

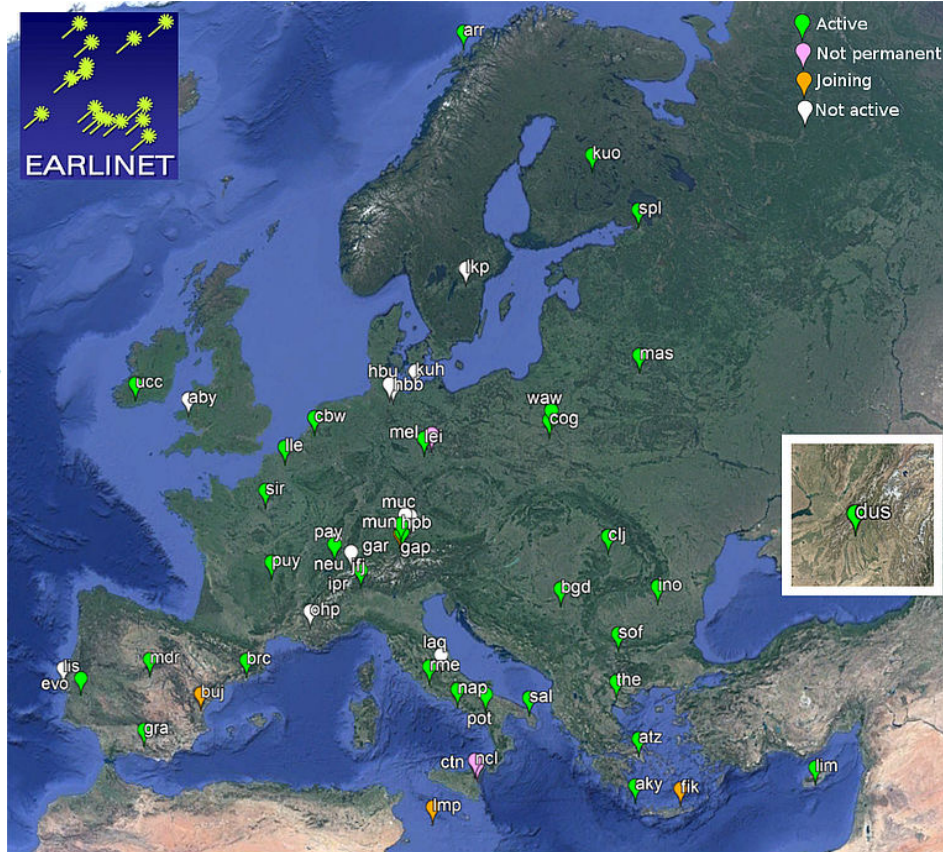


# ACTRIS/EARLINET aerosol lidar activities in the global dimension

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# European Aerosol Research Lidar NETwork – EARLINET/ACTRIS



➤ mainly based on **Raman** lidar systems, able to provide vertical **profiles of aerosol extinction and backscatter** coefficients without significant assumptions.

➤ most of the stations at **different wavelengths**

➤ currently most of the sites provides also **linear particle depolarization ratio**

➤ most of the sites has **co-located photometers**

EARLINET is since 2011 integrated in **ACTRIS (Aerosol, Clouds, and Trace gases Research Infrastructure)**

<https://www.earlinet.org/>

# What is ACTRIS?

Aerosols, Clouds and Trace gases Research Infrastructure

ACTRIS supports the scientific community and the society :

