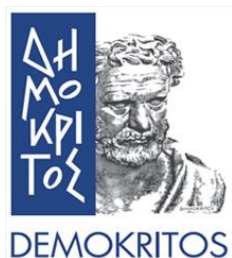


Cloud-Aerosol InteractionS in the Helmos background TropOsphere (*CALISTHO-HELMOS the PANACEA & PyroTRACH Campaign*)



Hosted by NCSR Demokritos at the [Helmos Hellenic Atmospheric Aerosol & Climate Change Station \(HAC²\)](#), a PANACEA, ACTRIS, GAW facility

Two sites: in-situ mainly at HAC², and remote-sensing (Kalavrita Ski Resort)

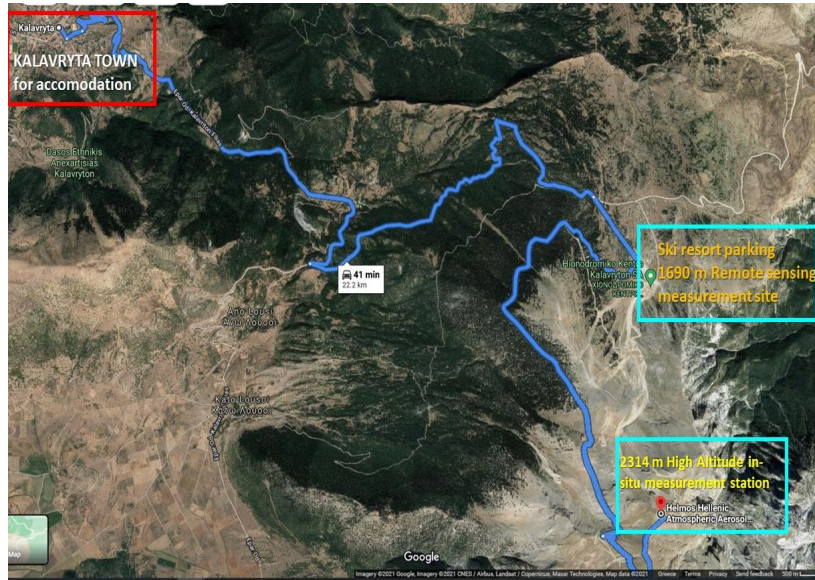
A satellite site (lidar remote sensing) will be at the C-STACC center in Patras for airmass characterization.



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Two sites: in-situ mainly at HAC², and remote-sensing (Kalavrita Ski Resort)

A satellite site (lidar remote sensing) also at C-STACC in Patras for regional airmass characterization.



Scientific Objectives

- Study aerosol-cloud interactions for orographic mixed-phase clouds in the E.Med region using synergy of remote sensing & in situ instrumentation.
- Improve remote sensing algorithms to retrieve cloud microphysical properties (e.g. cloud droplet number concentrations).

Observations will characterize:

- Dynamics of the air masses that drive cloud formation
- Understanding the sources and drivers of the aerosol population (new particle formation, secondary organic aerosol formation and long-range transport) that form cloud droplets and ice crystals.
- Cloud microphysical (droplet and ice size distributions) & optical properties.

Process-level and larger-scale modeling will synthesize the observations and provide a higher-level understanding of the processes controlling cloud formation in the region.

The



partners

Website (created by NOA Amiridis team)
<https://calishto.panacea-ri.gr/>



K. Eleftheriadis



A. Nenes, S. Pandis



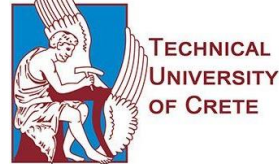
A. Papayannis



N. Mihalopoulos



K. Kourtidis



M. Lazaridis



D. Balis



S. Misios



E. Giannakaki

The /International partners



Karlsruher Institut für Technologie

Institute of Meteorology and
Climate Research, Atmospheric
Aerosol Research (IMK-AAF)
(in-situ)



Laboratoire d'Optique
Atmosphérique
(LOA), Lille, France
(remote sensing)



Finnish
Meteorological
Institute
(remote sensing)



