

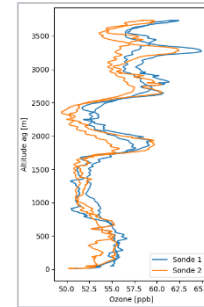
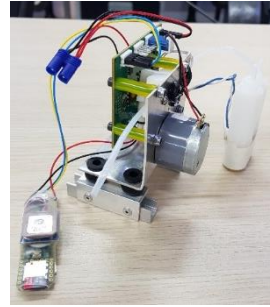
Development and adaptation of sensors and samplers for vertical profiling using fixed-wing drones in the context of the Cooperation to Unravel the Role of Atmospheric Aerosols over the Amazonian Basin (CURE-3AB).

Maximilien Desservettaz*, Christos Keleshis, Panayiota Antoniou, Panagiotis Vouterakos, Yunsong Liu, Christos Constantinides, Agapios Agapiou, Roland Sarda-Esteve, Dominique Baisne, Greg Kok and Jean Sciare.

Ozone Sonde



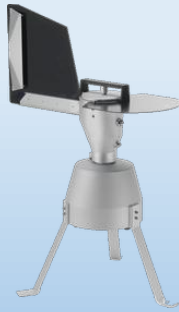
miniaturization
data logger



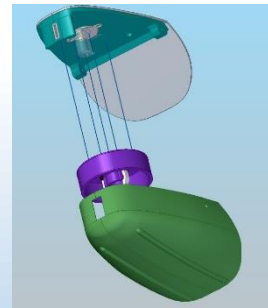
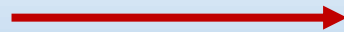
**Unmanned Systems Research Laboratory
(USRL)**

- Adaptation of available drones
- Design and built of need-specific drones
- Fixed-wing & Multi-copters
- EU Licensed pilots
- In-house autopilot & dataloggers
- Private runway & air space
- Adaptation of instrumentation
- Design/Development of sensors/samplers
- ACTRIS IMP | ATMO-ACCESS EU sponsorships

Bioaerosols
sampler



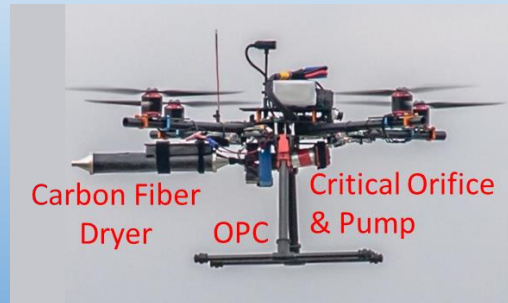
full design
3D printing
motor & controller