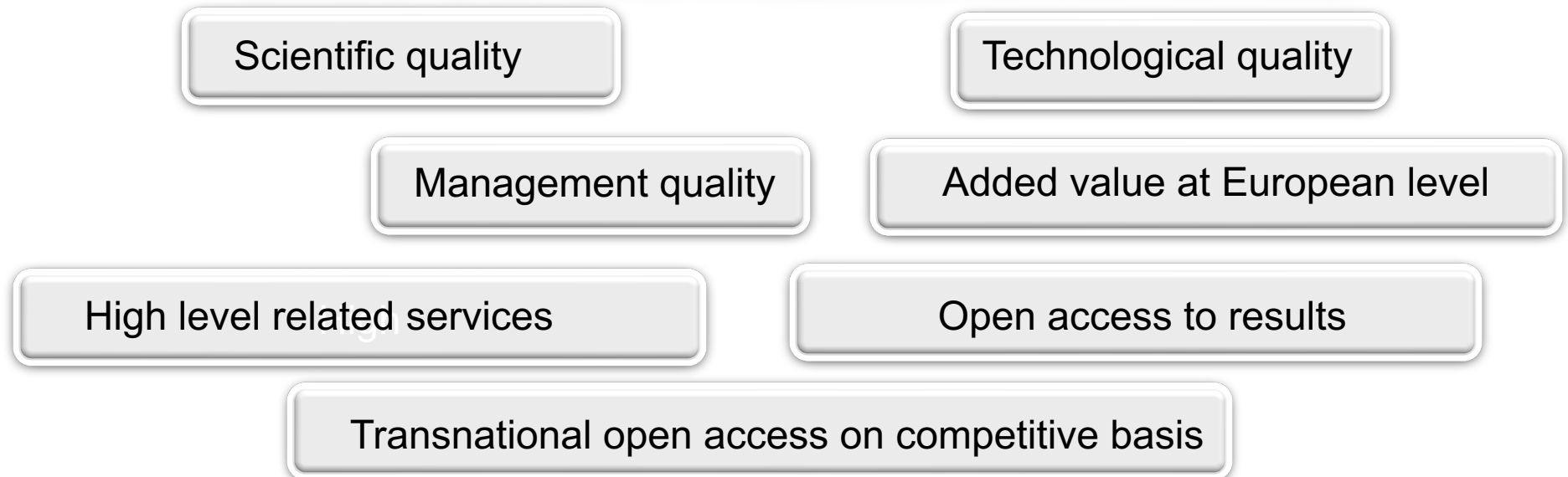
- continuous, intercomparable and quality assured 4D-data
- online data analysis tools for ACTRIS data.
- instrument calibrations
- access to the best atmospheric research facilities in Europe.
- dissemination and training



# What is a EU RI?

Research infrastructures are defined as «**platforms, resources and related services, used by the scientific community for high quality research in their fields, without any constraints linked to institutional or national belongings**» – definition given by the *European Strategy Forum for Research Infrastructures - ESFRI*).

## CHARACTERISTICS OF A RESEARCH INFRASTRUCTURE



# RI: from interest to operation

How do European research infrastructures work?

- The countries concerned sign a contract (*ERIC*)
- They finance the activities with workshops and an annual financial contribution
- They are committed to guaranteeing observations and expertise for a long time
- Central laboratories (i.e. necessary for the entire infrastructure to function) receive funding that comes from what the various countries participating in the infrastructure pay

# ACTRIS structure



Virtual Access  
ACTRIS data products  
ACTRIS VRE with tools and computing

Topical Centres

Data Centre

Physical Access  
Research Services  
Instrument calibration  
Industry Services  
Training services

*Instrument calibration*  
NF aerosol, cloud and trace gas variables



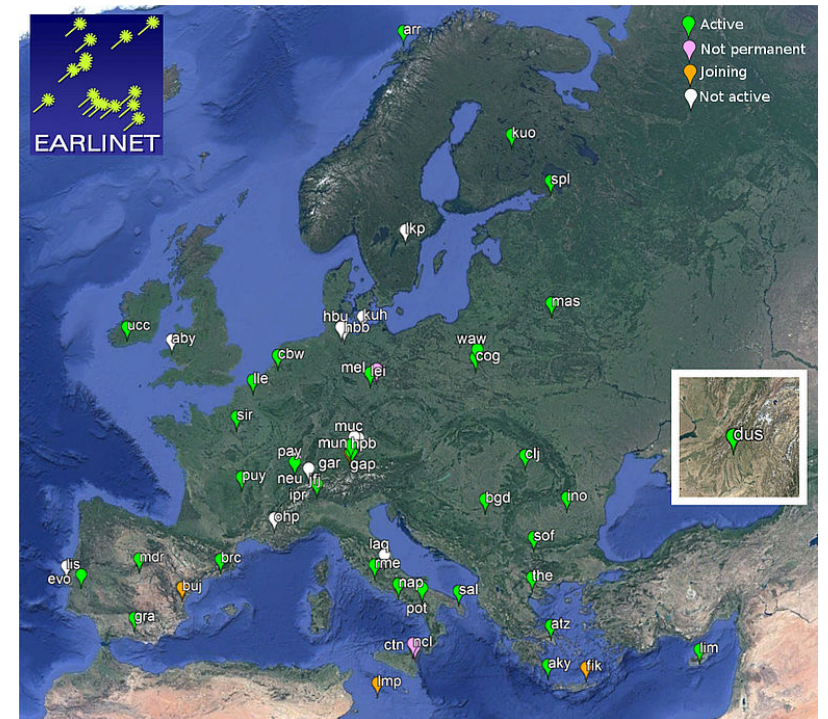
# Focus on Aerosol Remote Sensing = ARS

ACTRIS Aerosol Remote Sensing **data center** unit = **ARES**

ACTRIS **Topical Center** for Aerosol Remote Sensing = **CARS**

**NF** = National facilities (stations)

Building on the EARLINET heritage



# ARS National Facilities

## Main requirements and duties:

- Co-located Lidar and Photometer
- Lidar at least: 1 Raman + 1 depolarization
- Specific requests on overlap and max height reached
- Apply SOPs and perform QA tests as defined by TC
- Use of centralized processing (SCC for lidar)
- At least 5 runs of lidar measurements lasting >3h at specific schedule

