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A presentation slide with a purple background on the left and a night sky with sand dunes on the right. The purple section contains the title "The atmospheric GHG monitoring network of the Metropolitan Area of Barcelona" in white, bold, sans-serif font. Below the title, the presenter's name "Gara Villalba" and affiliation "Autonomous University of Barcelona" are listed, followed by the date "14 December 2023". The right section features the "AGU23 WIDE. OPEN. SCIENCE." logo and a background image of sand dunes under a starry night sky with a meteor streak.

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AGU23



GARA VILLALBA

Professor
Autonomous University
of Barcelona



CARME ESTRUCH

Researcher
Sustainability Area
Eurecat



ROGER CURCOLL

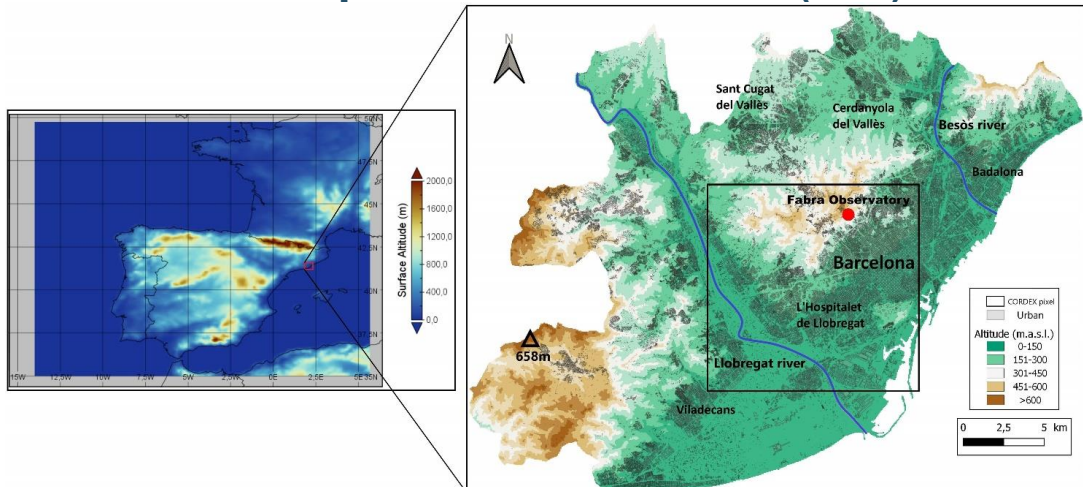
Technician and
researcher
Polytechnic University of
Catalunya



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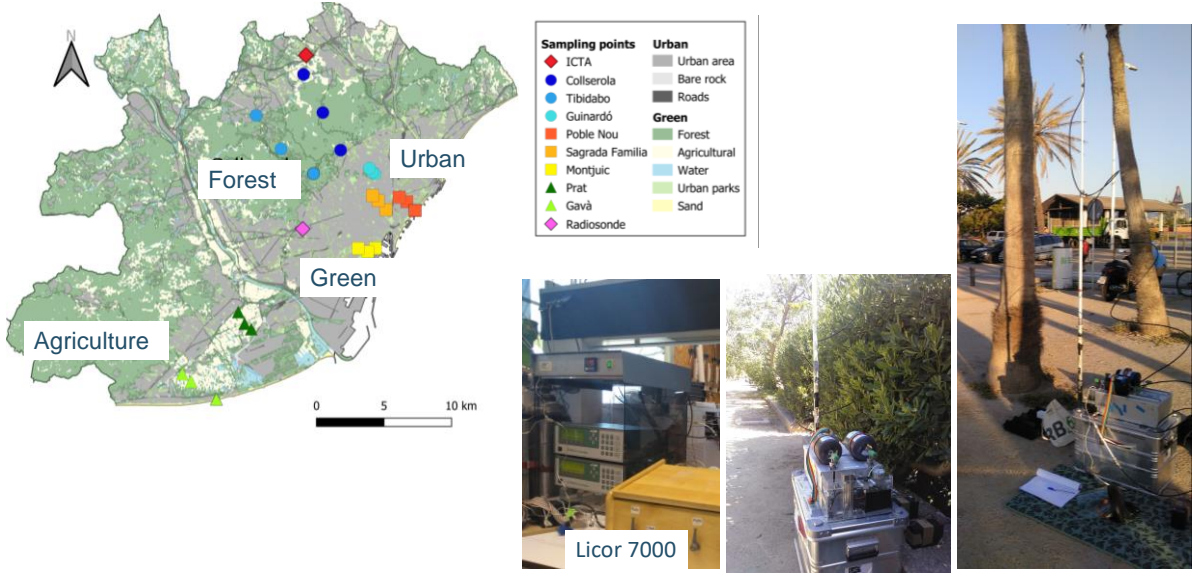
The Metropolitan Area of Barcelona (AMB)



