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## **PANAME – Project synergy of atmospheric research in the Paris region**

Martial Haeffelin, Simone Kotthaus, Sophie Bastin, Sophie Bouffies-Cloch , Chris Cantrell, Andreas Christen, Jean-Charles Dupont, Gilles Foret, Val rie Gros, Aude Lemonsu, et al.

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# PANAME

## Project synergy of atmospheric research in the Paris region

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EGU23 - CL2.8  
25<sup>th</sup> April 2023

# PANAME

An initiative to promote collaborations and develop multi-project synergies on urban environment research in Paris.

Paris region urbaN Atmospheric observations and models for  
Multidisciplinary rEsearch

<https://paname.aeris-data.fr>

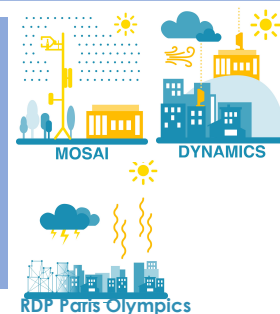
## Cities and Air Quality

- Anthropogenic and biogenic emissions
- Ultrafine particles
- Hydric stress □ tree emissions



## Cities and Meteorology

- Urban ABL dynamics
- Local circulations
- Urban heat island effects
- Effects on thunderstorms



## Cities and Climate

- GHG emissions and concentrations
- Effect of urban transformation



## Impacts

- Interdisciplinary studies
- Impact on human health
- Impact on human activities

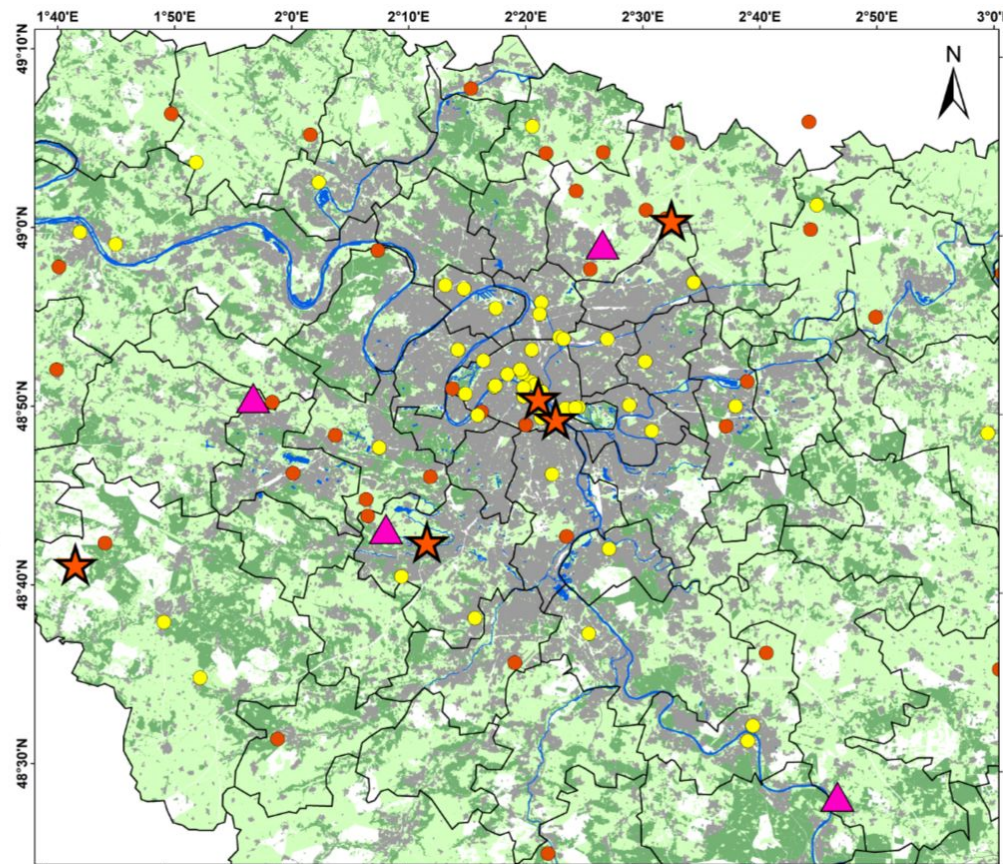
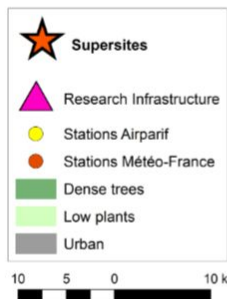


