



Adj. Prof. Henrik Rödjegård,
Research Manager at Senseair

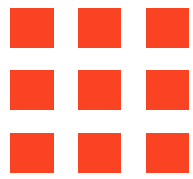
henrik.rodjegard@senseair.com

I have a passion for gas sensing!

Everyone should have access to
high-resolution and real-time
air-quality data.



The ULISSES team!



**AIR SENSORS
FOR EVERYONE,
EVERYWHERE**



Scientific communication
and management



Fabrication equipment business



Physics modelling
research



Material research



Smart sensor research
MOEMS research



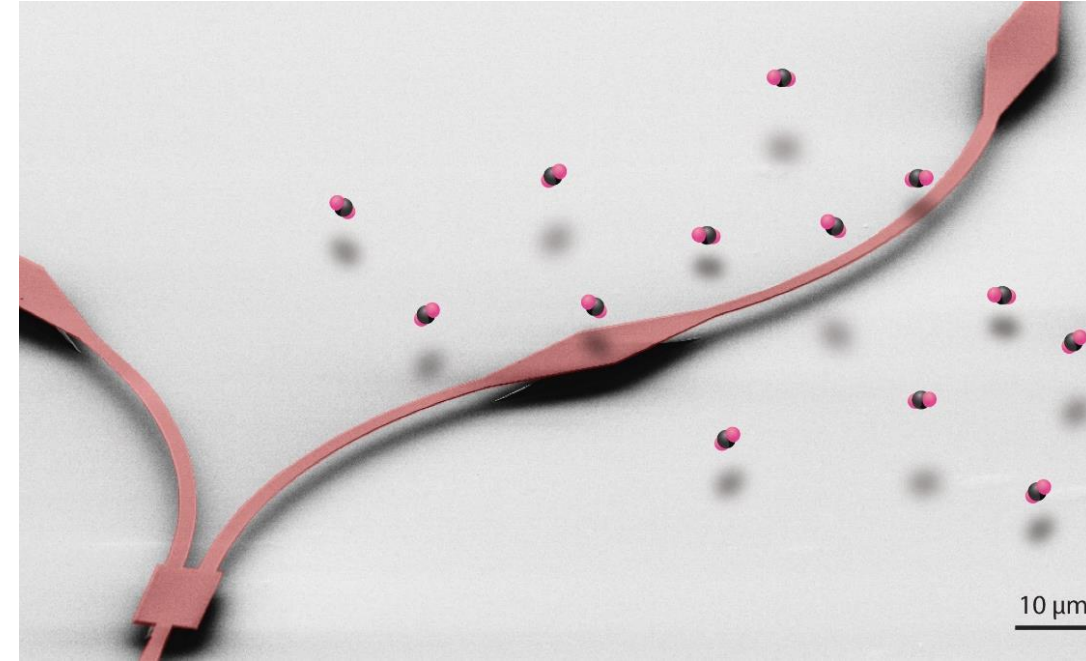
Opto-electrical
device research



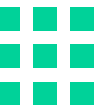
Develop gas sensor technology
and business