- Total area of AMB: 636 km², 40% urban fraction
- 3.3 million people, 16,000 people/km²
- AMB is limited by two rivers running NW to SE and their deltas: Llobregat (S) and Besòs (N).
- The port with a LNG regasification station, the airport.
- Industrial activity: Chemicals, pharmaceuticals, automobiles, electronics, and appliance manufacturing.

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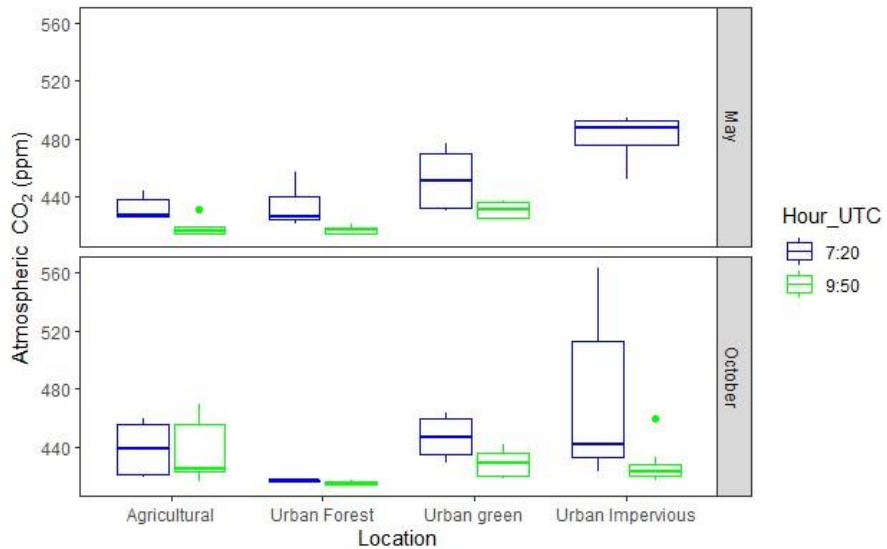
Sampling campaign 2020 to design monitoring network



Manuscript “Exploring how the heterogeneous urban landscape influences CO₂ concentrations: the case study of the Metropolitan Area of Barcelona” recently submitted to Urban Forestry and Urban Greening.

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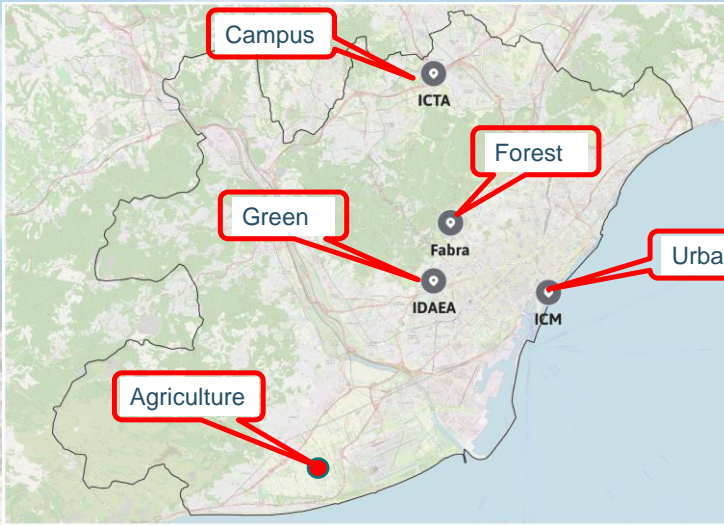
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GHG monitoring network of the Metropolitan Area of Barcelona



-5 picarros (4 out of 5 implemented) for long-term measurements CO₂, CH₄, H₂O_v to determine efficacy of GHG emission reduction strategies.

