
● Cabauw	Netherlands	51.968°N	4.927°E	-1m	CBW
● Chilbolton	United Kingdom	51.144°N	1.439°W	85m	-
● Delft	Netherlands	51.996°N	4.379°E	-4m	-
● Galați	Romania	45.435°N	28.037°E	40m	-
● Granada	Spain	37.164°N	3.605°W	680m	UGR
● Hyytiälä	Finland	61.844°N	24.288°E	174m	SMR
● Jülich	Germany	50.908°N	6.413°E	111m	JUE
● Kenttäröva	Finland	67.988°N	24.243°E	342m	-
● Leipzig	Germany	51.353°N	12.435°E	126m	LEI
● Leipzig LIM	Germany	51.333°N	12.389°E	126m	-
● Lindenberg	Germany	52.208°N	14.118°E	104m	LIN
● Lutjewad	Netherlands	53.24°N	6.21°E	1m	-
● Mace Head	Ireland	53.326°N	9.9°W	16m	MHD
● Mindelo	Cabo Verde	16.8778°N	24.995°W	13m	CVO
● Munich	Germany	48.148°N	11.573°E	538m	-
● Norunda	Sweden	60.086°N	17.479°E	46m	NOR
● Ny-Ålesund	Norway (Svalbard)	78.923°N	11.922°E	19m	NYA
● Palaiseau	France	48.716°N	2.212°E	156m	-
● Potenza	Italy	40.601°N	15.724°E	760m	POT
● Rzecin	Poland	52.758°N	16.31°E	57m	-
● Schneefernerhaus	Germany	47.417°N	10.977°E	2653m	ZSF
● Warsaw	Poland	52.21°N	20.98°E	112m	-

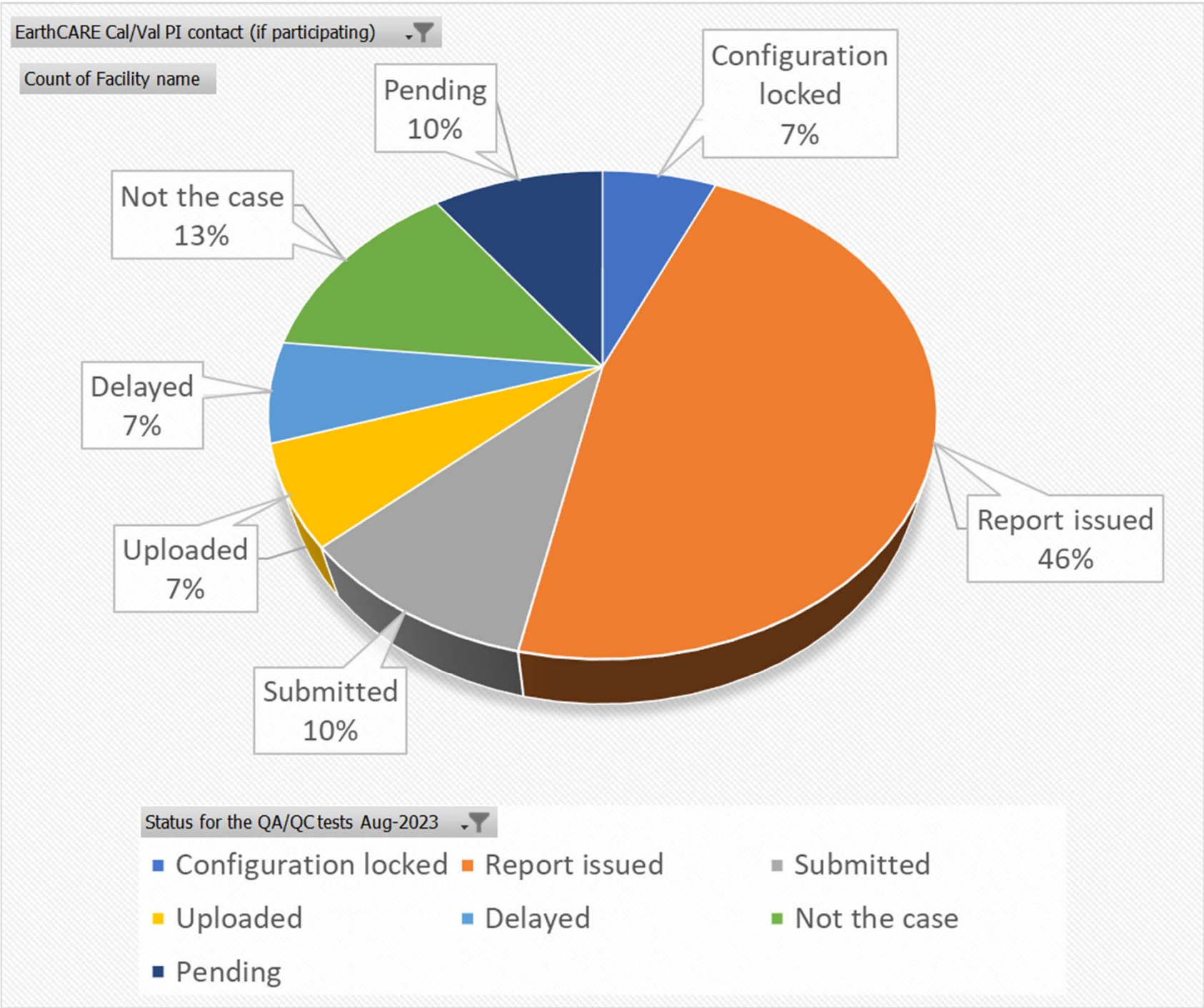
● Operational site ● Some data ● Inactive