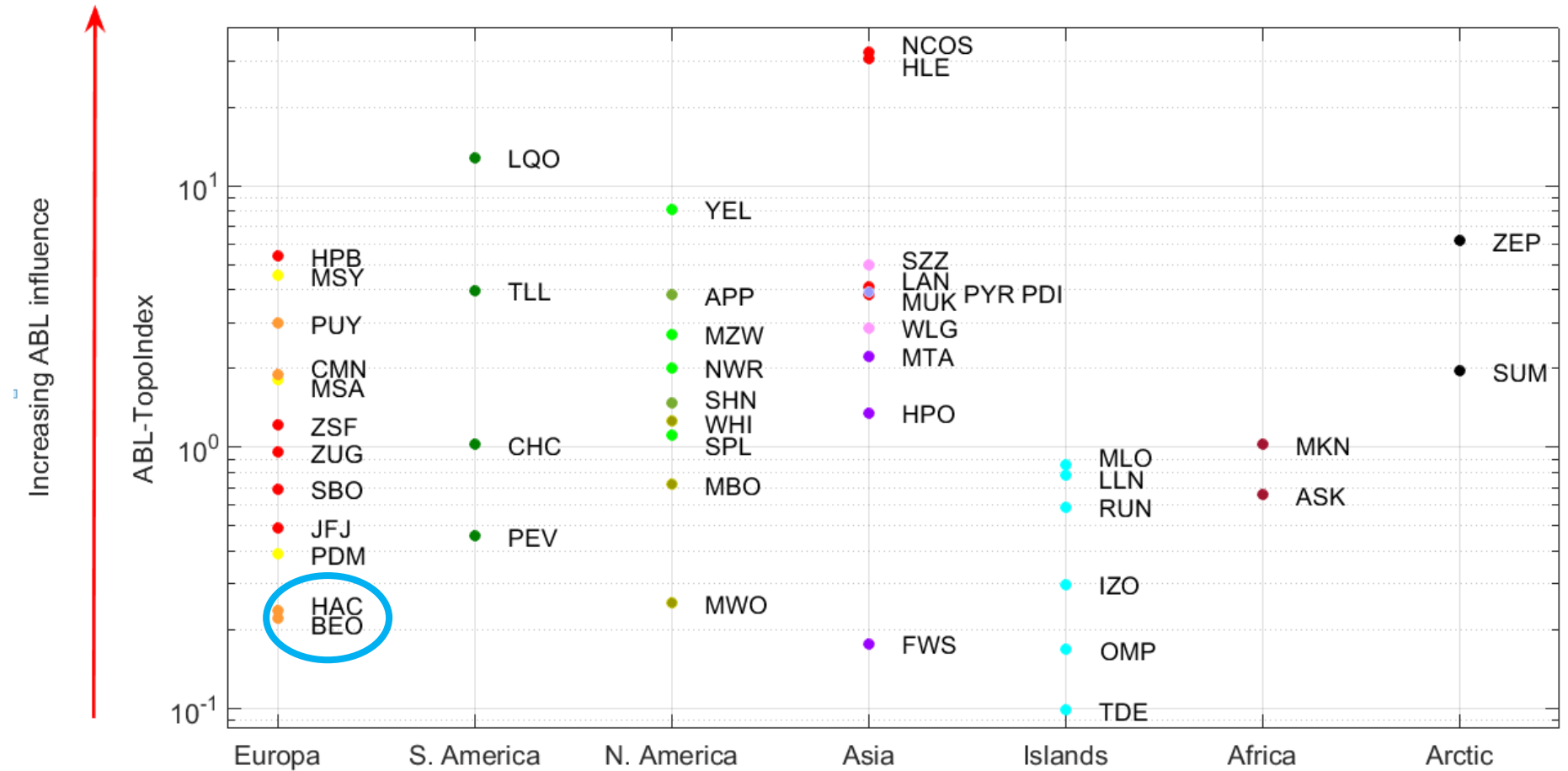
École Polytechnique Fédérale de
Lausanne
(A.Nenes – in-situ instrumentation
A.Berne - cloud remote sensing)



University of Birmingham
School of Geography, Earth and
Environmental Sciences, Birmingham, UK
(in-situ)

The relative influence of Boundary layer air with respect to other stations

Excellent location for Free
Troposphere Research
ranked very suitable
according to the
ABL-TopoIndex





Helmos Mt (HAC) Reported Continuous data



- Number size distribution (SMPS and OPC spectrometers)
- Scattering & Back Scat. coefficient
(3 λ) TSI Nephelometer
- EBC + Abs (Aethalometer AE31 7 λ)

PICARRO G2401CRDS Analyzer
CO₂ + CO + CH₄ + H₂O
Ozone monitor (Thermo)