# Measurement network design



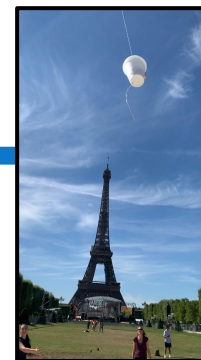
## New observations:

- process studies
- model evaluation

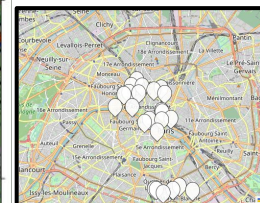


## Before 2022:

- no meteo or flux station in urban setting
- limited vertical measurements



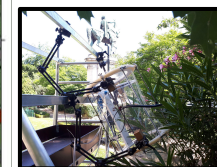
radiosoundings



high-density  
meteo network



atmospheric  
remote sensing



Urban biogenic  
emissions

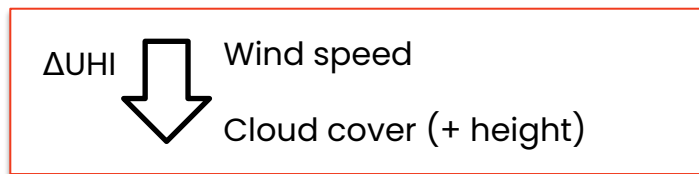
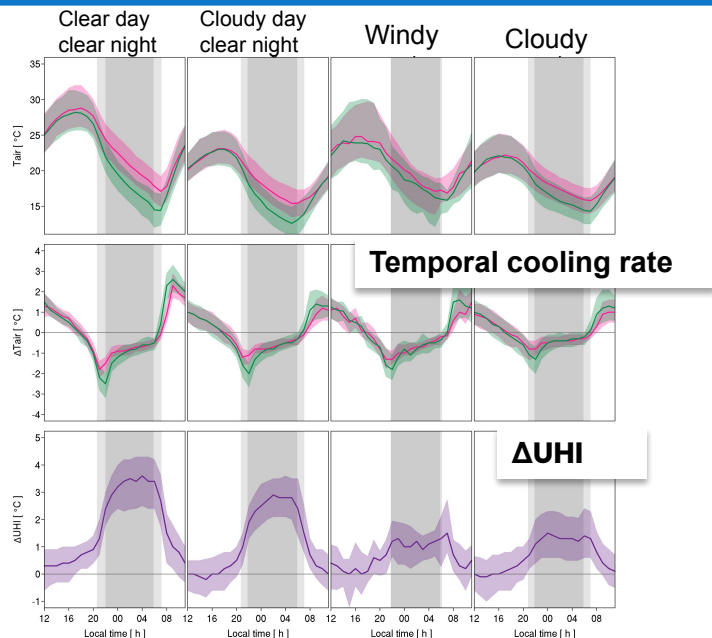


Forest atmospheric  
chemistry

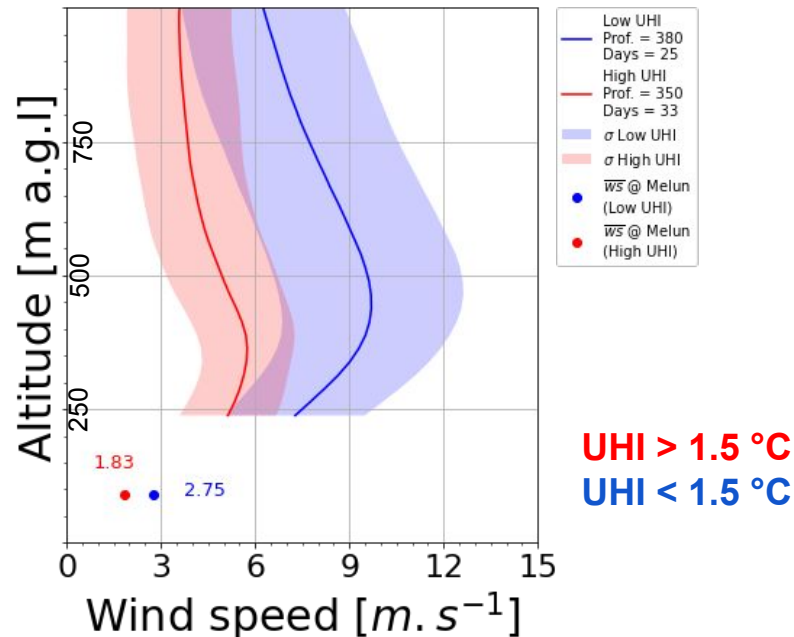




# Atmospheric boundary layer – DYNAMICS



- Frequent (70%) nighttime low-level jet
- Impact on Urban Heat Island (UHI)  
JJA 2022