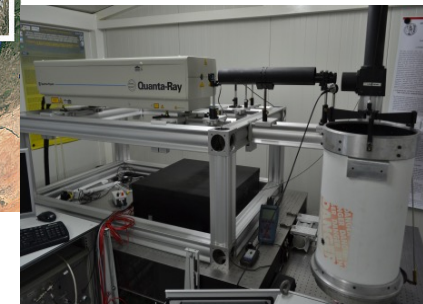
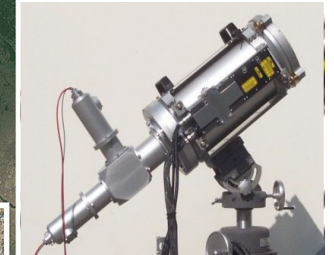
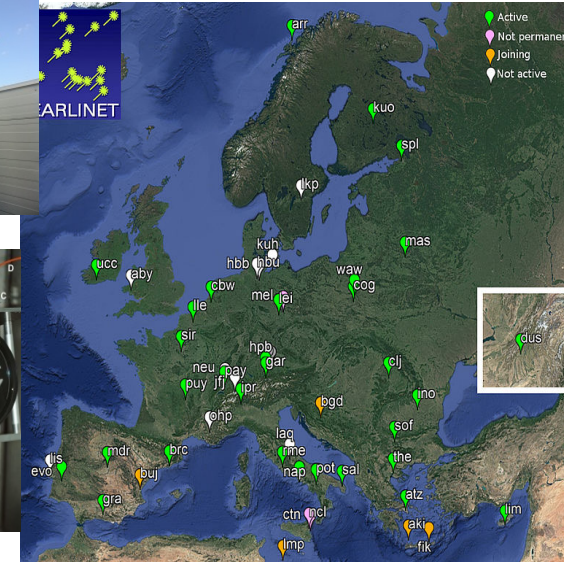
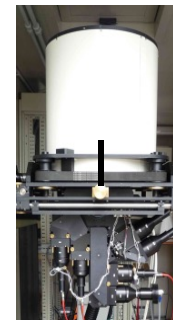
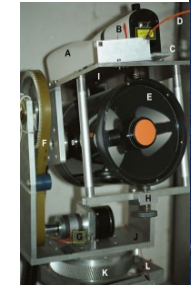


# Challenges

Standardization of ACTRIS/EARLINET products is difficult.

EARLINET was born as Research Lidar Network

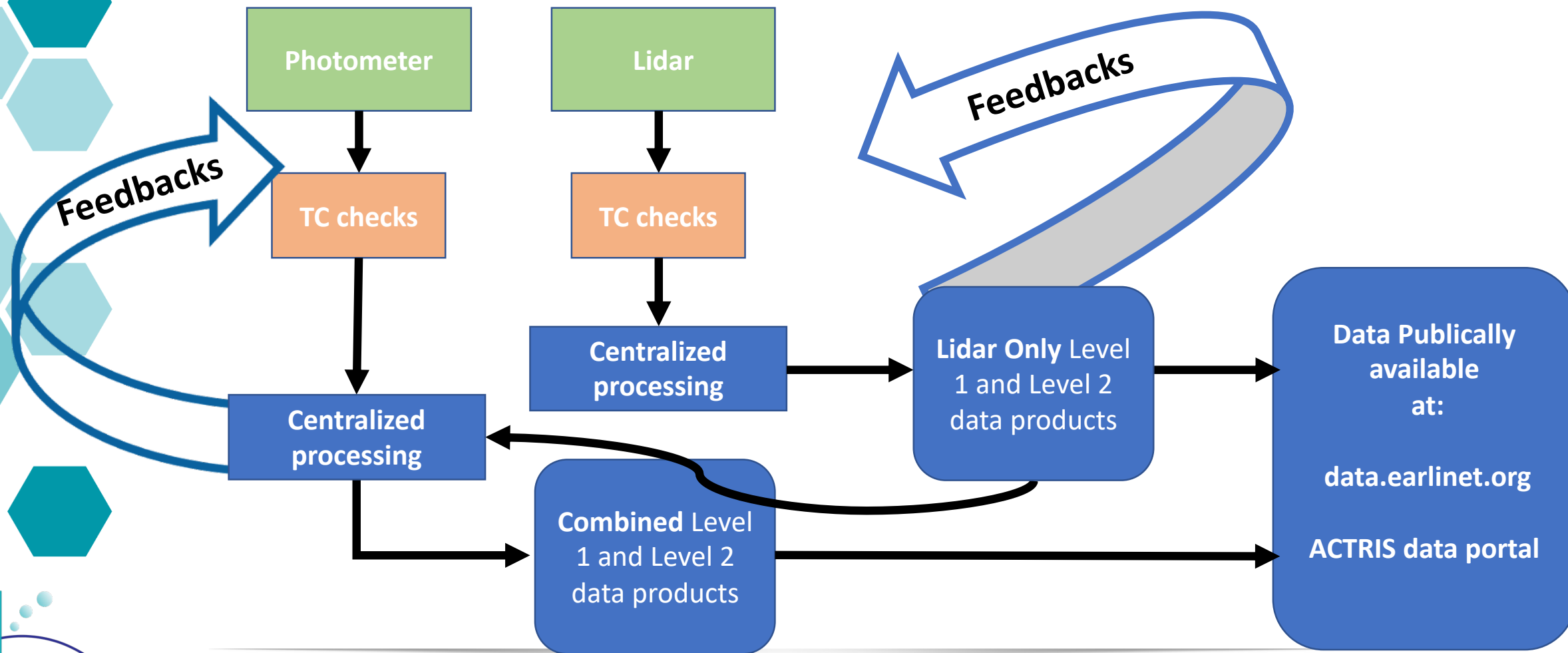
- lidar systems as often highly customized or fully home made
- differences in lasers, telescopes, detection and acquisition systems



