

In-situ absorption measurements in the atmospheric column with Unmanned Aerial Vehicle (UAV) : A contribution to ACTRIS2-JRA1

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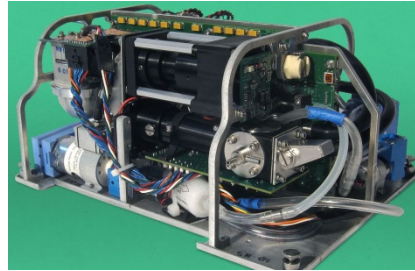
Field strategy

1. Evaluation of miniaturized multi- λ absorption sensors adapted for UAV observations
2. Intensive field campaign
 - Greece/Athens (January 2016)
 - Cyprus/Agia Marina Xyliatou (April 2016) with co-located LIDAR observations **Cyprus Institute - March 2015**
 - ...
3. One-year (weekly) profiles at Agia Marina Xyliatou



Miniaturized absorption monitors

BRECHTEL



Single-channel TAP

Wavelengths 450, 525, 624 nm

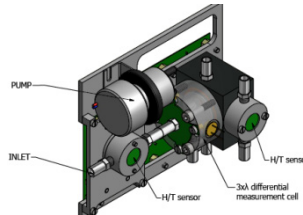
Sample flow 0.1 to 1.7 lpm



Microaeth

Wavelength 880 nm

Sample flow 0.1 to 0.2 lpm



Typhoon

Wavelengths 365, 525, 880nm

Sample flow up to 2-4 lpm



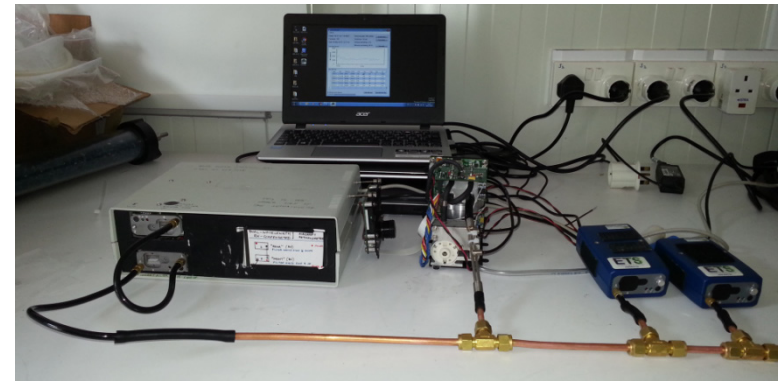
UAV prototype Absorption sensor

Wavelengths 370 & 880 nm

Sample flow up to 2 lpm

Intercomparison study

November-December 2015 (Cyprus)
January 2016 (Greece)



Aerosol BRECHTEL AethLabs



1. Remote site (Agia Marina Xyliatou) / Aged aerosols
(November 2015)



2. Urban site (CyI - Nicosia) / Fresh aerosols (no BB)
(December 2015)



3. Urban site (NOA - Thissio) / Fresh aerosols (BB)
(January 2016)



4. Weather simulation chamber (CyI) / low P and T
(2016)

CyI / rotary-wing UAV - Hexacopter S6

Payload between 1 and 2kg

Endurance: 30 mins



Kotsiatis airfield - Cyprus - October 2015

CyI / Fixed-wing UAV - Skywalker x8



Wing span = 2.1m

Payload up to 3Kg (including batteries)

Endurance: about 1 hour



Kotsiatis airfield - Cyprus - October 2015

CyI / Fixed-wing UAV - Cruiser

Wing span = 3.8m

Payload: up to 12Kg (including fuel)