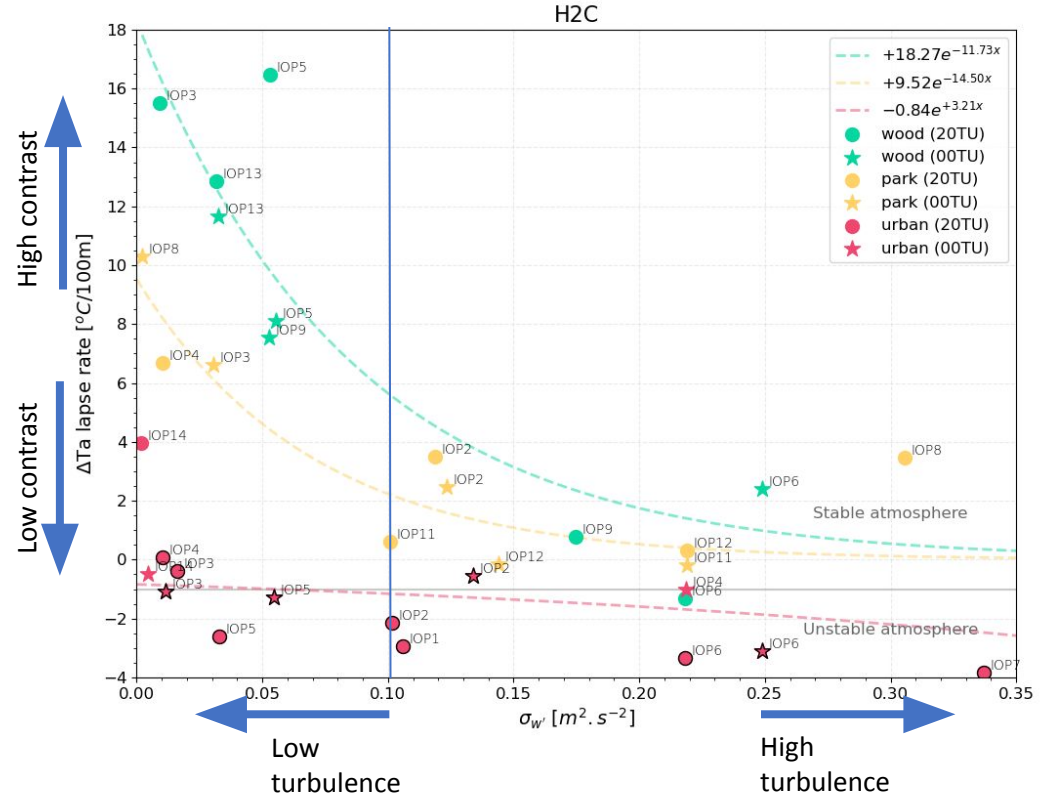


Vaisala Doppler wind lidar @QUALAIR-SU; Paris Region PhD @LMD: Jonnathan Cespedes

# Cooling by urban green spaces - H2C



## Evening cooling and turbulence



### LOW turbulence conditions:

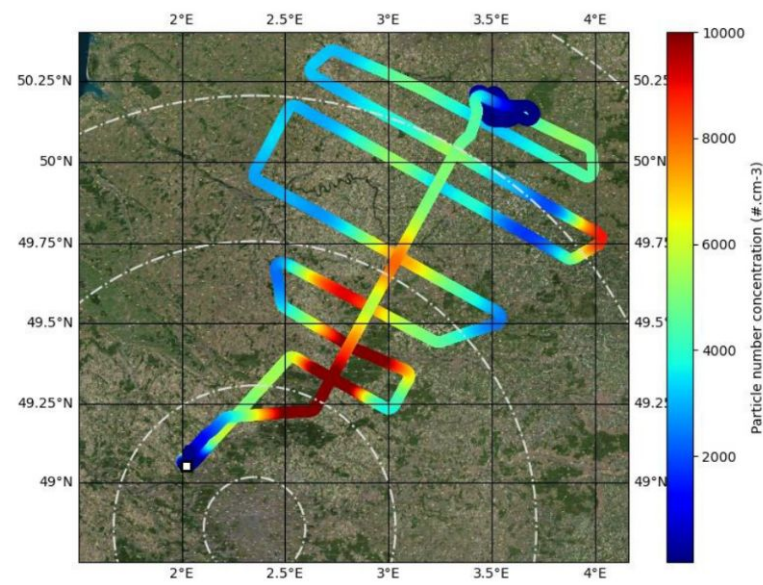
- STRONG temperature contrasts between Wood-City and Park-City
- Cooling of vegetation is STRONG in woods and parks, but not in city.