-ICOS Cities PAUL: Pilot Application in Urban Landscapes - Towards integrated city observatories for greenhouse gases



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GHG monitoring network of the Metropolitan Area of Barcelona



Observatori Fabra building



Forest (FABRA)



ICTA-LIAB building



Campus (ICTA)



Institut de Ciències del Mar



Urban (ICM)



Agricultural

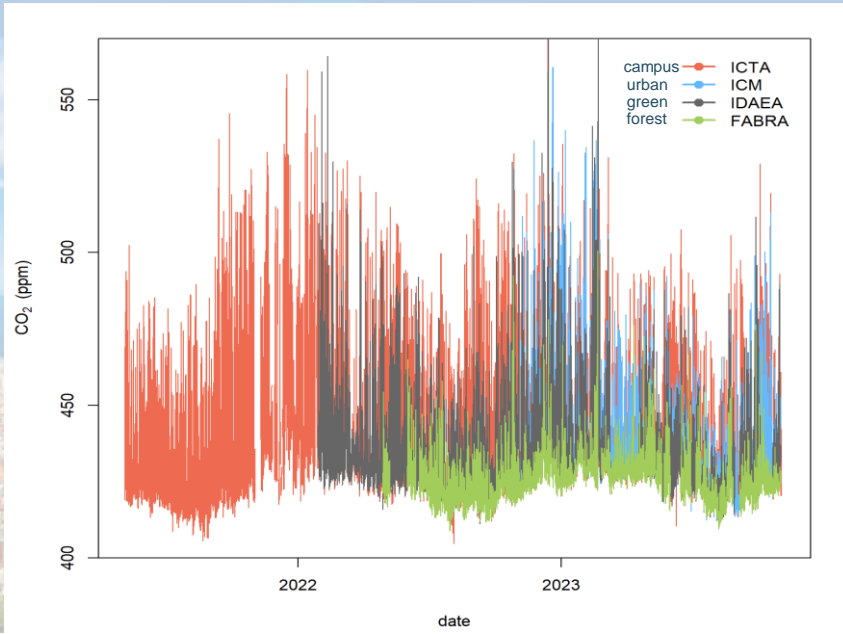


Green (IDAEA)



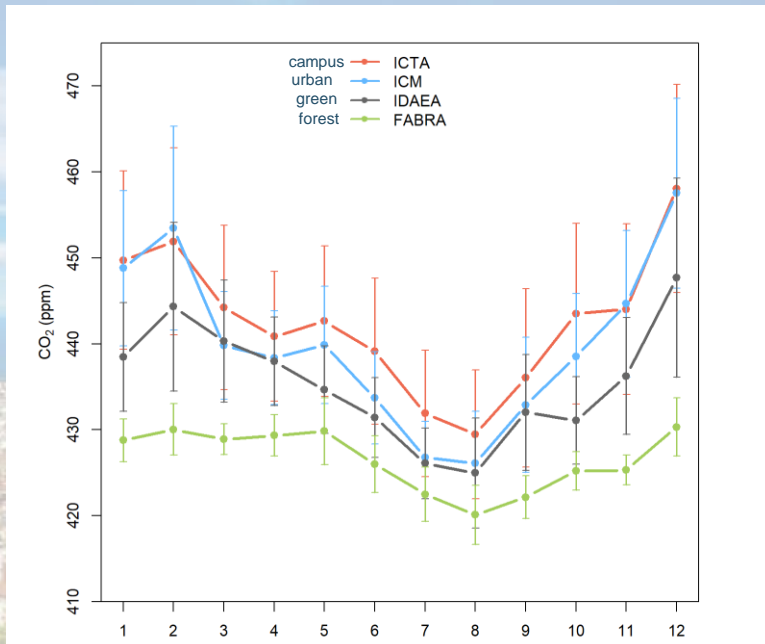
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CO2 historical data so far