Low-cost
OPC



Adaptation
for flight
data logger

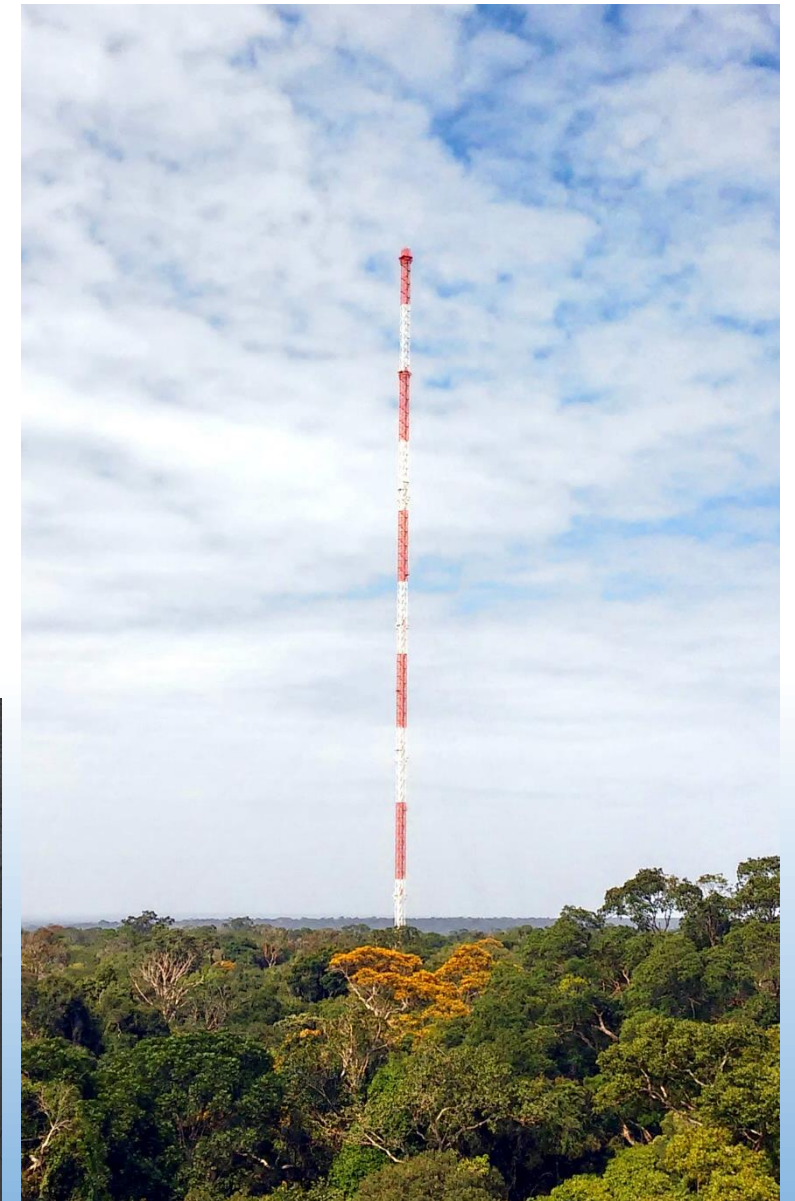


CURE-3AB

The mission of the Cooperation to Unravel the Role of Atmospheric Aerosols over the Amazon Basin (CURE-3AB) is to provide high quality vertical profiles of key atmospheric pollutants relevant to air quality and climate change at the heart of the Amazon Basin (ATTO tower).

Campaign delayed by Pandemic.

- Ozone
- Bioaerosols
- PM size distribution



Ozone (O₃)

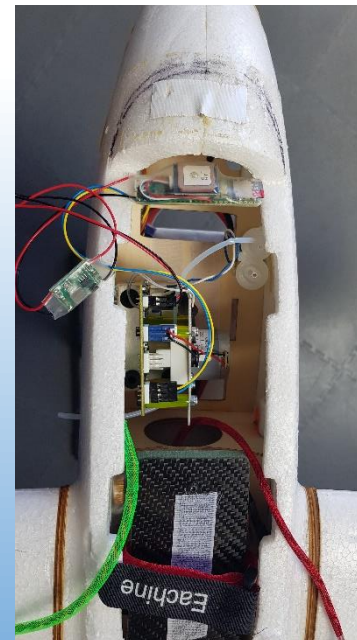
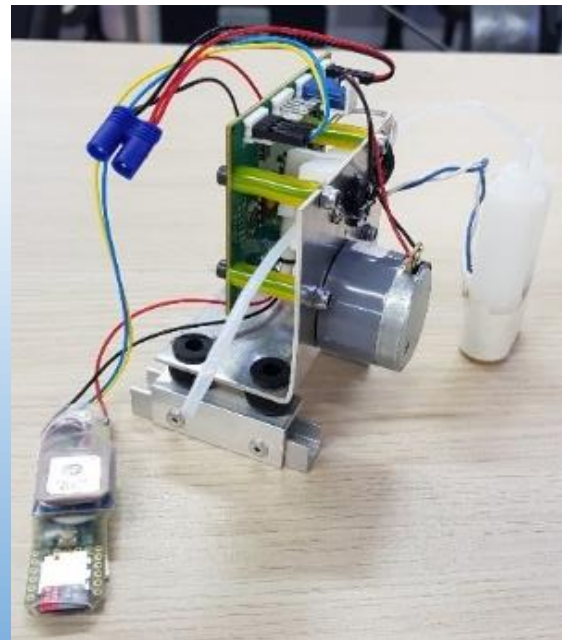
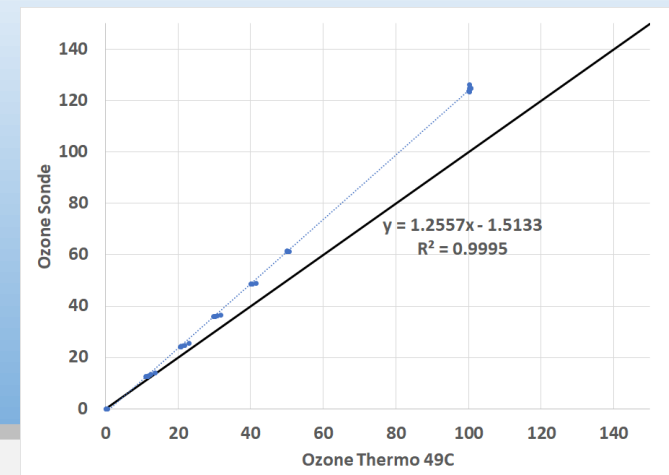
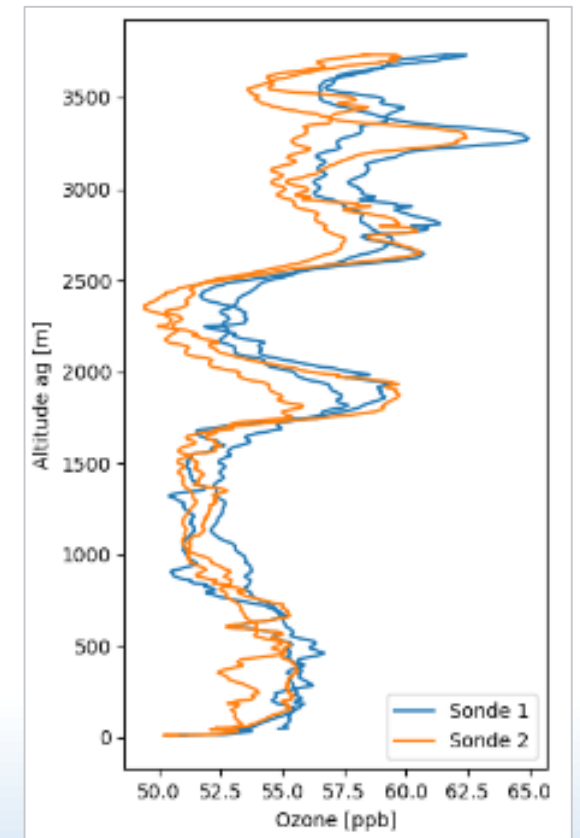
Use of EN-SCI OzoneSondes (also used by NOAA)