# ACTRIS Keywords/Goals

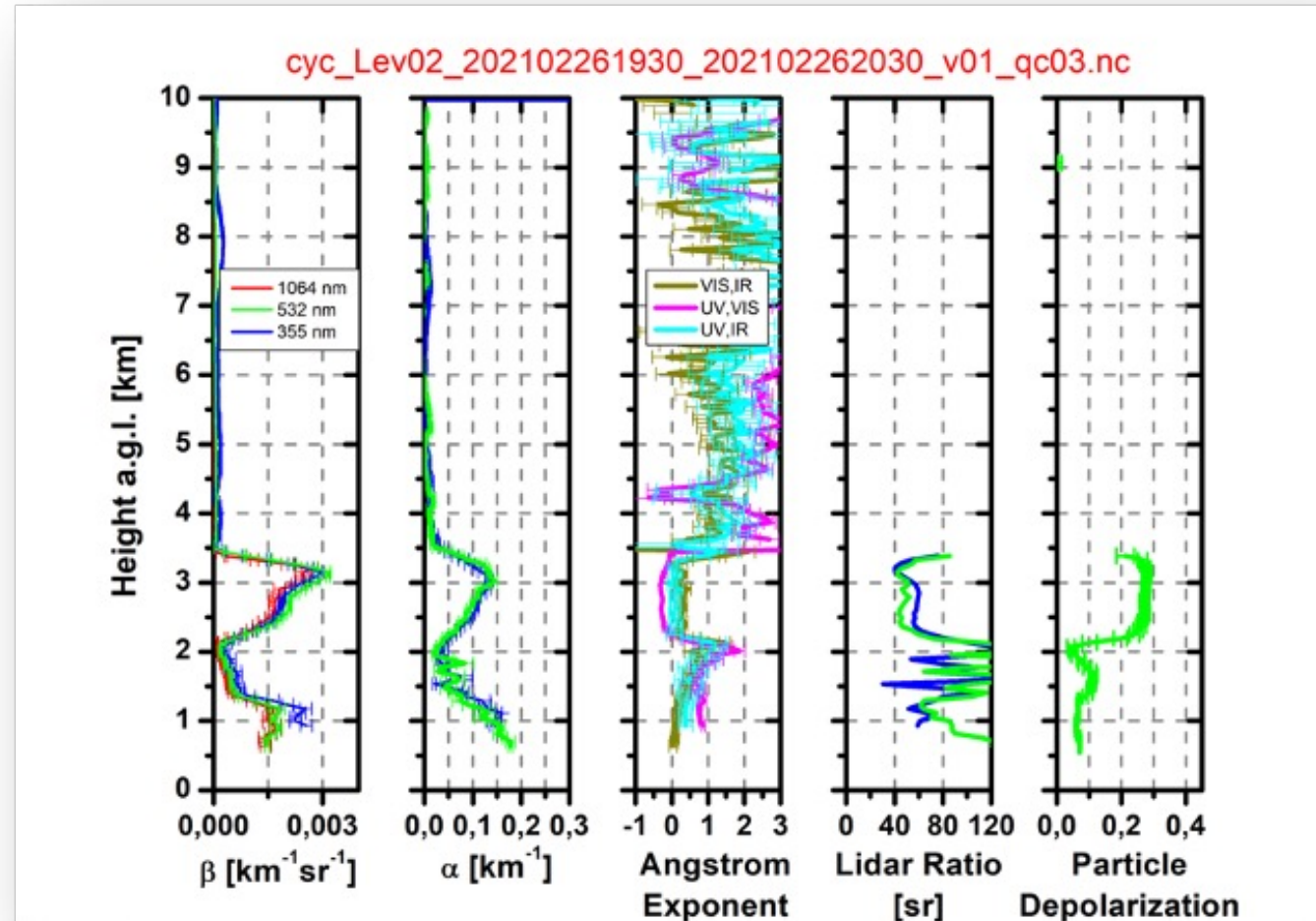
- **Standardization and harmonization**
- **Full traceability**
- **Quality control**
- **Reprocessing capability**
- **Open and FAIR data**
- **NRT data provision**
- **Excellence**