Complex aerosol profiling QA/QC workflow



CARS = ACTRIS center for Aerosol Remote Sensing, ARES = Aerosol Remote Sensing Data Centre Unit

Status of the ARS QA/QC



Configuration locked

- Configuration set and checked
- “GO” for final data products

Report issued

- CARS finalized the analysis
- PI to set the operational configuration

Submitted

- Tests under analysis at CARS

Uploaded

- PI to finalize the test data

Delayed

- Instruments under repair

Not the case

- Instruments not compliant, internal QA/QC

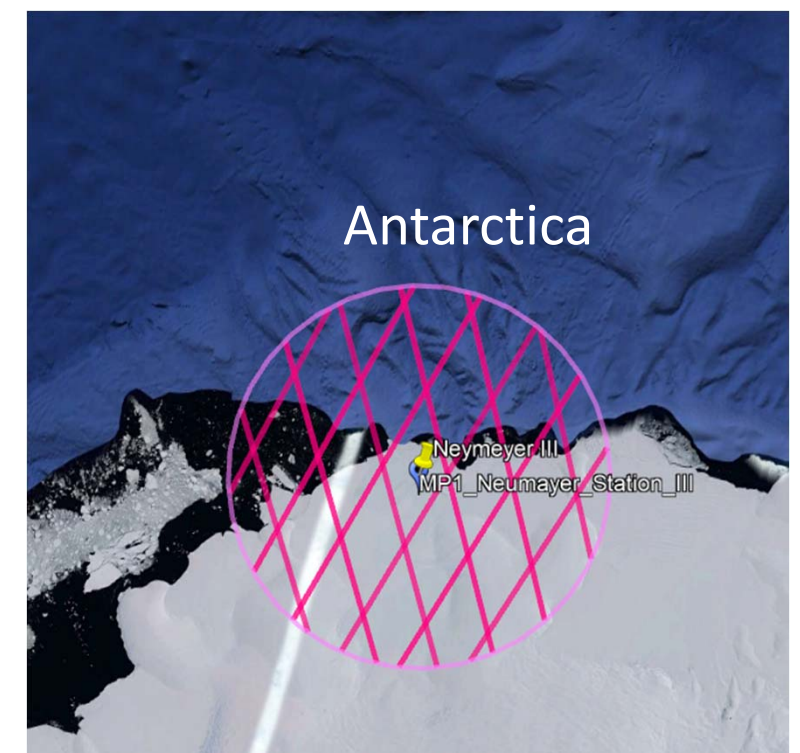
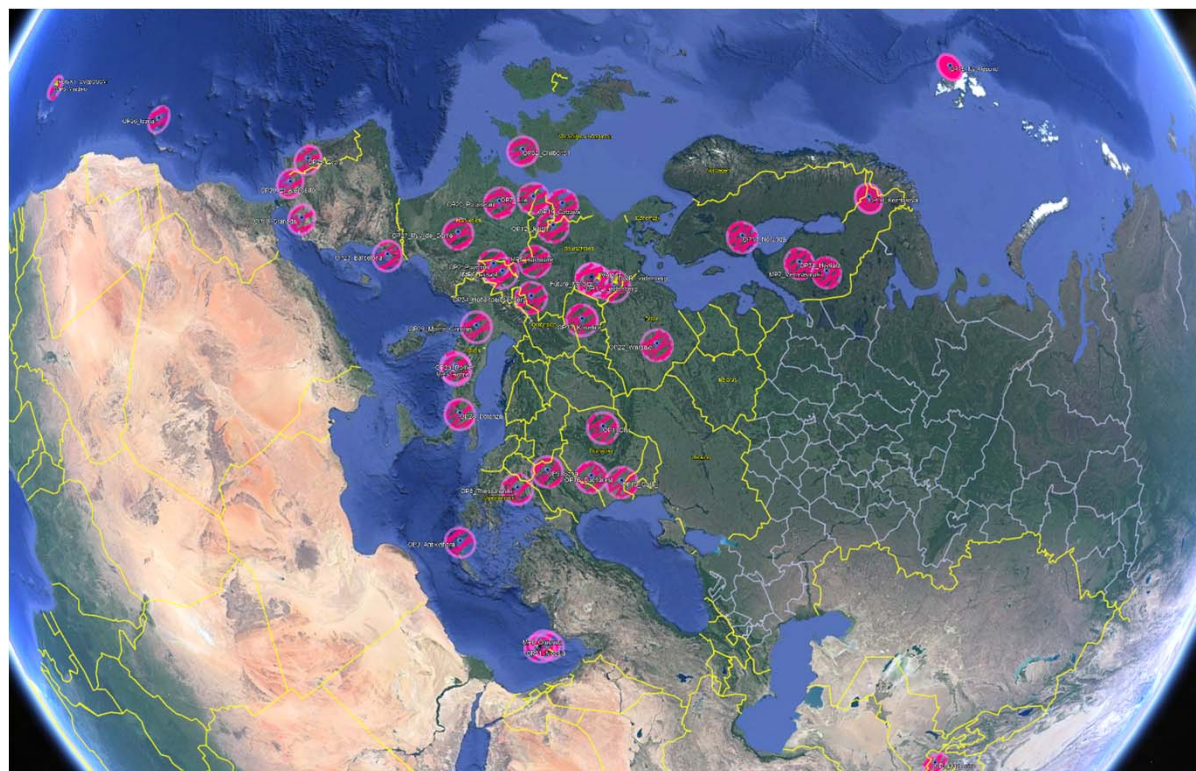
Pending

- No test data available



Rehearsal campaign with simulated orbits

	Task	Start month	End month	Deliverable(s)	Provider(s)*
Network rehearsal campaign  CRS: yes ARS: partly 	Performance of observations according to simulated overpasses	Oct. 2023	Nov. 2023	8 measurements per month x 2 months	Observational platforms Mobile platforms
	NRT submission of measured data	Oct. 2023	Nov. 2023	8 datasets per month x 2 months	Observational platforms Mobile platforms
	Fast delivery of data products to EVDC (rehearsal campaign)	Oct. 2023	Nov. 2023	8 datasets per month x 2 months	DC Units