### STRONG turbulence conditions:

- Weak temperature contrasts between Wood-City and Parks-City
- Cooling effect of vegetation is mixed vertically and horizontally

- Impacts of chemistry of mixed urban and biogenic emissions on
  - Oxidants levels
  - Speciation of reactive nitrogen
  - Organic carbon oxidation pathways
  - Aerosol composition & properties
- Consequences for air quality, biosphere health & representation in models
- <https://across.aeris-data.fr>

Particle Number Concentration (11-478 nm)  
ACROSS-Aircraft Observations – CNRM (C. Denjean)



Demonstration of plume evolution  
due to dilution and chemistry  
downwind of Paris in particle number

**AS5.9 Urban to rural atmospheric observations and models for multidisciplinary research**

Posters: Wed. 26 April, posters up all day, presenters at 14:00-15:45 CEST (Hall X5)

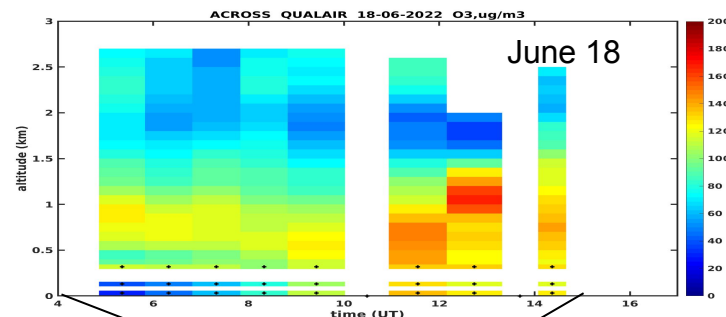
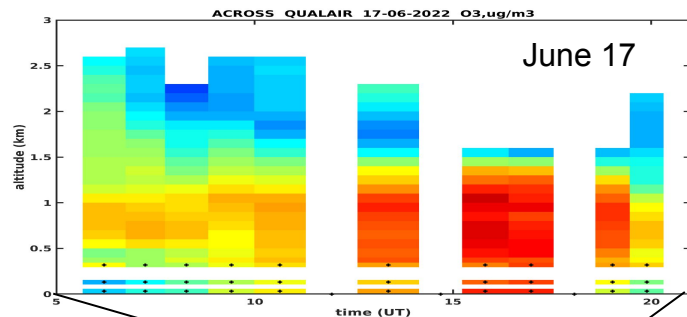
Oral: Wed. 26 April, 16:15-18:00 CEST (Room M2)

Contact Chris Cantrell, LISA-IPSL

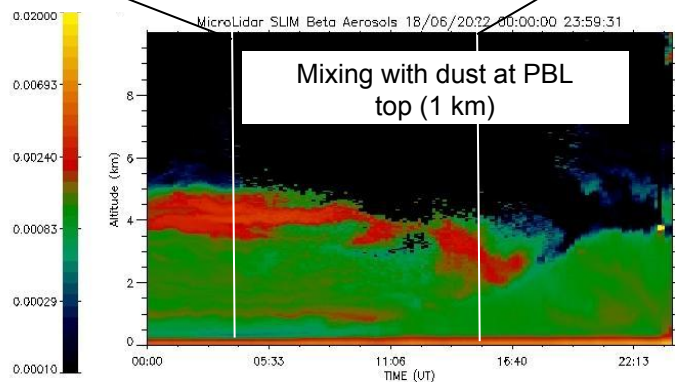
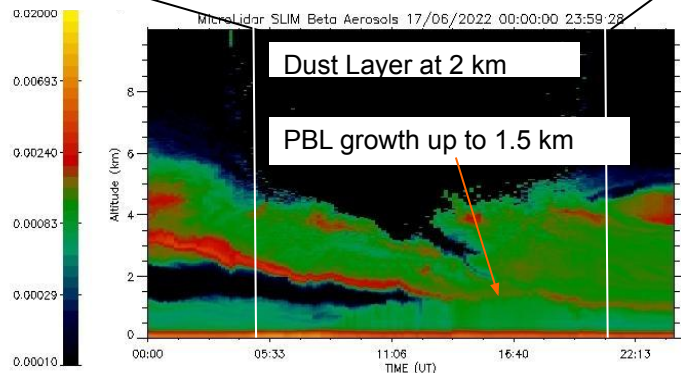
# Ozone profile variability - ACROSS