# ACTRIS aerosol remote sensing workflow at operation



# Aerosol optical profile products

Final products of centralized processing chain (namely SCC)



# Multiwavelength products

Currently data file are single product oriented  
(1 backscatter or 1 extinction , single wavelength)



Multiwavelength product with all available aerosol optical  
property profiles at the same vertical-temporal  
resolution currently **available in experimental mode**



Multiwavelength product will allow for more robust aerosol layering and  
typing products





# Level 3 climatological dataset



Covered period: 2000-2019

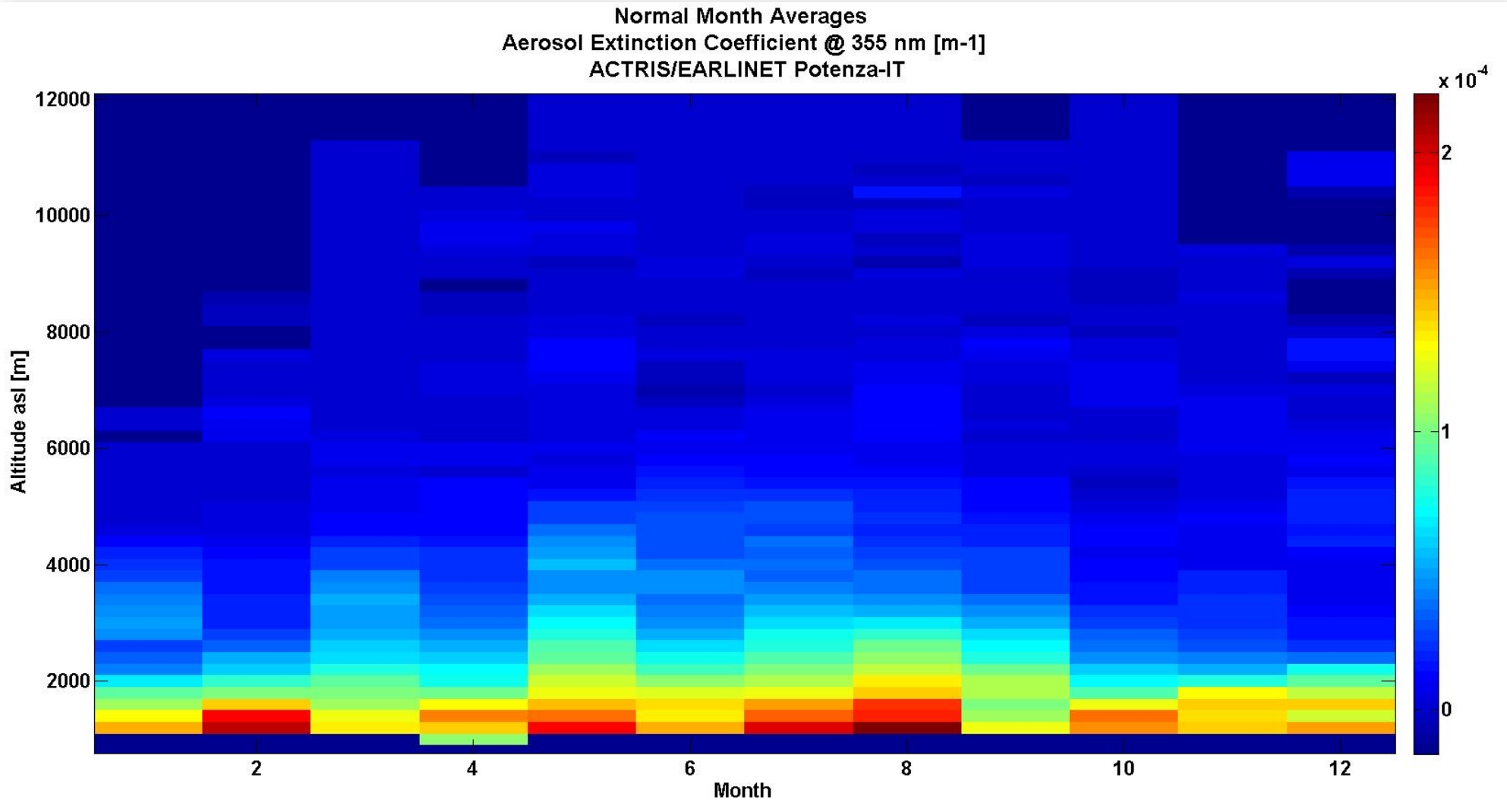
Based on L2 (QC v03) available on Oct 2022