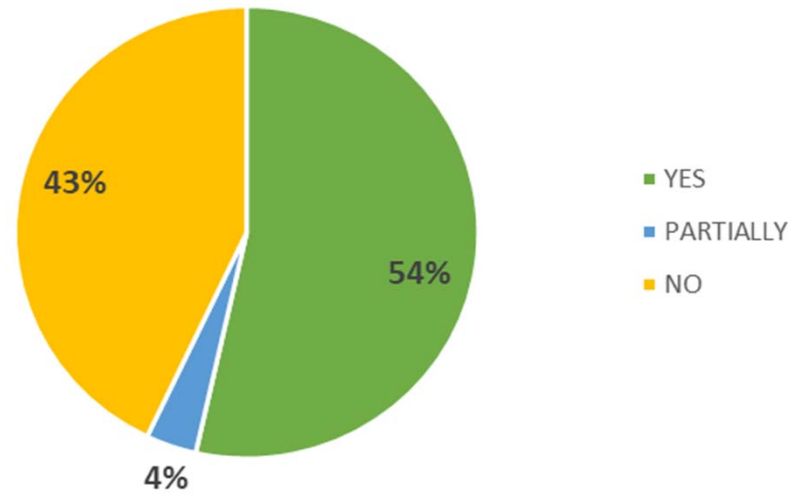


Status of first month of rehearsal

- Maintenance of the instrument
- Internet/power failure
- No approved configuration
- Weekend
- Instrument upgrade
- Instrument testing

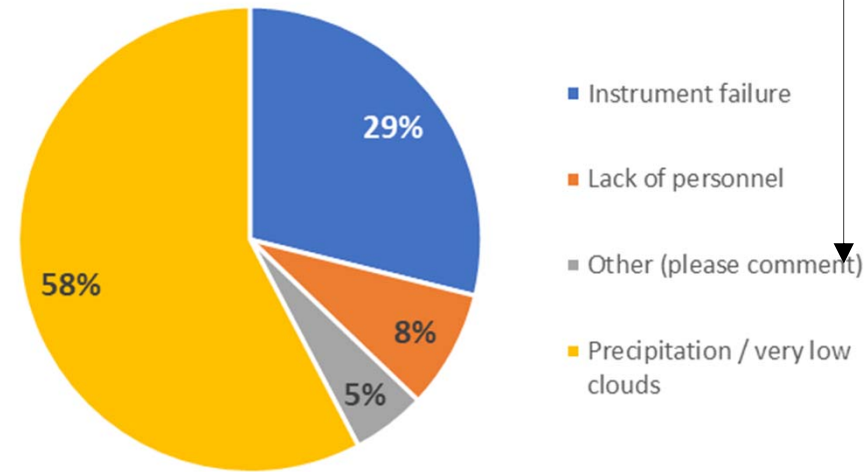
ARS
(Lidar)

