

# ST9: Vertical Profiles IAGOS

## RI-URBANS FINAL SCIENCE MEETING

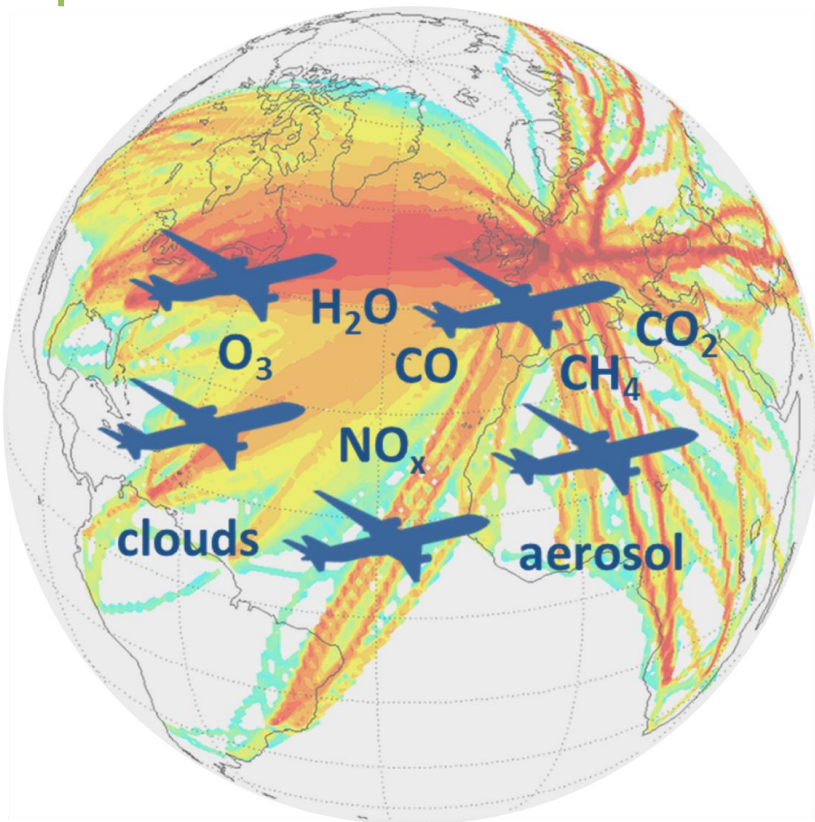
Research Infrastructures Services Reinforcing Air Quality  
Monitoring Capacities in European Urban & Industrial Areas









RI-URBANS (101036245)  
RI-URBANS FINAL SCIENCE MEETING 8<sup>th</sup>-9<sup>th</sup>  
September 2025



# IAGOS: European Research Infrastructure for monitoring climate and air quality using commercial aircraft



- 8  AIRLINES
- 11  AIRCRAFT  
Airbus A330/A340
- 8  RESEARCH  
INSTITUTES
- 30  YEARS  
of data since 1994
- 330  VISITED  
AIRPORTS
- 470  PEER REVIEWED  
PUBLICATIONS

## 2 METHODS



8 Essential Climate Variables  
10 Aircraft, daily flights



100 Atmospheric Components  
1 Aircraft, 4 flights per month

 Lufthansa  AIRFRANCE  CHINA AIRLINES  CATHAY PACIFIC  IBERIA  HAWAIIAN AIRLINES  discover airlines  AIR CANADA



70,000  FLIGHTS



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# Air Quality Observations on IAGOS