33 stations included in the dataset

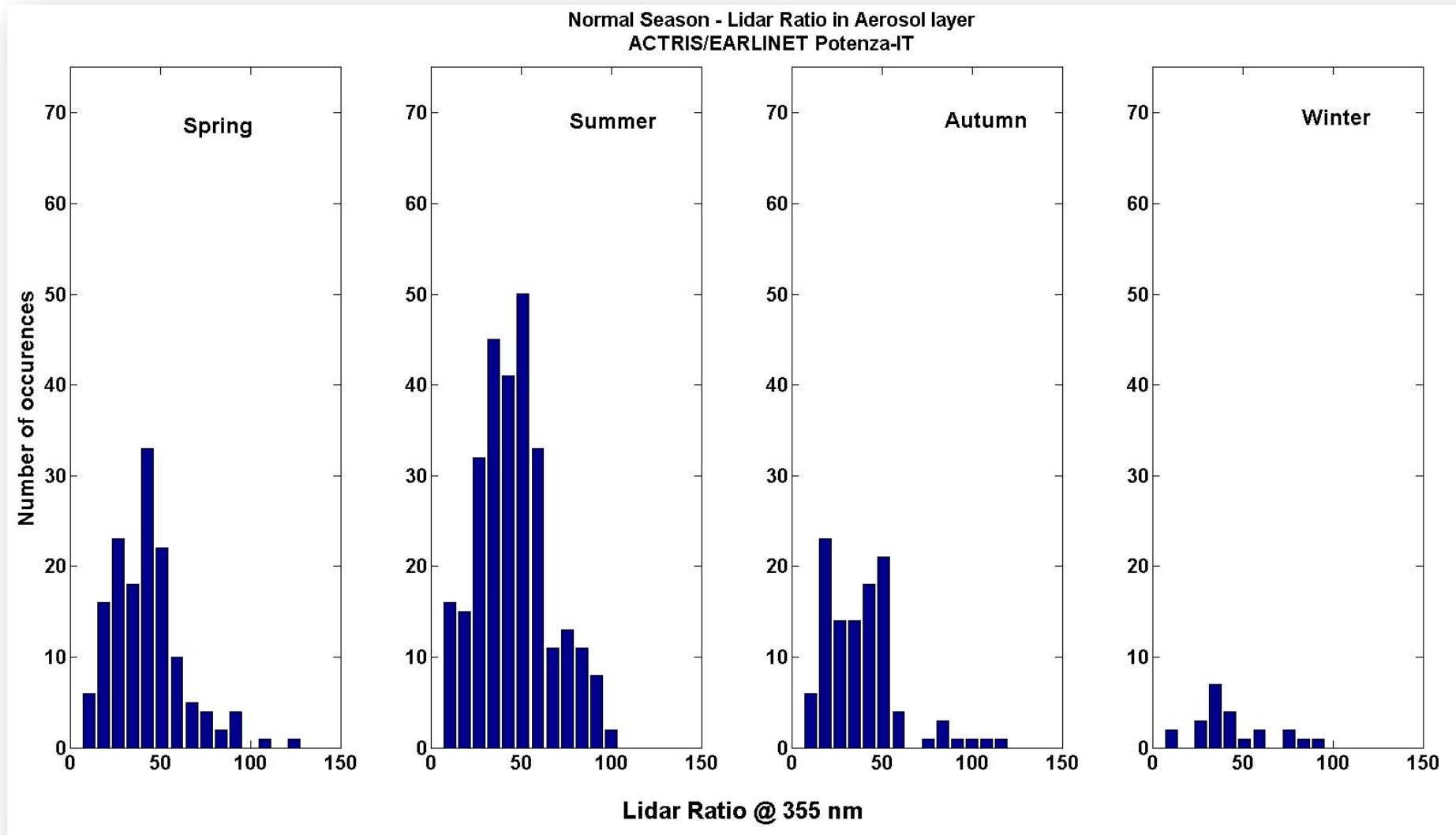
Station Code	Name	Station Code	Name	Station Code	Name
<b>aby</b>	Aberystwyth	hpb	Hohenpeissenberg	nap	Naples
<b>arr</b>	Andoya	ino	Bucharest	pot	Potenza
<b>atz</b>	Athens	ipr	Ispra	puy	Clermont-Ferr
<b>brc</b>	Barcelona	kuh	Kuehlungsborn	rme	Roma
<b>cbw</b>	Cabauw	lei	Leipzig	sal	Lecce
<b>cog</b>	Belsk	lkp	Linkoping	sir	Palaiseau
<b>dus</b>	Dushanbe	lle	Lille	sof	Sofia
<b>evo</b>	Evora	mas	Minsk	spl	St. Petersburg
<b>gar</b>	Garmisch	mdr	Madrid	the	Thessaloniki
<b>gra</b>	Granada	mel	Melpitz	ucc	Cork
<b>hbu</b>	Hamburg	muc	Maisach	waw	Warsaw