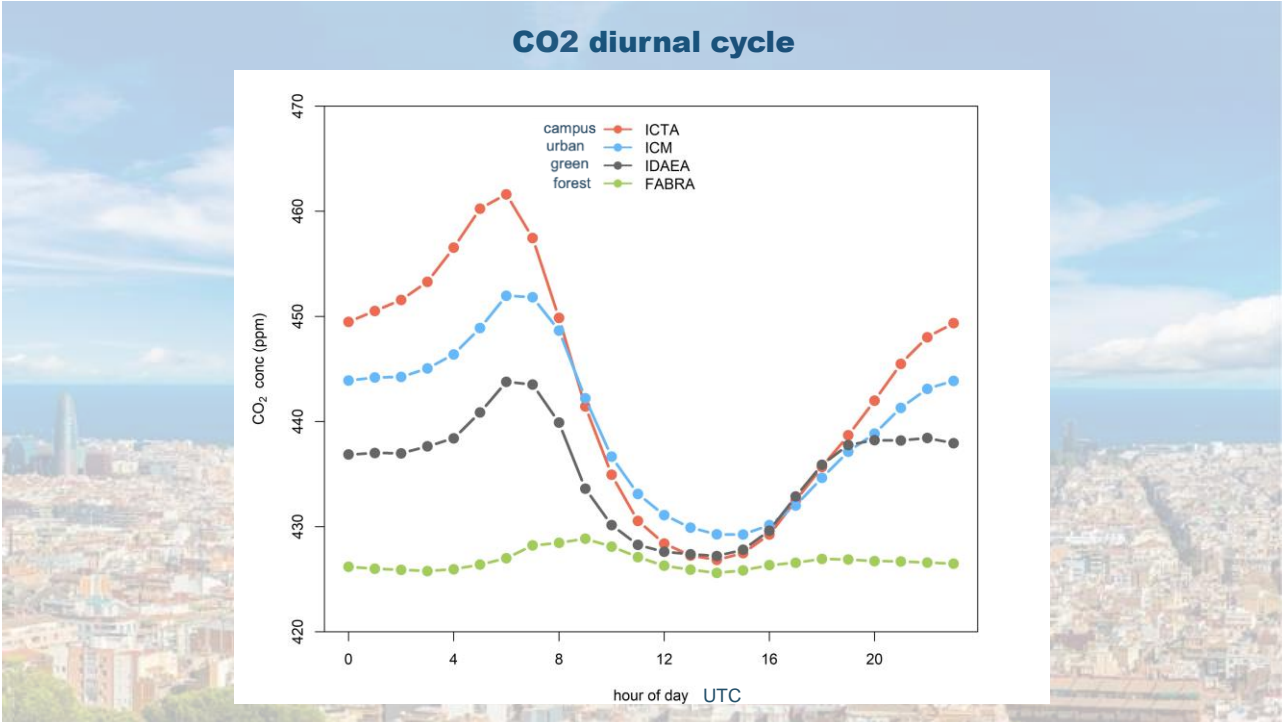


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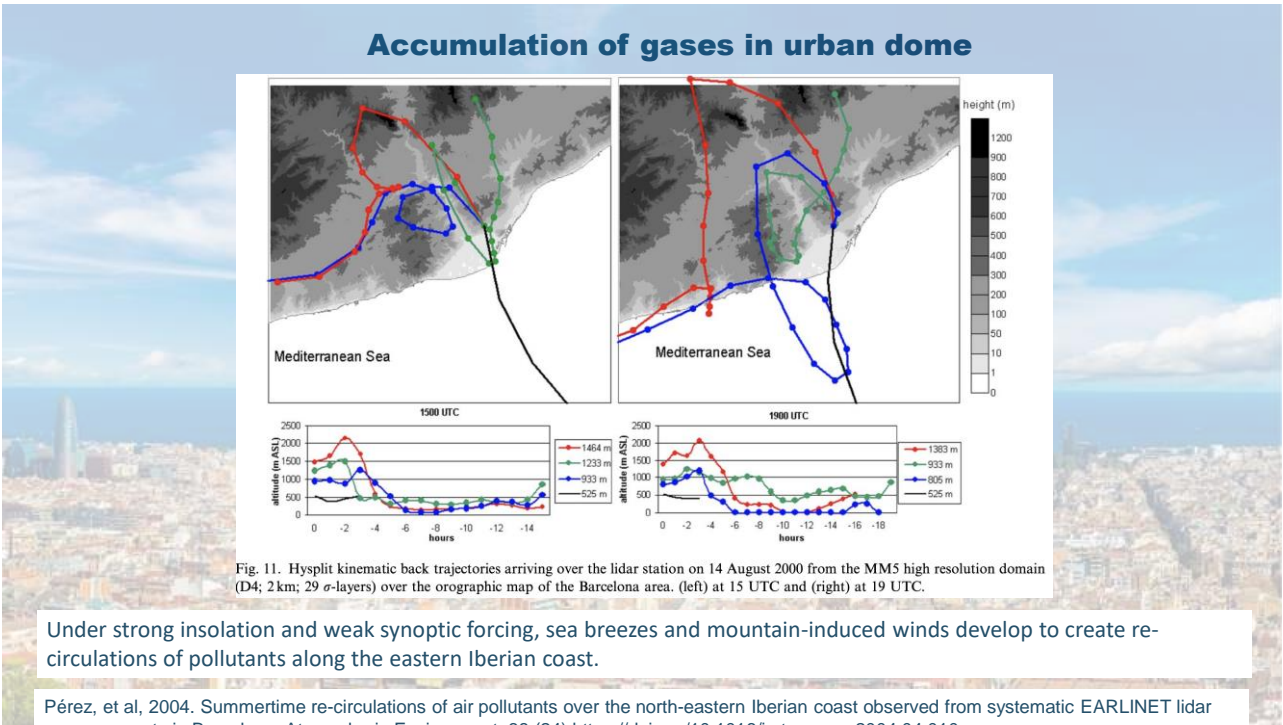
CO2 yearly cycle