## Ozone pollution peak in Paris and advection of dust plume above the ABL

Ozone profiles



Aerosol profiles



High ozone in residual layer ( $>140 \text{ ug/m}^3$ ) → daytime ozone peak exceed  $180 \text{ ug/m}^3$

Lower ozone in transported dust layer & dust → reduced photolysis and ozone



# Biogenic VOC emissions – sTREEt



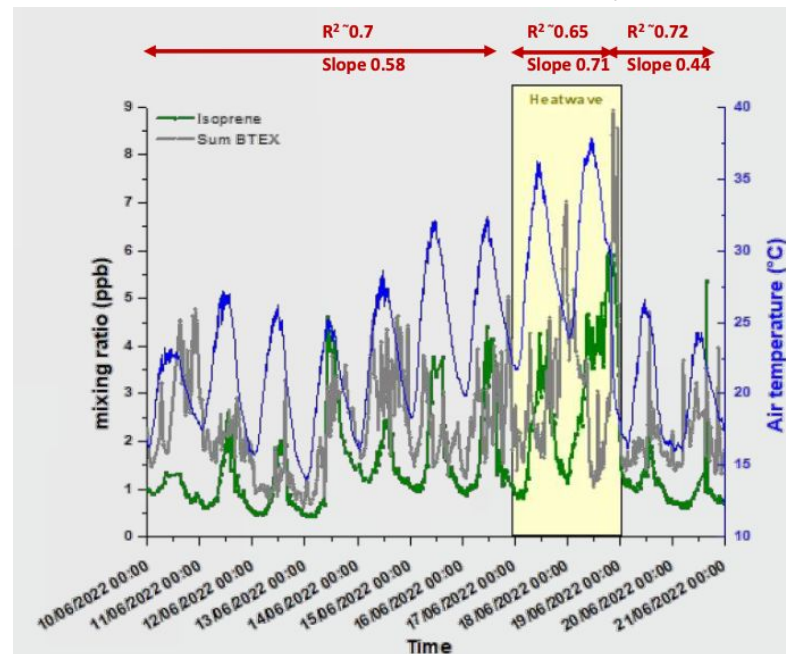
What is the impact of urban stress on biogenic VOC emissions of city trees and its consequence on air quality?

In central Paris, significant traffic-related source to ambient isoprene and monoterpene (typical biogenic markers)

But increase biogenic source during heat wave

PANAME allows to study biogenic VOCs at multiple sites (urban, suburban, forest, ...)

Isoprene and Benzene/Toluene mixing ratio in Paris Garden located near heavy traffic



# PANAME data portal by



### PANAME DATA PORTAL: Content

**1. Objectives and projects**

- Scientific issues
- Scientific questions
- Projects contributing to PANAME

**2. Measurement networks and campaigns**

- Urban, suburban, rural super sites
- Research infrastructures (ACTRIS, ICOS)
- Distributed operational networks
- Satellite data

**3. Modelling activities**

- Weather prediction
- Chemistry-transport
- Climate models
- Campaign deployment planning

**4. Data access**

- Data catalog
- Data visualization

<https://paname.aeris-data.fr>

### PANAME DATA PORTAL: Catalog

- Each **Data Product** is described in a specific **Data Sheet**
- Each data product has a **DOI**
- Access to data and metadata via an **API** to facilitate interoperability
- Use of **controlled vocabularies**. (<https://skosmos.aeris-data.fr/>)
  - AERIS
    - CF standard names
    - Parameters
    - Instruments
    - Platforms
    - Projects
    - Data policies
  - Reference Thesaurus
    - GCMD (NASA)
    - WIGOS



### PANAME DATA PORTAL: Visualizations

Many data visualizations are available:

### Improvements and future developments

- Graphical tools improvements
- Serve PANAME Jupyter notebooks on a Jupyter Hub
- Cross-referencing of data from various sources
- Use of citizen science data

Thank you for your attention

<https://paname.aeris-data.fr>

Contact [martial.haeffelin@ipsl.fr](mailto:martial.haeffelin@ipsl.fr)