Graphene fabrication business



**Together we make an
optical gas sensor chip!**

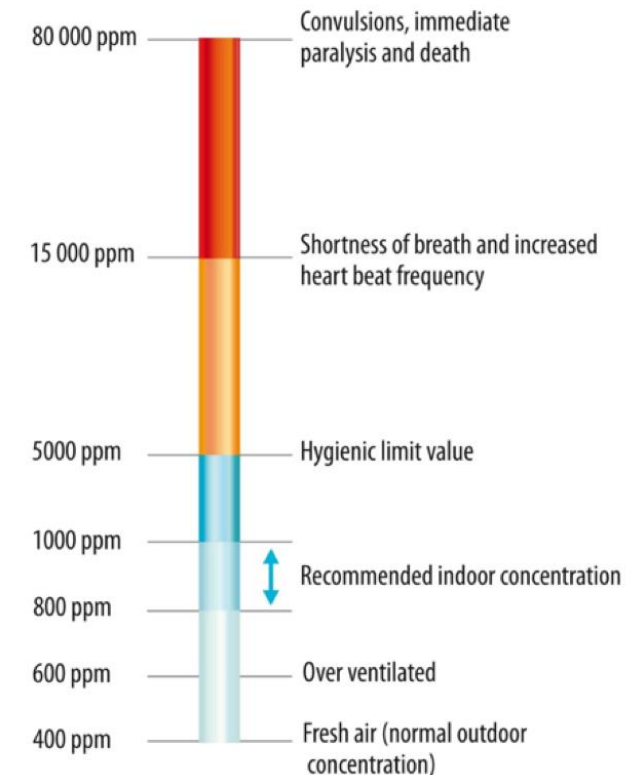


WHY WE MEASURE CO₂

- We cannot sense or smell air quality.
- CO₂ is an indicator for airborne disease spreading.
- CO₂ reduces cognitive performance and productivity.
- CO₂ causes diseases.
- Ventilation control saves energy and can extend range of e-vehicles.
- CO₂ can be used to map outdoor pollution.



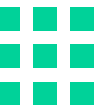
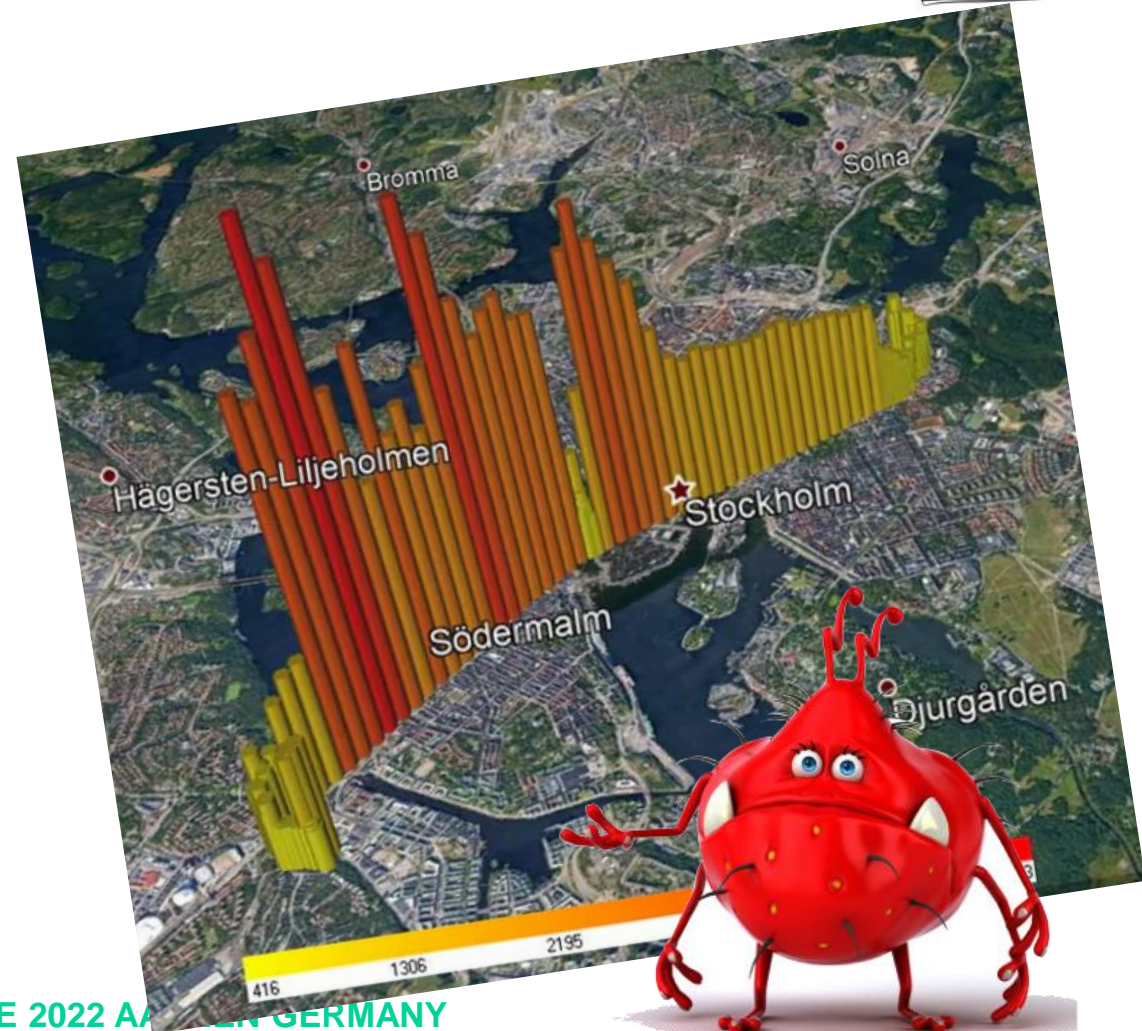
How does CO₂ affect the human body?



