





#### **PAUL- Pilot Application in Urban Landscapes**

- Subtitle: Towards integrated city observatories for greenhouse gases
- Rechristened into: ICOS Cities
- Reacting to the H2020 European Green Deal call
- Coordinated by ICOS ERIC

Some numbers:

- 31 partners
- 48 months: 1 October 2021 30 September 2025
- 1121 PM (23 persons full time)
- Budget 13 M€



# **Goals of ICOS Cities (PAUL)**

- Many European cities need/want to measure greenhouse gases
  - To monitor implementation of their commitment to emission reductions in the framework of the Paris Agreement
  - Show progress and raise awareness of their citizens
- The project is aiming at finding out and defining:
  - The specific requirements of the city stakeholders
  - Which observations are needed, where and how and at which cost
  - Which tools should be used to process and analyse the observations
  - How to best communicate the results
  - The contents of the toolkit to setup a observation system in a given city as a service
- To better serve the diversity of cities of Europe, we pilot the different methods by implementing the elements in a large (Paris), medium (Munich) and small (Zurich) city.





- Demands of the cities
- Demands of the policy-makers
- Behavioural aspects and attitudes of citizens

- Based on high-quality observation data and climate models
- Using the latest service design methods
- Services for cities, policy-makers and industry



#### Many Partners and WP leaders are also part of the CoCO<sub>2</sub> community



WP	Work Package Title	Lead Participant Short Name
1	City needs and data for services with impact	TNO, NL
2	Modelling	UH, Helsinki
3	Observations	ALU-FR, Freiburg
4	Data harmonisation and integration	ICOS ERIC, Lund
5	Communication, engagement, and exploitation	ICOS ERIC, Helsinki
6	Integration into Research Infrastructures	CMCC, Italy
7	Project management	ICOS ERIC



# **Expected impacts**

- Advance scientific and technical progress by testing novel methods and instruments
- Develop prototype services to the cities in interdisciplinary teams
- Support improvement of these city emission inventories by providing them direct observations for a reference to the indirect methods such as traffic counts and fuel consumption
- Contribute to planning of a sustainable long-term infrastructure perspective for city observations to enable the multiannual time series needed for GHG assessment beyond the project duration
- Contribute to the work of global organizations such as WMO in guidance and best practises for regional and urban observations





# Paris – Munich – Zurich + 12 others





- - 1e+04

1e+02

ffCO<sub>2</sub> Point sources kg yr<sup>-1</sup>

- 1e+06
- 1e+07
- 1e+08
- 1e+09





### **Emission inventories**



- 100m resolution for all 3 cities
- GIS based using building resolved emissions
- TNO-GHGco (100m resol)
- Harmonisation and benchmarking of the different emission inventories
- Scenario based spatio-temporal emissions modelling
- Integrating social sciences to model behavioural patterns





# Observations

- Dream: over-instrument a city and see what is enough
- Budget reality ...
- 6 x soil microclimate stations, 6 x sap flow systems and 1 x tower bioclimate systems (in all 3 cities)
- Low and mid-cost sensor networks
- Tall tower EC
- Mini wind LIDAR installed in EC tower footprint
- Scanning wind lidars

- Total column (TCCON) in Paris and München
- Co-emitted species, 14C, Quantum cascade laser system for EC fluxes of COS in Zurich
- Manual measurements of soil respiration, leaf area index, leaf photosynthesis and leaf respiration



# Models

- Biogenic model evaluations in pilot cities, shared and building on with CoCO<sub>2</sub>
- Transport model simulations (forward and adjoint), shared and building on CoCO<sub>2</sub>
- GRAMM/GRAL (München)
- LES (München and Paris)





# FAIR and transparent data pipelines

Harmonisation of observational, modelling input and modelling result data across the cities, models and end user services, to enable interoperable, transparent and open access to underlying data

- Build and contribute to IG3IS best practice guidelines
- Map all existing and new data streams with respect to
  - data formats
  - requirements of the models
  - timeliness
- Develop strategy to ingest these data streams in a coherent framework
- Design, implement and apply the processing pipelines
- Federated and scalable setup
- Transparency and reproducibility are key



# Webinars on Wednesdays – open to registered participants (yes you can)



30-minutes online presentations topics related to greenhouse gas measurement and climate change in urban landscapes.

https://www.icos-cp.eu/projects/icoscities-project/icos-cities-talks



- 24 November 2021 at 9 am CET
  Oslo's climate budget a tool to achieve ambitious climate goals
   Speaker: Astrid Ståledotter Landstad, Climate Agency, City of Oslo
- 8 December 2021 at 3 pm CET
  Seeing the tree for the forest: New ways to use eddy covariance to map landscape fluxes
   Speaker: Ankur Desai, University of Wisconsin-Madison
- 15 December 2021 at 9 am CET
  Surveying attitudes towards climate change and energy preferences among citizens
   Rory Fitzgerald, ESS ERIC
   Diana Zavala-Rojas, ESS ERIC