- Meteorological parameters (T, RH, W Speed & Dir (sonic))

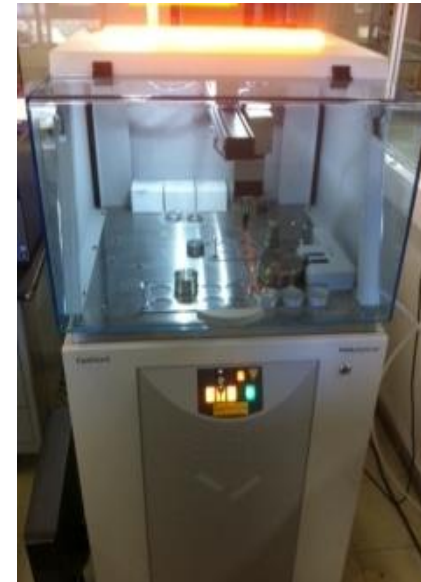


Analysis programme for Hi-Vol Quartz filters @ ERL NCSR Demokritos

- EC/OC Thermo-optical Sunset Lab
- XRF Spectrometry for Major & trace metals (Panalytical E5)
- γ (Gamma) Spectrometry for Radionuclide Tracers (well type HpGe)



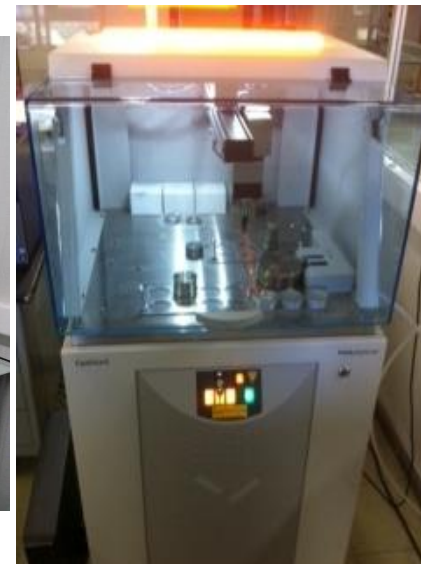
Sampling frequency 12-24h
570 l/min



- IC analysis (EPFL/CSTACC) for hygroscopicity and pH calculations
- Offline AMS (CSTACC) for PMF analysis of sources & OC composition
- ATR-FTIR analysis (EPFL) for OC Analysis
- BrC/OP and soluble metals (Fe, Cu, Mn) with ICP-MS (CSTACC/EPFL)
- Phospholipids analysis for bioaerosol content characterization (EPFL)
- Sugars, polysaccharides (NOA/UoC)



Sampling frequency 12-24h
570 l/min



In-situ measurements (EPFL, CSTACC, KIT, UB)

- Wet Annular Dednuder (EPFL/CSTACC), 1/week for determining NH_3 , HNO_3 , etc. for pH
- WIBS-Neo (EPFL) for measuring Fluorescent PBAPs (continuous)
- PINE (KIT) for measuring IN at specific temperatures (continuous)
- Filter-based IN measurements (KIT) for measuring T-spectra of immersion mode IN (1/day)
- APS (KIT) for measuring supermicron aerosol size distribution
- Aerosol size distribution with SMPS (CSTACC)
- Cloud Condensation Nuclei with a DMT counter (EPFL/U.Birmingham)
- Gerber probe for cloud water content (Demokritos)
- Bioaerosol sampling/analysis with molecular biology tools (TUoC) 1-2/month
- Lightning/atmospheric electricity measurements (DU, NOA)

Check CALISHTO website for full description of instruments and analysis techniques.