WHY WE MEASURE CO₂

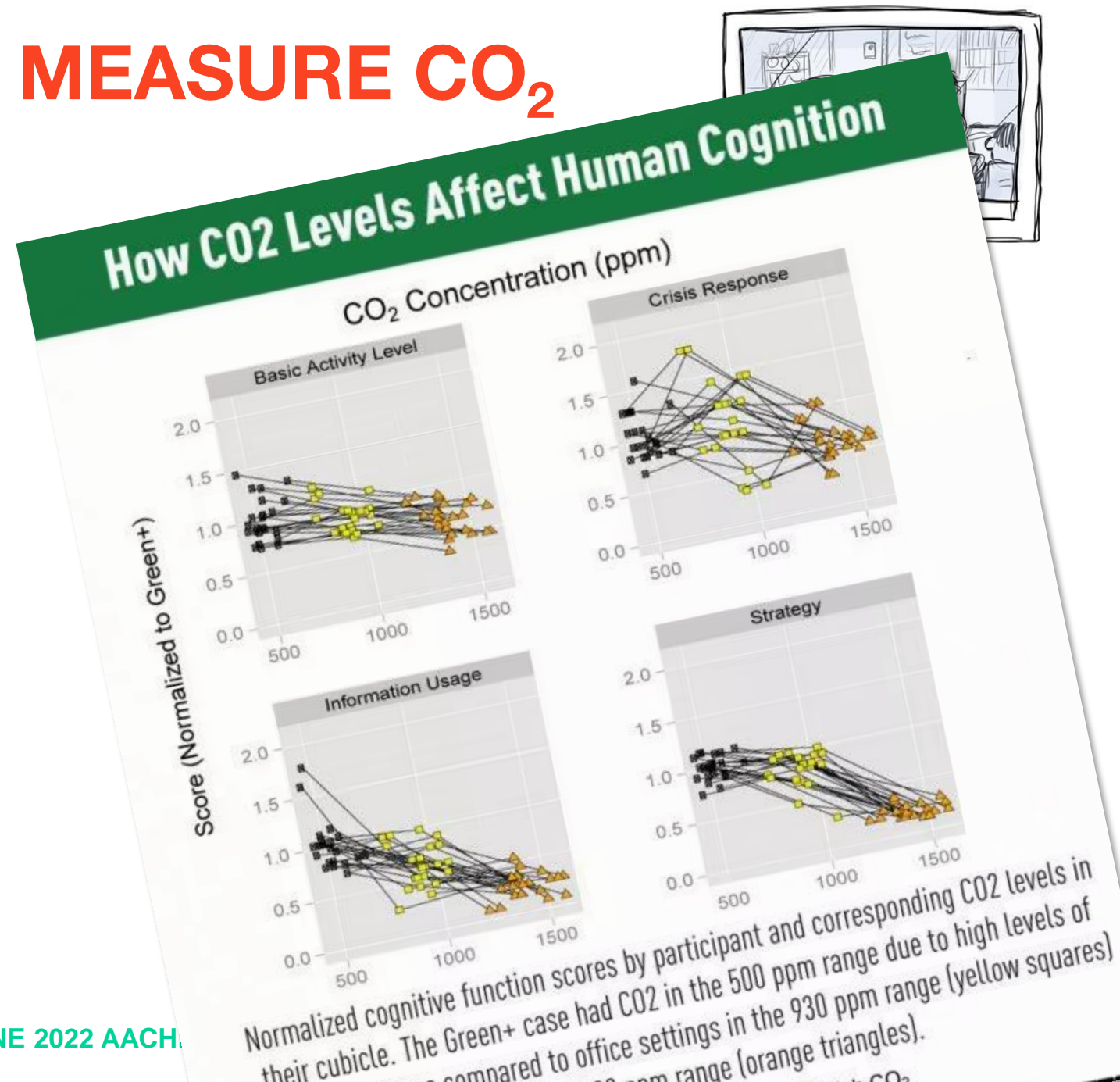


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nature
sustainability

REVIEW ARTICLE
<https://doi.org/10.1038/s41893-019-0323-1>

Direct human health risks of increased atmospheric carbon dioxide

Tyler A. Jacobson¹, Jasdeep S. Kler², Michael T. Hernke^{3,4*}, Rudolf K. Braun⁵, Keith C. Meyer⁶ and William E. Funk¹

Growing evidence suggests that environmentally relevant elevations in CO₂ (<5,000 ppm) may pose direct health risks. Increasing atmospheric CO₂ concentrations could make adverse exposures more frequent and prolonged through increases in indoor air concentrations and increased time spent indoors. We review preliminary evidence of chronic exposure to environmentally relevant elevations in ambient CO₂ in higher-level cognitive abilities, bone demineralization, kidney calcification. Early evidence indicates potential health risks at CO₂ exposures as low as 1,000 ppm in many indoor environments with increased room occupancy and reduced building ventilation rates, and equivalent to some estimates for urban outdoor air concentrations before 2100. Continuous exposure to increased atmospheric CO₂ could be an overlooked stressor of the modern and/or future environment. Further research is needed to quantify the major sources of CO₂ exposure, to identify mitigation strategies to avoid adverse health effects and protect vulnerable populations, and to fully understand the potential health effects of chronic or intermittent exposure to indoor air with higher CO₂ concentrations.

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Growing evidence suggests that environmentally relevant elevations in CO₂ (<5,000 ppm) may pose direct risks for human health. Increasing atmospheric CO₂ concentrations could make adverse exposures more frequent and prolonged through increases in indoor air concentrations and increased time spent indoors. We review preliminary evidence concerning the potential health risks of chronic exposure to environmentally relevant elevations in ambient CO₂, including inflammation, reductions in higher-level cognitive abilities, bone demineralization, kidney calcification, oxidative stress and endothelial dysfunction. This early evidence indicates potential health risks at CO₂ exposures as low as 1,000 ppm—a threshold that is already exceeded in many indoor environments with increased room occupancy and reduced building ventilation rates, and equivalent to some estimates for urban outdoor air concentrations before 2100. Continuous exposure to increased atmospheric CO₂ could be an overlooked stressor of the modern and/or future environment. Further research is needed to quantify the major sources of CO₂ exposure, to identify mitigation strategies to avoid adverse health effects and protect vulnerable populations, and to fully understand the potential health effects of chronic or intermittent exposure to indoor air with higher CO₂ concentrations.