## IAGOS-CORE instruments in avionic bay



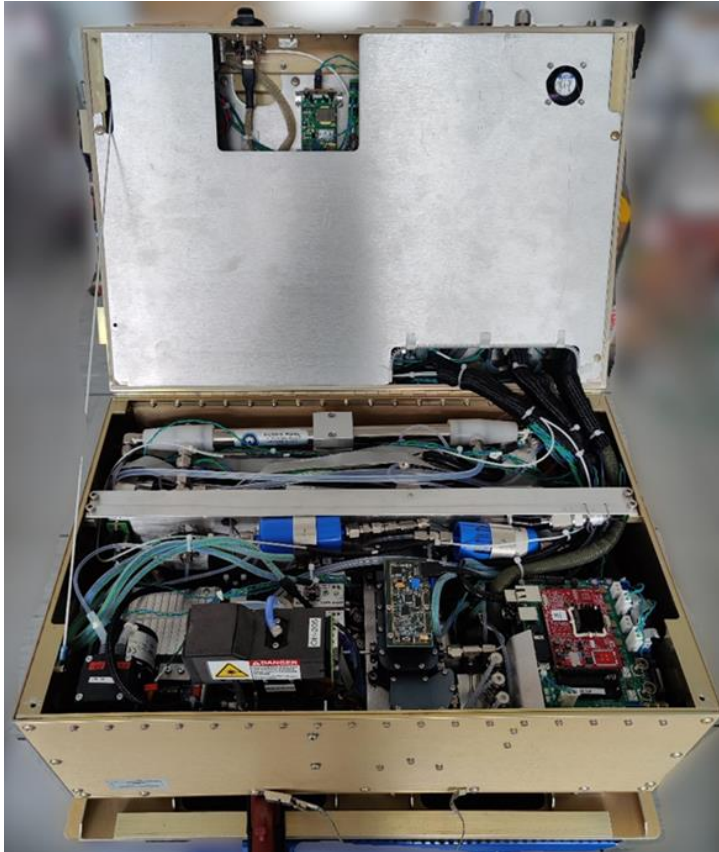
## IAGOS-CORE inlet plate



## Parameters from currently operated instrumentation:

- P1: CO, O<sub>3</sub>, and basic avionic data
- ICH: water vapour, RH<sub>i</sub>, RH<sub>w</sub>, and temperature
- BCP: cloud particle number concentration
- P2b: NO, NO<sub>2</sub>, and NO<sub>x</sub> mixing ratio
  - Now on three European airlines with regular profiles measured over Frankfurt, Madrid, and Paris
- P2d: CO<sub>2</sub>, CH<sub>4</sub>, CO, and water vapour

# Air Quality Observations on IAGOS



## New air quality instrument (P2e):

- Aerosol total number concentration
  - Aerosol size distribution for diameter range: 125 nm – 4  $\mu$ m
  - Aerosol extinction coefficient at wavelengths of 450 and 630 nm
  - NO<sub>2</sub> mixing ratio
- Installation expected for November 2025