Lidar measurements performed



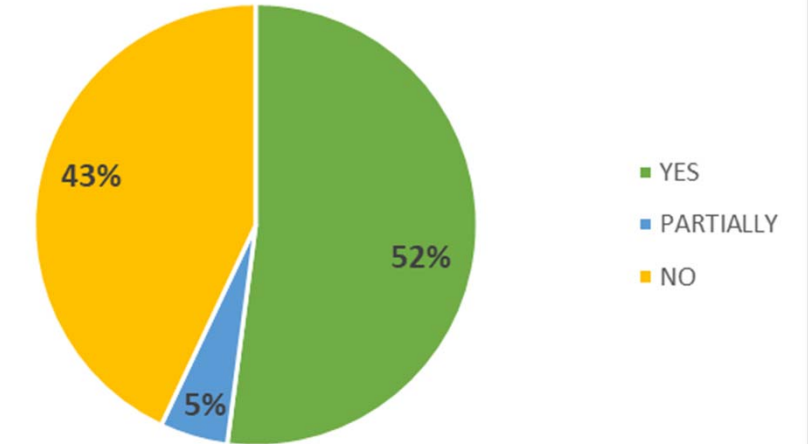
Out of the scheduled measurements

Reasons for not performing lidar measurements



Out of the not performed measurements

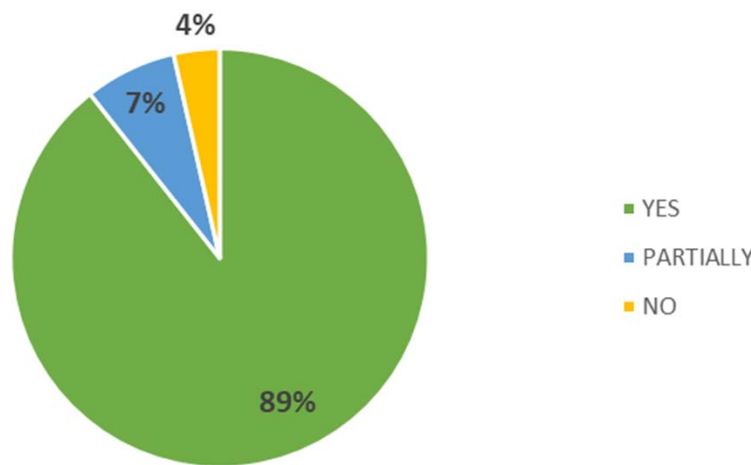
Lidar measurements uploaded to SCC



Out of the performed measurements

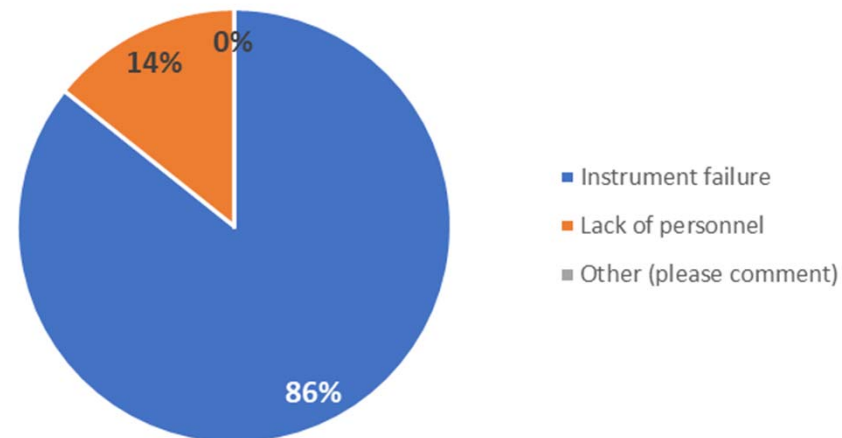
CRS
(Cloud profiling)

