Multi-instrument platforms for investigating the aerosol-cloud-dynamic interaction in Eastern Mediterranean

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This project has received funding from the European Union's "Horizon 2020 Research and Innovation Programme" under Grant Agreement No 857510".

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EXCELSIOR Project

- The EXCELSIOR project, standing for "ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment," is a Horizon 2020 Widespread Teaming Phase 2 initiative.
- The project's objectives include
  - To upgrade the Remote Sensing and Geo-Environment Lab at the CUT into a sustainable and autonomous Centre of Excellence, now known as the ERATOSTHENES Centre of Excellence (ECoE).
  - enhancing scientific and innovation potential,
  - promoting the uptake of innovative scientific outputs,
  - achieving sustainability through diversified funding,
  - positioning Cyprus as a focal point for advanced Earth Observation research,
  - establishing strategic partnerships, and addressing societal challenges through research.

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EXCELSIOR Project

- The EXCELSIOR project has a total of six partners, including institutions from Cyprus and Europe. The partners are

1- **Cyprus University of Technology (CUT)** – Coordinator of the project and home of the ERATOSTHENES Centre of Excellence.

2- **German Aerospace Center (DLR)**

3- **National Observatory of Athens (NOA)**

4- **TROPOS Institute (Leibniz Institute for Tropospheric Research)**

5- **University of Twente (UT-ITC, Netherlands)**

6- **Department of Electronic Communications (DEC) of the Deputy Ministry of Research, Innovation and Digital Policy of Cyprus**

Affiliated partners

This project has receive
Union's "Horizon 2020
Programme" under Gra

Cyprus Atmospheric Remote Sensing Observatory (CARO)

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	EXCELSIOR
Who we are?	ERATOSTHENES centre of Excellence (ECoE)
	Cyprus Atmospheric Remote Sensing Observatory (CARO)
	National Facility
	ECoE-CARO
What are the most unique advantages of the ECoE-CARO GBS?	Cyprus climate conditions that are strongly affected by a mixture of aerosols originated from different sources.
	Using multi-instrument platforms to investigate the aerosol-cloud-dynamic interaction

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Why synergistic <u>multi-instrument platforms</u> must be employed in the top-level of atmospheric sciences?	**The exact impacts of aerosol particles on the evolution of the different types of clouds, precipitation, and radiation budget are still unknown.**
	Passive and active remote sensing instruments on ground-based, airborne, and spaceborne platforms provide different pieces of information on atmospheric aerosols.
	Vertically resolved aerosol and cloud information (dual-FOV lidar and cloud radar) together with different vertical wind scenario (Doppler wind lidar) must be utilized to investigate the aerosol and cloud interaction and its impact on cloud evolution.

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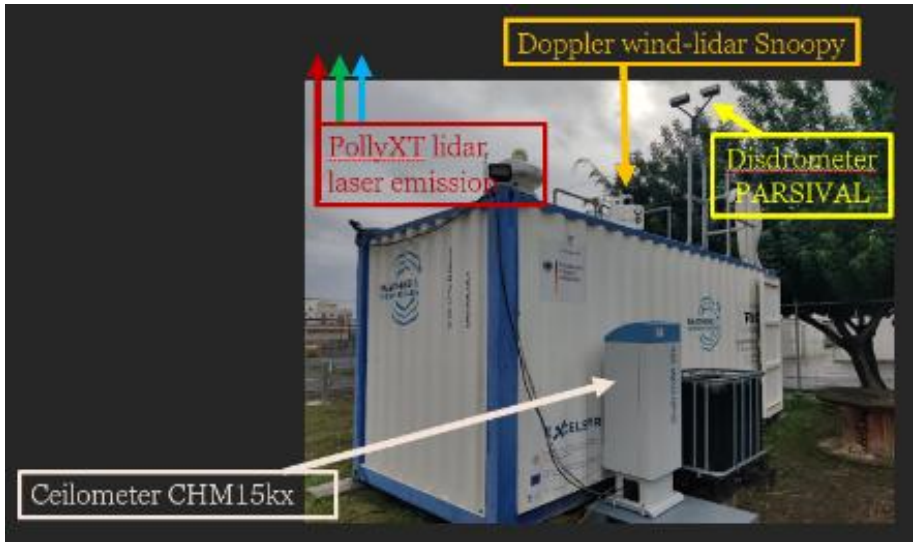
• Active sensors preforming continues measurements in the CARO observatory includes:
A) A multi-wavelength dual field of view Raman polarization Lidar >>Dual-FOV PollyXT
B)A 35-GHz scanning polarimetric cloud Doppler radar >> Mira-35
C)A Streamline-XR Doppler lidar>> Halo Lidar Snoopy
D)A 1064-nm ceilometer >> CHM 15kx
• Passive sensors preforming continues measurements in the CARO observatory includes:
E) A 14-channel microwave radiometer>> HATPRO G5
F) An optical 1-d precipitation disdrometer>> PARSIVEL
G) A CUT-TEPAK AERONET Sun-photometer>> CUT-TEPAK CE318
H) A Radiation station>> Sun-traker STR22G, Pyrgeometer, …



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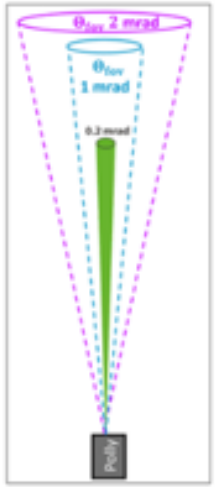
What are the main advantages of the new Dual-FOV Polly^{XT} lidar at ECoE-CARO?

1- Measuring the cross and total signal components at 532 nm at two different FOVs

2- Measuring of two volume linear depolarization ratios at two different FOVs.



4- Retrieve aerosol microphysical properties such as CCNC, INPC from Polly lidar

3- Derive microphysical properties of liquid water clouds

3- 1 Droplet effective radius ($R_e(z_{ref})$)

3-2 cloud Extinction Coeff., ($\alpha(z_{ref})$)

3-3 cloud liquid water content (LWC)

3-4 Droplet number concentration $N_d(z_{reff})$

3-5 cloud droplet number concentration, (CDNC)

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Cyprus participates in the CAL\VAL activities by the EVID39: **CORAL** project.

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CARO ERATOSTHENES IN WMO's GLOBAL ATMOSPHERE WATCH

Enhancing Global Weather and Climate Data

ERATOSTHENES
CARO National Facility

Cyprus Atmospheric Remote Sensing Observatory National Facility [CARO NF] located in the Eastern Mediterranean, Limassol, Cyprus [$34.7N^{o}, 33E^{o}$] with its 24-7 continuously operating instrumentation, contributes its expertise in aerosol remote sensing, capturing the atmospheric changes.

CARO NF [GAWSIS-LIM] contributes to the GAW through the provision of its advanced remote sensing measurements in a unique and representative area for the Easter Meditrerranean.

What is the GAW?

Global Atmosphere Watch Programme [GAW] of the World Meteorological Organization [WMO] is a global network that delivers essential data for assessing and comprehending atmospheric composition, including air quality, greenhouse gases, and pollution.

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CARO NF in GAW

CARO NF contributes to global efforts aimed at mitigating the impacts of climate change through accurate, real-time and near-real time data helping to enhance the overall accuracy of satellite and ground-based observations.

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ATARRI is a Horizon Europe Twinning project funded by the European Union, focused on ATmospheric and solAR Research and Innovation in the Eastern Mediterranean

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