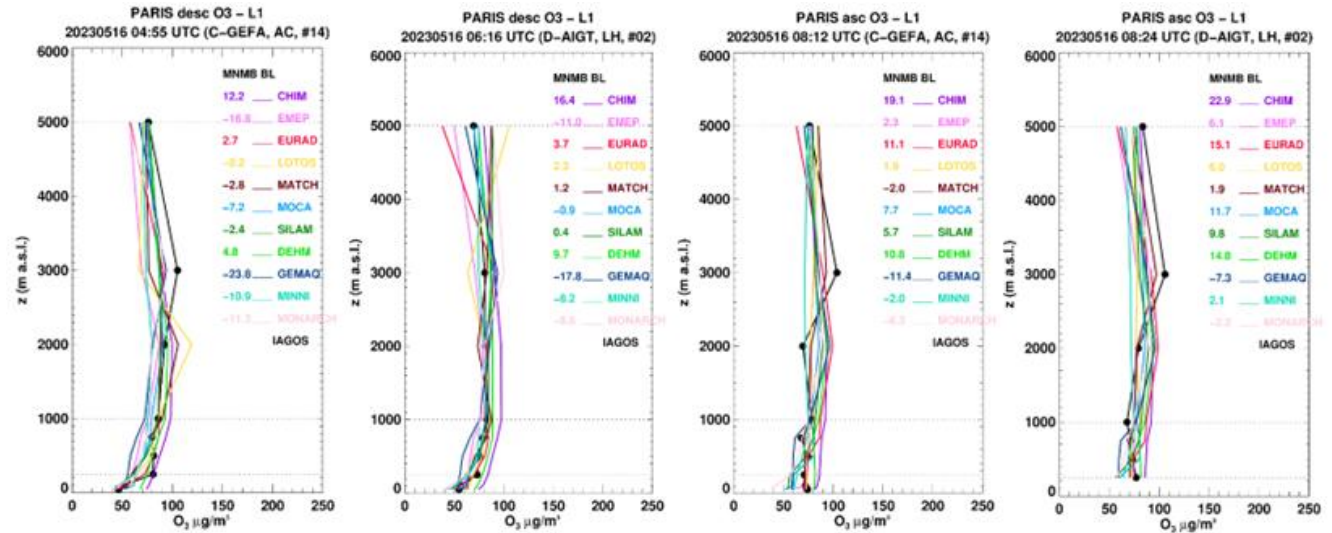
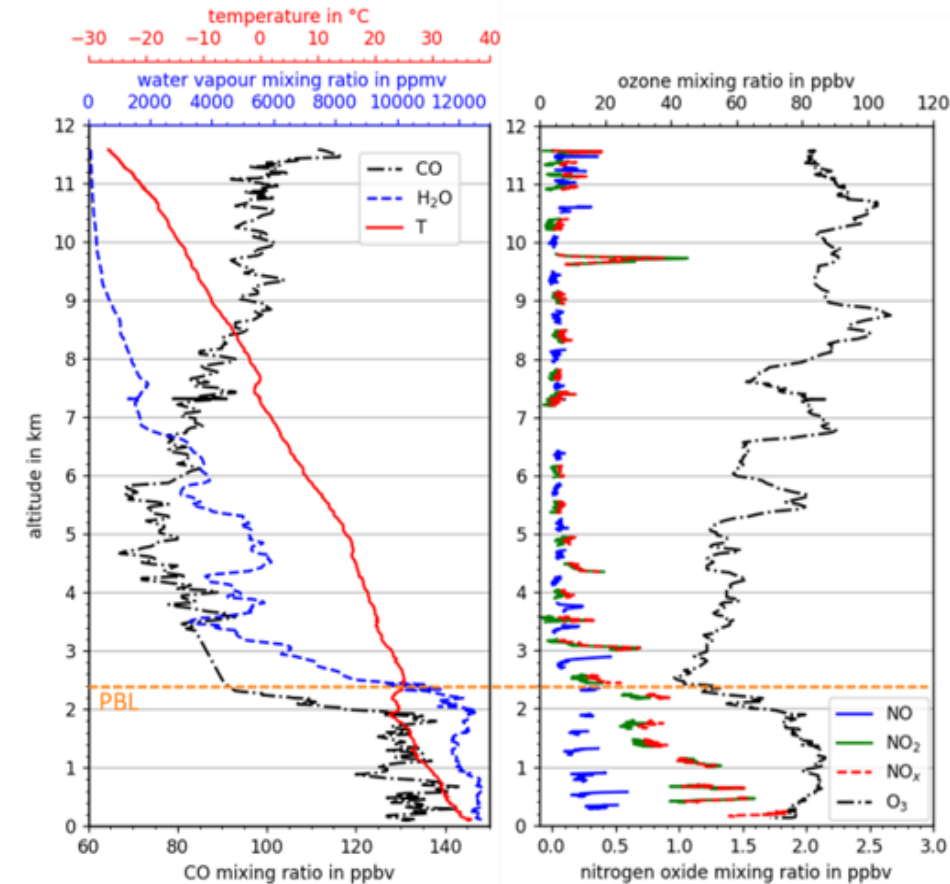
# Air Quality Observations on IAGOS

## IAGOS in-situ profiles provide information about:

- layers of enhanced mixing ratio that can affect the urban air quality;
- the vertical distribution and budget of gases (e.g., O<sub>3</sub> or NO<sub>x</sub>) in the PBL;
- the vertical profile of the NO to NO<sub>2</sub> ratio within the PBL;
- co-located information about the atmospheric boundary layer height;
- the diurnal cycle of trace species (e.g., O<sub>3</sub>; see example for Paris: increase from 50 to 70 μg m<sup>-3</sup> from 04:55 – 08:24).