Miniaturized

Dedicated data-logger custom built – communication with auto-pilot.

Linear response against reference Thermo instrumentation.

Instrument package now used for fortnightly vertical profiles over Cyprus.



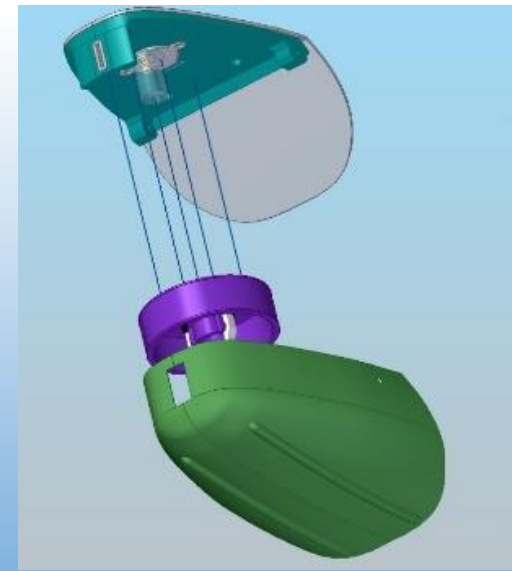
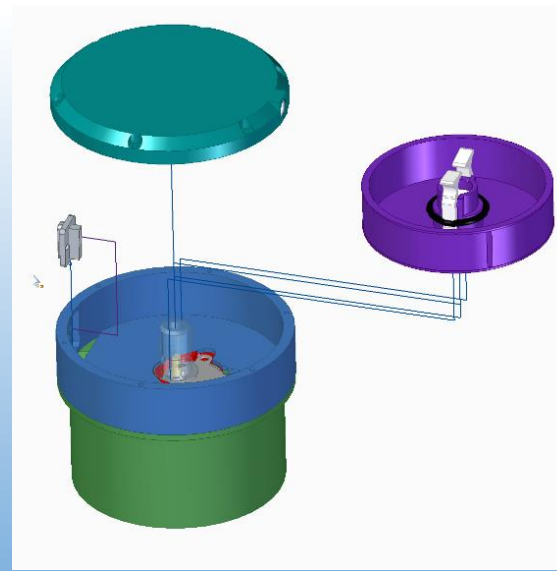
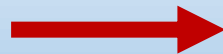
Bio-sampler (Pollens, Fungal Spores, Bacteria)

Design based on reference instruments (VPPS#, EasySPT#)

Intermediate design between reference instrument and UAV shell.