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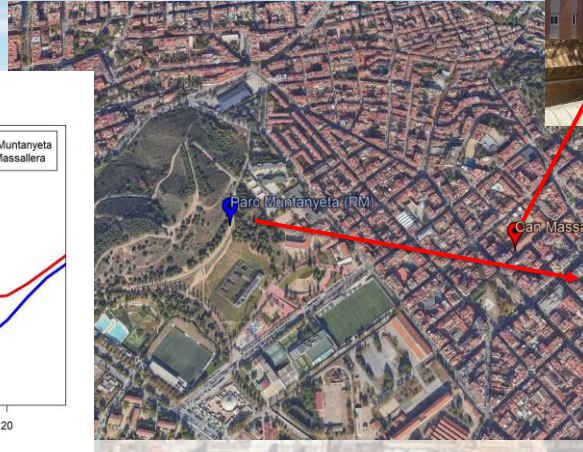
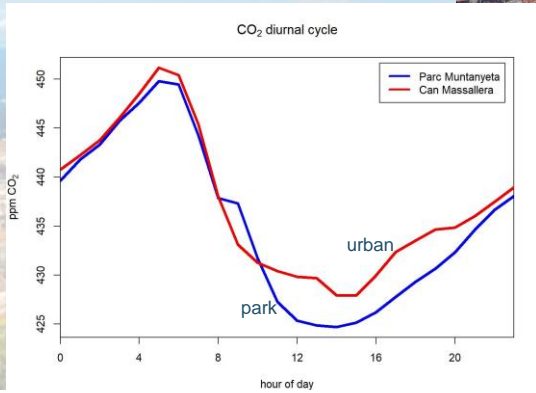
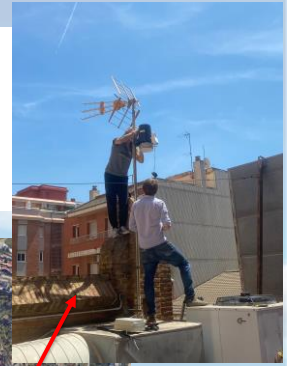
Under strong insolation and weak synoptic forcing, sea breezes and mountain-induced winds develop to create re-circulations of pollutants along the eastern Iberian coast.

Pérez, et al, 2004. Summertime re-circulations of air pollutants over the north-eastern Iberian coast observed from systematic EARLINET lidar

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Future work

- Implementation of fifth station in agricultural area, also capturing activity of the airport
- Complement picarro analyzers with CO₂ and CH₄ sensors
- Determine the contribution of urban vegetation, emission reduction strategies
- validation of inverse modeling to complement bottom-up GHG inventories.
- How do land-use, geography, and local climate influence CO₂ concentrations over the heterogeneous landscape of an urban area.



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THANK YOU

Gara.Villalba@uab.cat

<https://urbag.eu/ghg/>

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CH4 diurnal cycle