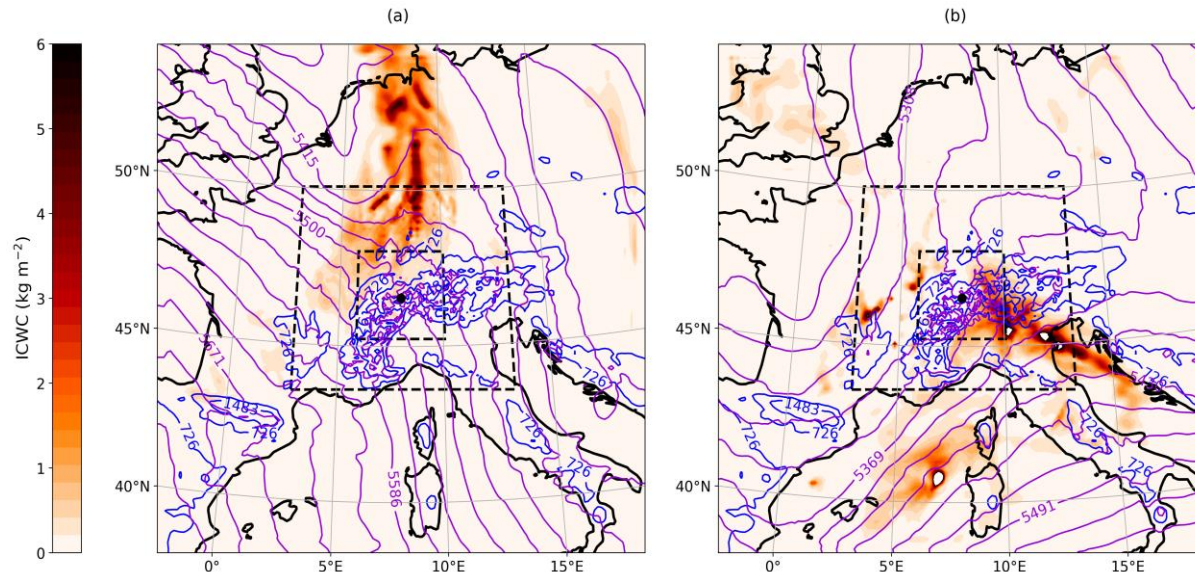
Remote Sensing observations (NTUA, EPFL, FMI, UoL)



- Cloud radars (EPFL/NTUA) (continuous)
- Cloud profiler (HALO) for vertical velocity measurements (FMI/NTUA)
- Aerosol lidars (NTUA)
- MAX-DOAS (AUTH)
- CIMEL (LOA)



- WRF-multinested domain focused on Mt.Helmos
- Full microphysical package for mixed-phase clouds, including secondary ice processes (ice-ice collisions, Hallet-Mossop, droplet shattering and sublimation splintering) following the work of G.Sotiropoulou (CSTACC/EPFL) and P.Georgakaki (EPFL)
- Aerosol fields can be obtained from PMCAMx (-UF) for CCN, IN fields.



Map of WRF setup for cloud formation at the Jungfraujoch station, Switzerland (black dot) with computational domains. Outer domain is 12km, with two embedded domains at 3km and 1km-resolution, respectively. Maps show synoptic conditions around JFJ station at (a) 00:00 UTC, 26 January 2014 and (b) 00:00 UTC, 30 January 2014. The purple (blue) contours show the 500 hPa geopotential height in m (the terrain heights in m). The color shading shows the vertically-integrated condensed water content (in kg m^{-2}). From Georgakaki et al., ACPD, 2021.

CALISHTO communication/outreach

Twitter (Mt.Helmos, Partners and others)

Website (courtesy of A.Georgiou from NOA)

<https://calishto.panacea-ri.gr/>

CALISHTO

Revealing the secrets of aerosol-cloud interactions

1 Oct – 30 Nov 2021

Organized by

Hosted by NCSR Demokritos at the Helmos Hellenic Atmospheric Aerosol & Climate Change Station a PANACEA, ACTRIS, GAW facility

The Goal

The Cloud-Aerosol, InteractionS in the Helmos background Troposphere (CALISHTO-HELMOS Campaign) is a synergy between the PANhellenic infrastructure for Atmospheric Composition and climateChange (PANACEA) Project focusing on WorkPackage 9 (WP9): Aerosol Cloud Interactions (ACI) and the European Research Council (ERC) Pyrogenic Transformations Affecting Climate and Health (PyroTRACH) Project.

The main goal of the CALISHTO Campaign is to provide a better understanding to the key processes involved in the formation and evolution of mixed-phase clouds, using a synergy of various *in situ* and remote sensing instrumentation located at a unique and optimal high-altitude location for targeted studies of aerosol-cloud interactions.

Learn More

Campaign Partners

Twitter (Mt.Helmos, Partners and others)

EGU Atmospheric Sci

Athanasios Nenes

Helmos Station

Website for #CALISHTO #aerosol-cloud interaction campaign is up! Visit calishto.panacea-ri.gr for goals & site description, participants, instrumentation, funding & results. Follow @MtHelmosSite on Twitter for news. @PanaceaRI @LAPLepti @FORTH_ITE @cstacc #ERCfunded @EPFL_en

aerosol-cloud interactions

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