3D printed sampler designed to replace part of UAV shell.

Testing still underway.



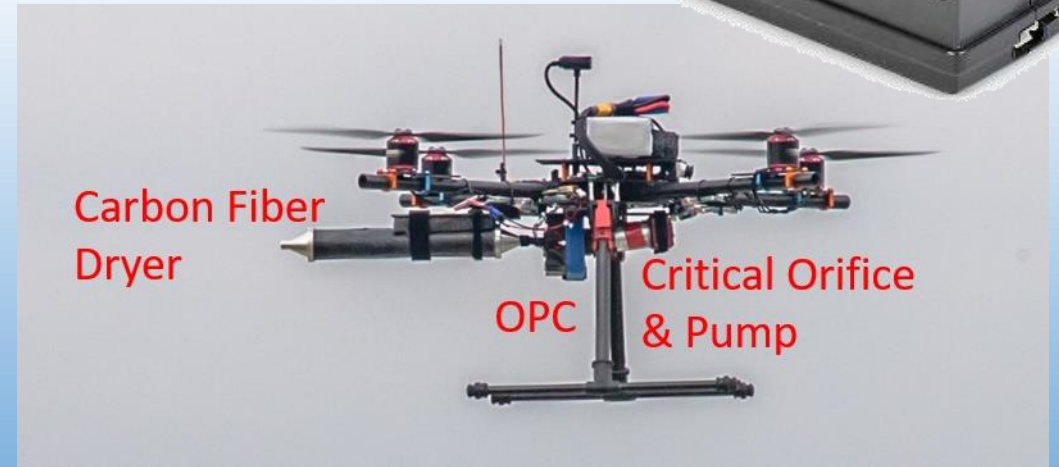
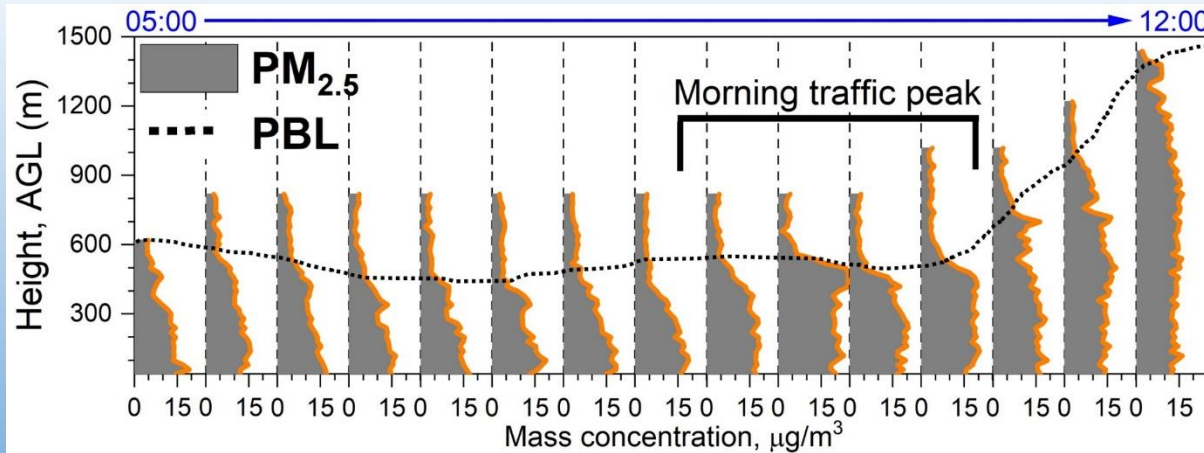
PM size distribution

Using commercially available miniature/low-cost Optical Particle Counter: **Alphasense OPC-N3**

Equipped for robust scientific application:

- In-house developed small carbon-fiber/silica beads dryer – dry aerosols
- Miniature pump + orifice – constant flow
- In-house developed data-logger + pump controller

Tested in Nicosia – PBL development.



Other instrumentation examples

- CO₂ infrared spectrometer
- Dual channel filter sampler
- Open-path OPC
- Back-scattering spectrometer
- Giant Particle Impactor
- Low-cost electrochemical detectors (O₃, NO₂, CO, SO₂)
- Aethalometers
- Other applications
- Heat camera
- 3D scanning sensor