Clouds measurements performed



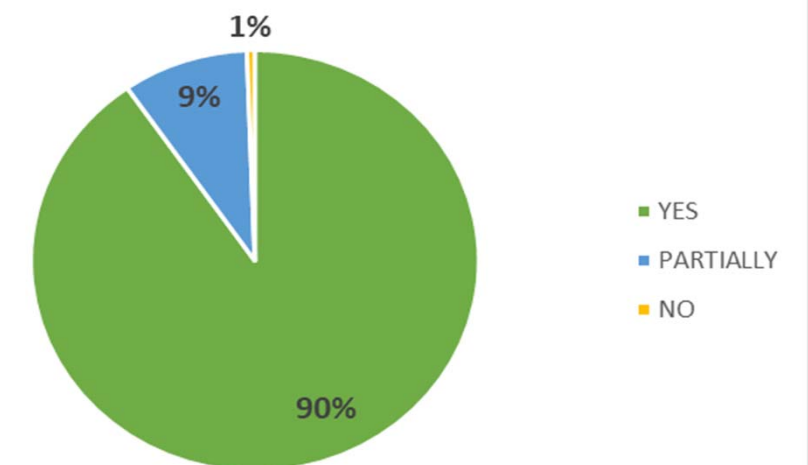
Out of the scheduled measurements

Reasons for not performing cloud measurements



Out of the not performed measurements

Clouds measurements uploaded



Out of the performed measurements

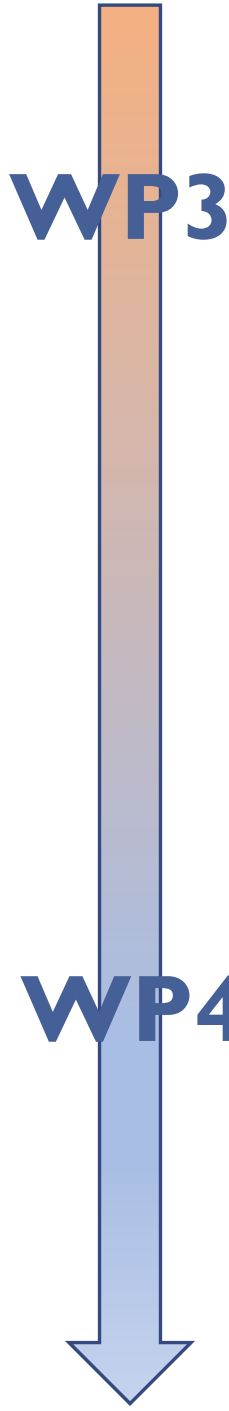


Future: Post-rehearsal campaign activities

Objective	Task	Start	End	Provider(s)
Preparation of Cal/Val campaign – including official ESA rehearsal	Inspection of processed data and optimization of processing configurations	Dec. 2023	April 2024	Observational platforms Mobile platforms
	Reprocessing of the rehearsal campaign data with optimized configurations	Dec. 2023	April 2024	DC Units
	QA of instruments for the participating platforms (Cal/Val campaign)	Dec. 2023	April 2024	TC Units

EarthCARE launch

Objective	Task	Start	End	Provider(s)
Cal/Val campaign	Measurements according to real overpasses (fixed observation sites)	May 2024	Sep. 2024	Observational platforms
	Campaign beneath the orbit (mobile observations)	May 2024	Sep. 2024	Mobile platforms
	NRT submission of measured data	May 2024	Sep. 2024	Observational platforms Mobile platforms
	Fast delivery of data products to EVDC	May 2024	Sep. 2024	DC Units
	Validation of EarthCARE data products against ground-based data (access to expertise)	May 2024	Sep. 2024	All





Intercalibration with reference systems

Objective	Task	Start month	End month	Deliverable(s)	Provider(s)*
Intercalibration with reference systems	Direct comparison of reference systems with MPL	July 2023	Feb. 2024	Report on direct comparison between ACTRIS lidar and MPL	Observational platform, selected (Barcelona lidar station)
	Direct comparison of reference systems with ESA systems (e.g. eVe, EMORAL)	July 2023	Feb. 2024	Report on direct comparison between ACTRIS lidar and eVe & EMORAL	TC Unit (CARS-AHL-INOE)
	Operation of the ESA reference lidar (EMORAL, eVe) for the direct comparison with the ACTRIS reference lidar	July 2023	Feb. 2024		Observational platforms, selected (PANGEA-EARLINET, Warsaw Observatory Station)