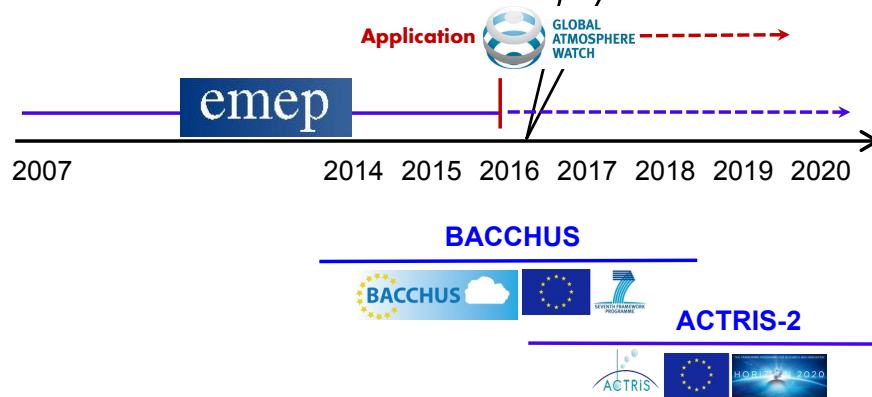
Endurance: up to 4 hours



Agia Marina Xyliatou airfield - Cyprus - March 2015

Intensive study

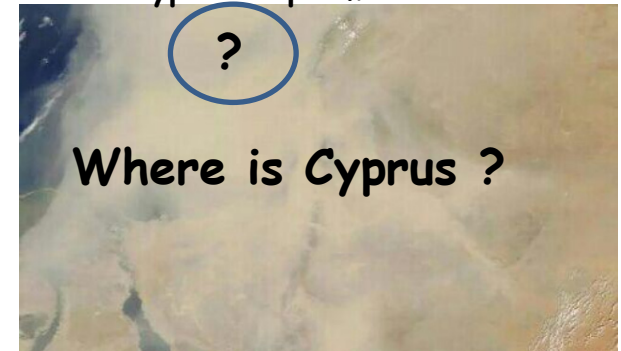
April 2016 (Cyprus)



⇒ Characterization of absorption induced by dust

Severe dust event

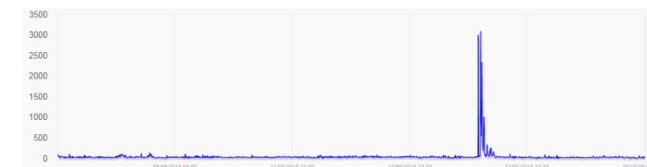
Cyprus September 2015



Where is Cyprus ?



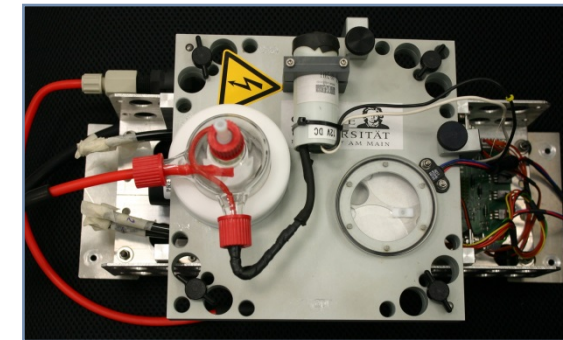
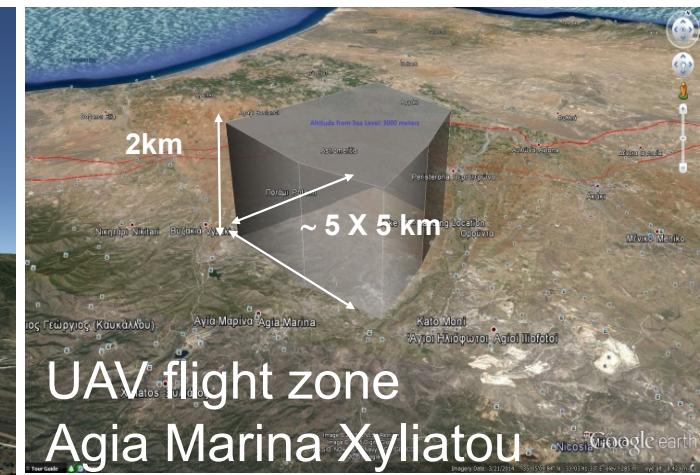
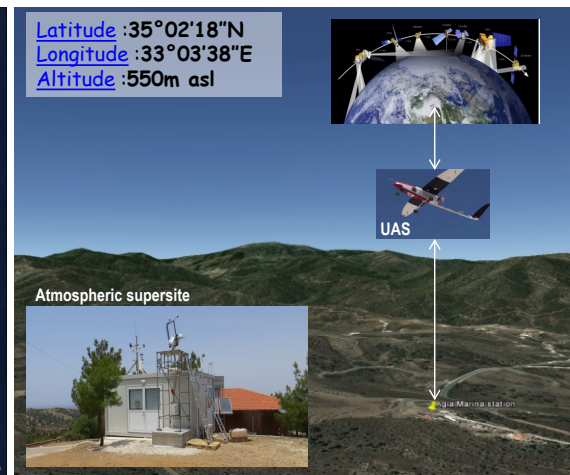
Nicosia September 2015



Last 6 months of PM₁₀ in Nicosia

Long-term monitoring

Weekly flights / April 2016 - End of 2017 (Cyprus)



Parameters: P, T, RH, OPC, CN, BC, O₃, IN
Altitude: 0 to 2.5km (a.s.l.)

Thank you for your attention !