### Frankfurt (European heatwave)

3 Aug 2022 18:26:45 (UTC+2)



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# Air Quality Observations on IAGOS



ORGANISATION INSTRUMENTATION IAGOS FLEET DATA PUBLICATIONS RELATED PROJECTS EVENTS

Search product by name

Case sensitive search

- ▶ CAMS Global
- ▶ CAMS Regional
- ▼ RI-URBANS
  - MILANO NRT profiles
  - BARCELONA NRT profiles**
  - PARIS NRT profiles

## BARCELONA NRT PROFILES

a)

Parameters :

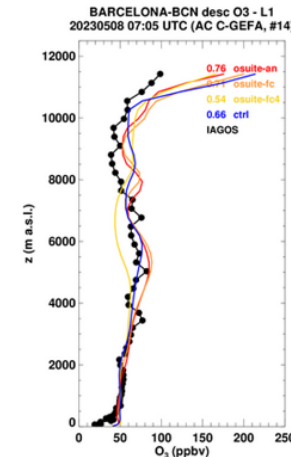
CO H2O **O3**

Time :

**0705h** 1130h

Navigation icons

2023-05-08



b)

Parameters :

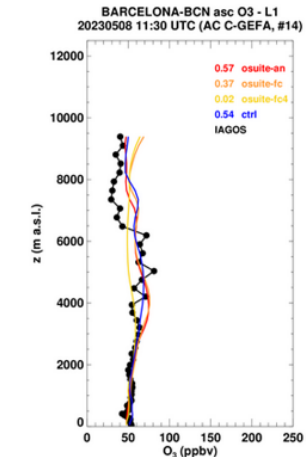
CO H2O **O3**

Time :

0705h **1130h**

Navigation icons

2023-05-08



## Visualisation Service for vertical profiles:

- Available at [www.iagos.org/products](http://www.iagos.org/products)
- For CAMS global and regional scales
- Subset of profiles over the RI-URBANS pilot cities is accessible under the category RI-URBANS:
  - Currently: Amsterdam, Milano, Barcelona, Paris, and Zurich.
- NRT: CO, O<sub>3</sub>, and H<sub>2</sub>O
- In preparation: L1/L2 NO, NO<sub>2</sub>, and NO<sub>x</sub>