In progress/scheduled

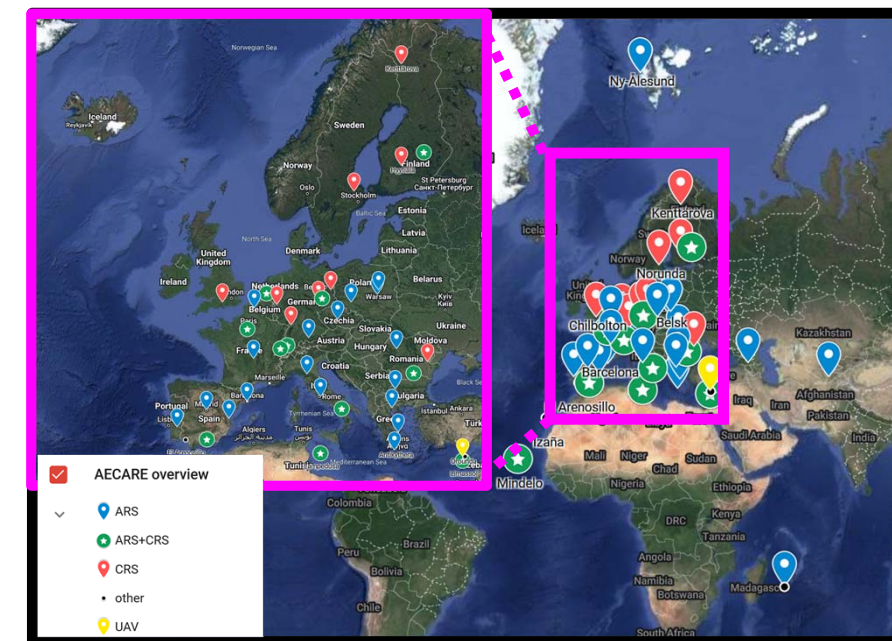
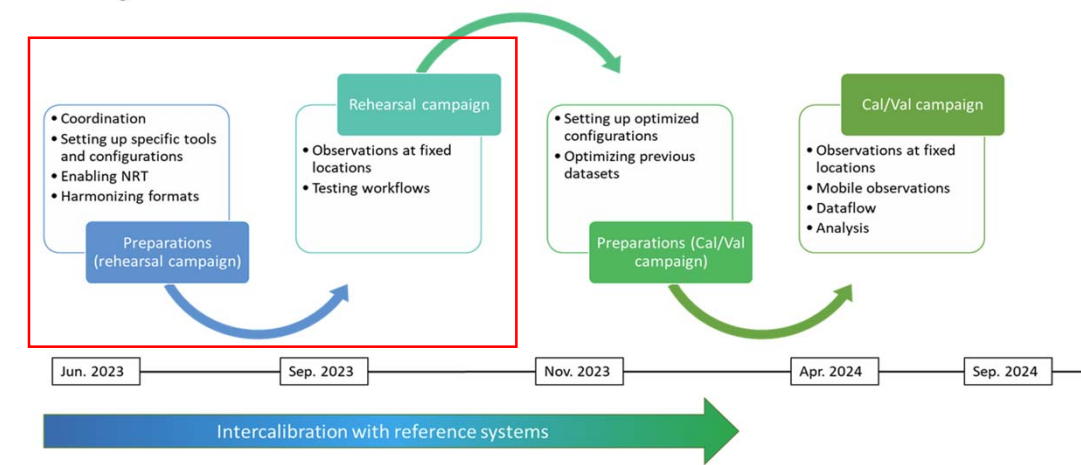
WP5



Conclusions

- ATMO-ACCESS **pilot activity** to **prepare** ACTRIS for EarthCARE validation
- Most tasks of the preparation activities already **achieved**
- **Rehearsal campaign** started with good measurement coverage
- CRS (cloud profiling) data already delivered near-real time to EVDC
- Complex QA/QC and central processing for lidars (ARS) delays the process → preliminary data delivered EVDC → re-processing after rehearsal campaign → **Goal: ready at launch**
- Instrument (MPL, ESA lidars) **inter-comparison** scheduled
- Real validation planned with additional mobile facility deployment and **some data analysis, but:**
- **Pilot activity ends 2024** 😞

Project in a nutshell



Project Management Board

Name	Role	Contact
Holger Baars	Project leader	
Eleni Marinou	Project leader deputy	
Stephanie Rusli	Representative of the stakeholder	
Rob Koopman	Representative of the stakeholder deputy	
Ann-Mari Fjæraa	Expert	
Lucia Mona	Expert	
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Doina Nicolae	ATMO-ACCESS pilot coordinator	

Questions?



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