Available @ <https://www.earlinet.org/index.php?id=319>

# Level 3: some examples (1/2)



# Level 3: some examples (2/2)

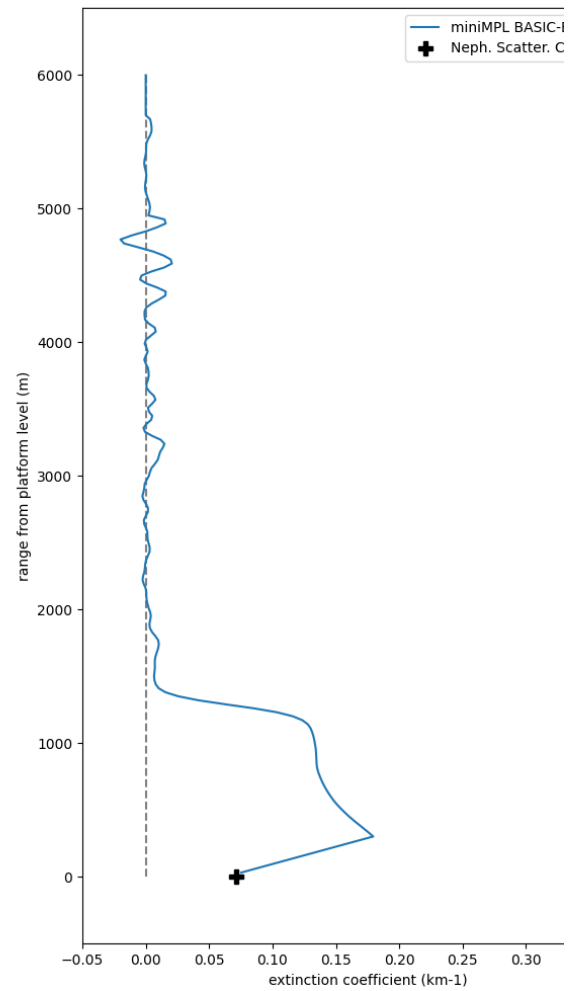




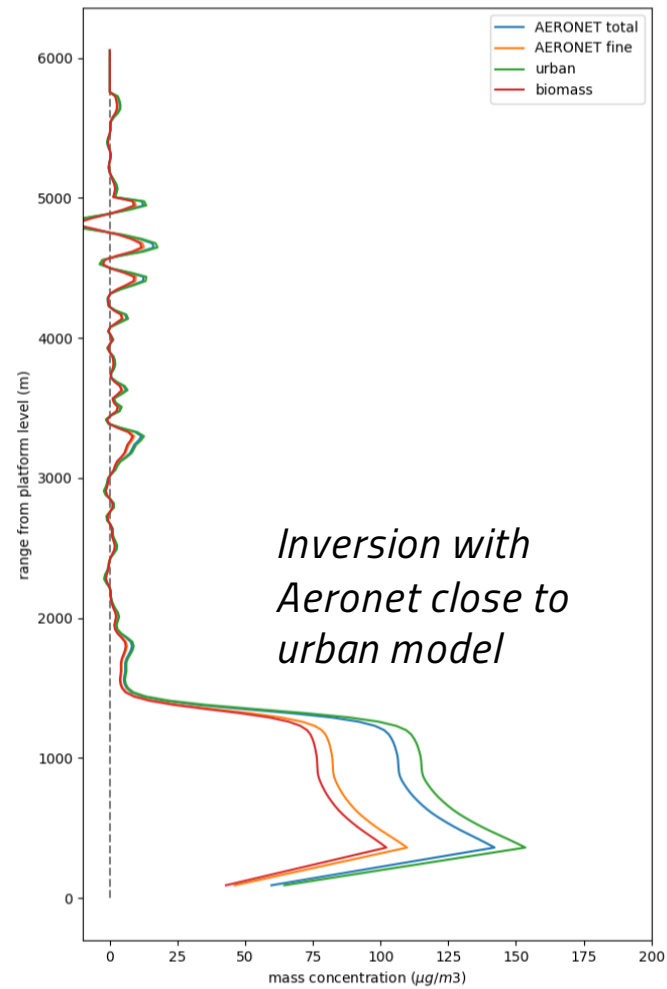
# Lidar + Photometer retrieval

Mini MPL MF Lille – 2018-05-14 16h37

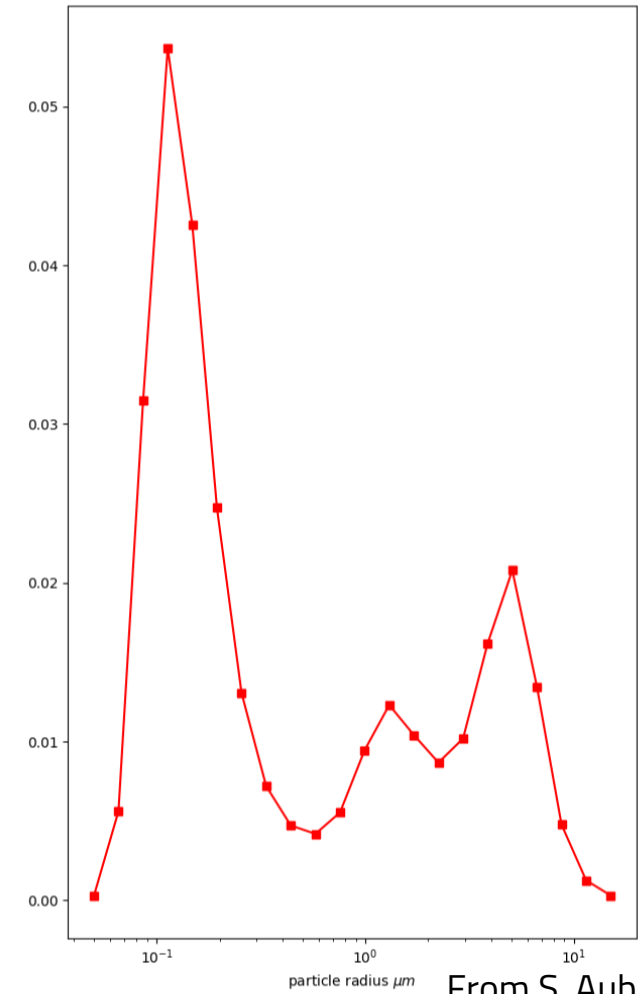
BASIC-EVO Klett AOD 0.190 S 49.2 sr SI 1.09



BASIC-EVO Klett AOD 0.190 S 49.2 sr SI 1.09






AERONET VSD - SZA : 72.0





# Main data services – Current status

- 
- 
- 
- Processing by SCC
  - Direct and automatic upload on db
  - Quality check on the data
  - Data provision (preprocessed, optical cloud mask, high resolution...) through data portal, API, THREDDS...
  - Monitoring of data access and provision
  - **PID and DOI provision \***
  - Level 3 climatological products production and provision
  - **Combined data with AERONET (GARLLIC)\***
  - Simulator for data upload
  - Reprocessing
  - Storage of old version of data

\* In implementation or partly implemented

# ACTRIS- Aerosol Profile Provision

## The aim:

optimizing the system in terms of reduction of distance from the target for the aerosol profiling provision in CAMS

## *HOW*

- Implementation of technical solutions for **enhancing the quality of data provided in NRT**
- Provision of **new products** (MW, typing and layering)
- **Interacting with aerosol model community**






CNR; CNRS, DWD, FMI, INOE, NOA, TROPOS, UGR, UPC, AUTH, UW, ECoE





# ACTRIS services offered to externals

- 
- 
- 
- Processing: Argentinian stations are now implementing SCC
  - Hosting dataset of aerosol profiles processed at home by other stations: example in ATMO ACCESS
  - Campaigns with reference mobile instruments
  - Tutorial for quality assurance tests and data processing

# How ARES services could be available for not ACTRIS stations?

**Physical / Remote and Virtual access to Data services and campaigns**

Currently offered through European projects

- Physical/Remote accesses: through iterations with ACTRIS personnel (like training and hands on workshop, or setting up SCC and specific services )



- Virtual Access to digital services: data provision service, doi, etc...

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





ACTRiS

The logo features the word "ACTRiS" in a teal, sans-serif font. The letter "C" is stylized as a circle with a white center. A dark blue arc curves over the text. A vertical teal line extends from the top of the "C" upwards, with three light teal circles of varying sizes floating to its right.

Exploring the Atmosphere

*Thank you!*