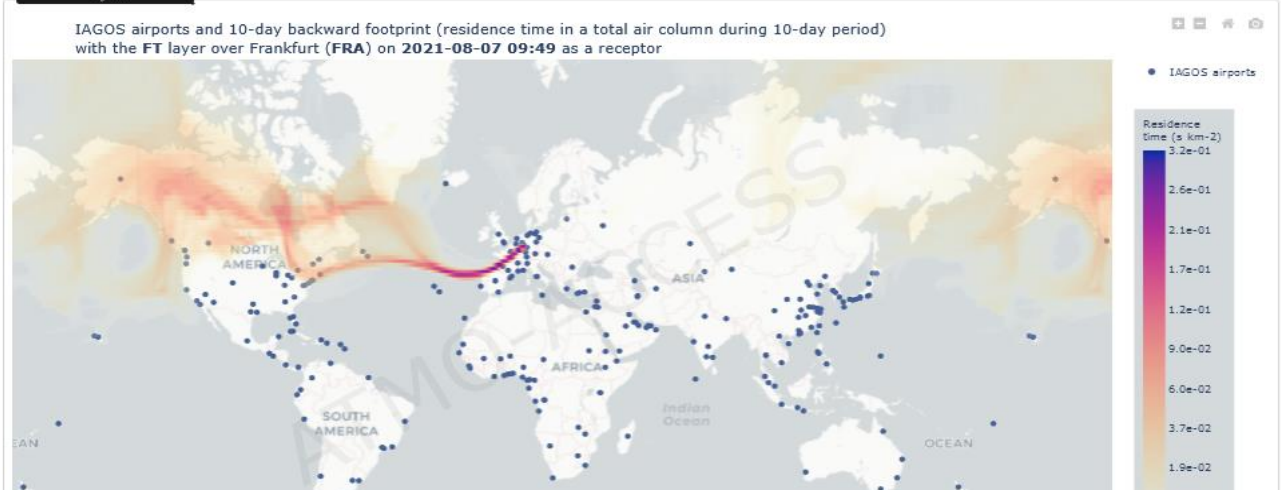
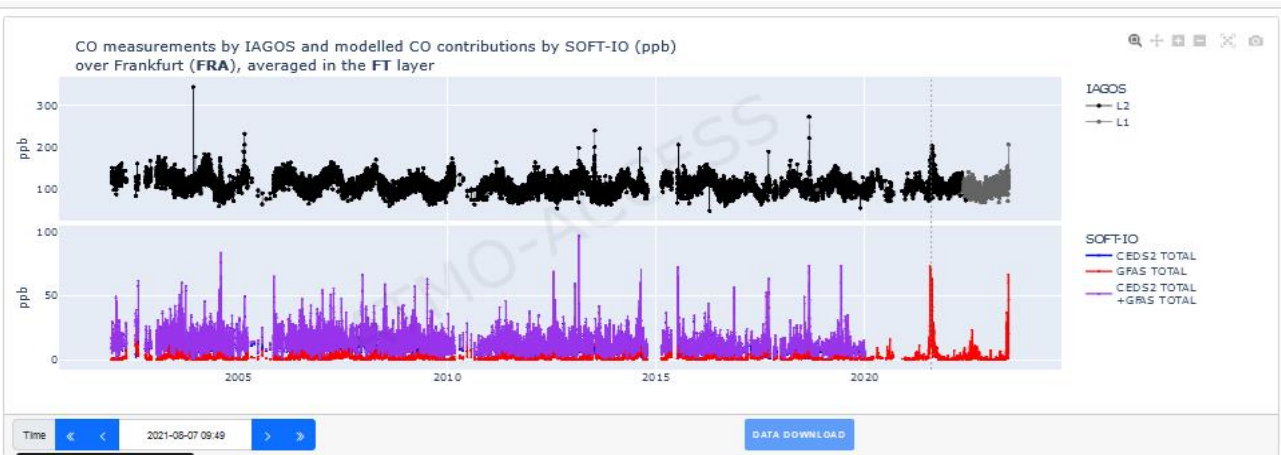
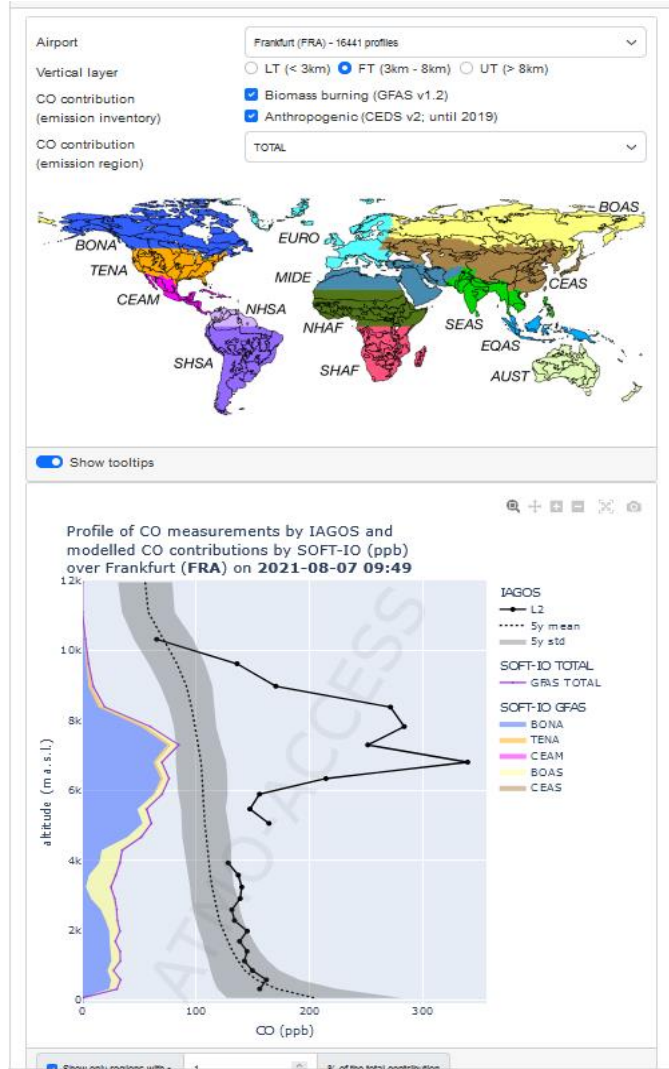


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# ATMO-ACCESS: FOOTPRINT VIEWER



<https://services.iagos-data.fr/atmo-access/footprint>



**Thank you for your attention!**

**For questions, please contact:**

**[c.mahnke@fz-juelich.de](mailto:c.mahnke@fz-juelich.de)**