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Tyler A. Jacobson
and William E. F

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Direct human
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031D2ADD

0 %

Senseair index



4 038 ppm

Carbon Dioxide



23,4 °C

Temperature



36 %

Relative Humidity



853 hPa

Air pressure



VOC

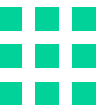


PM 2.5



K. Braun⁵, Keith C. Meyer⁶

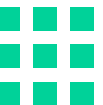
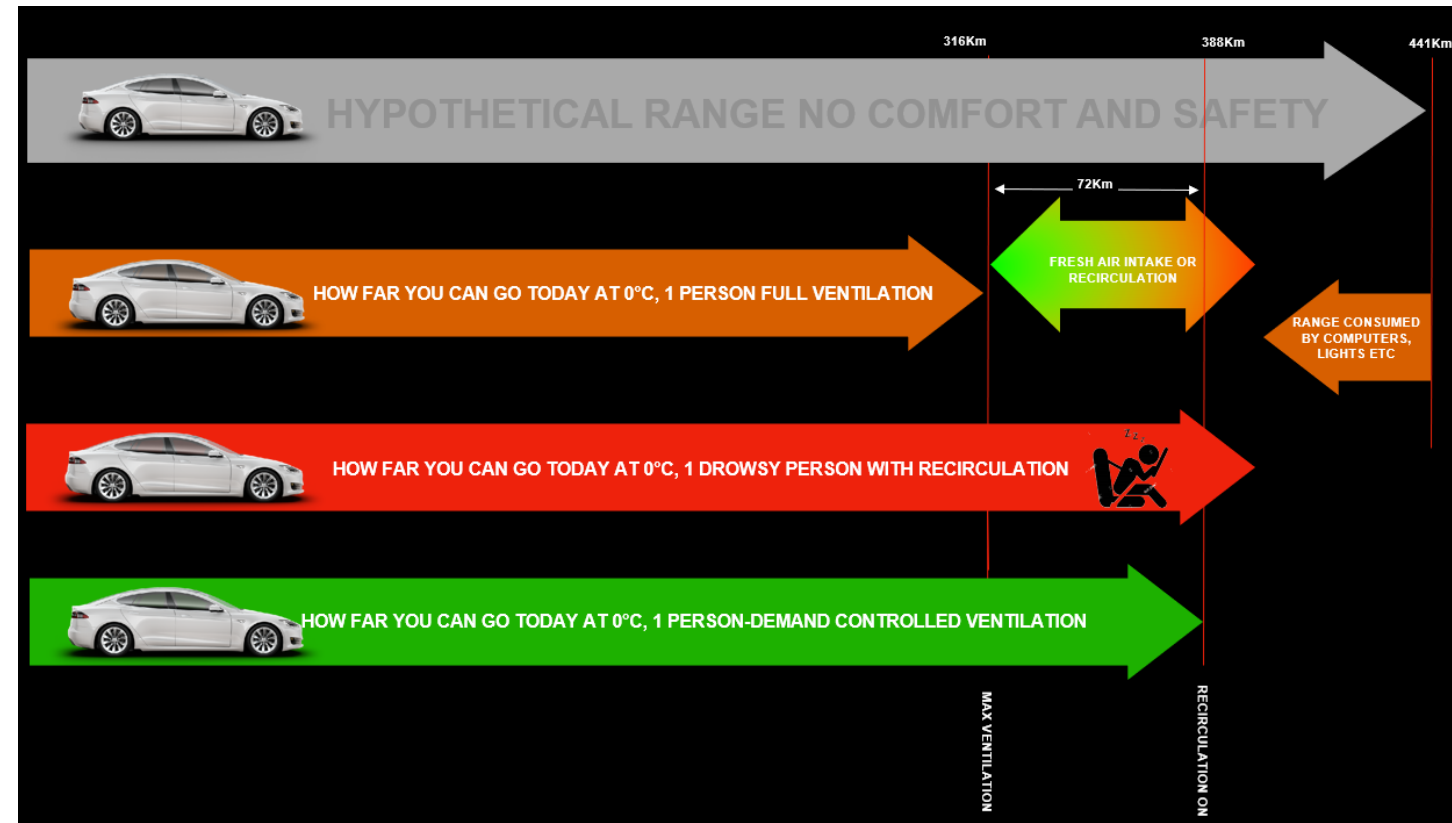
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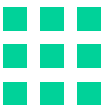
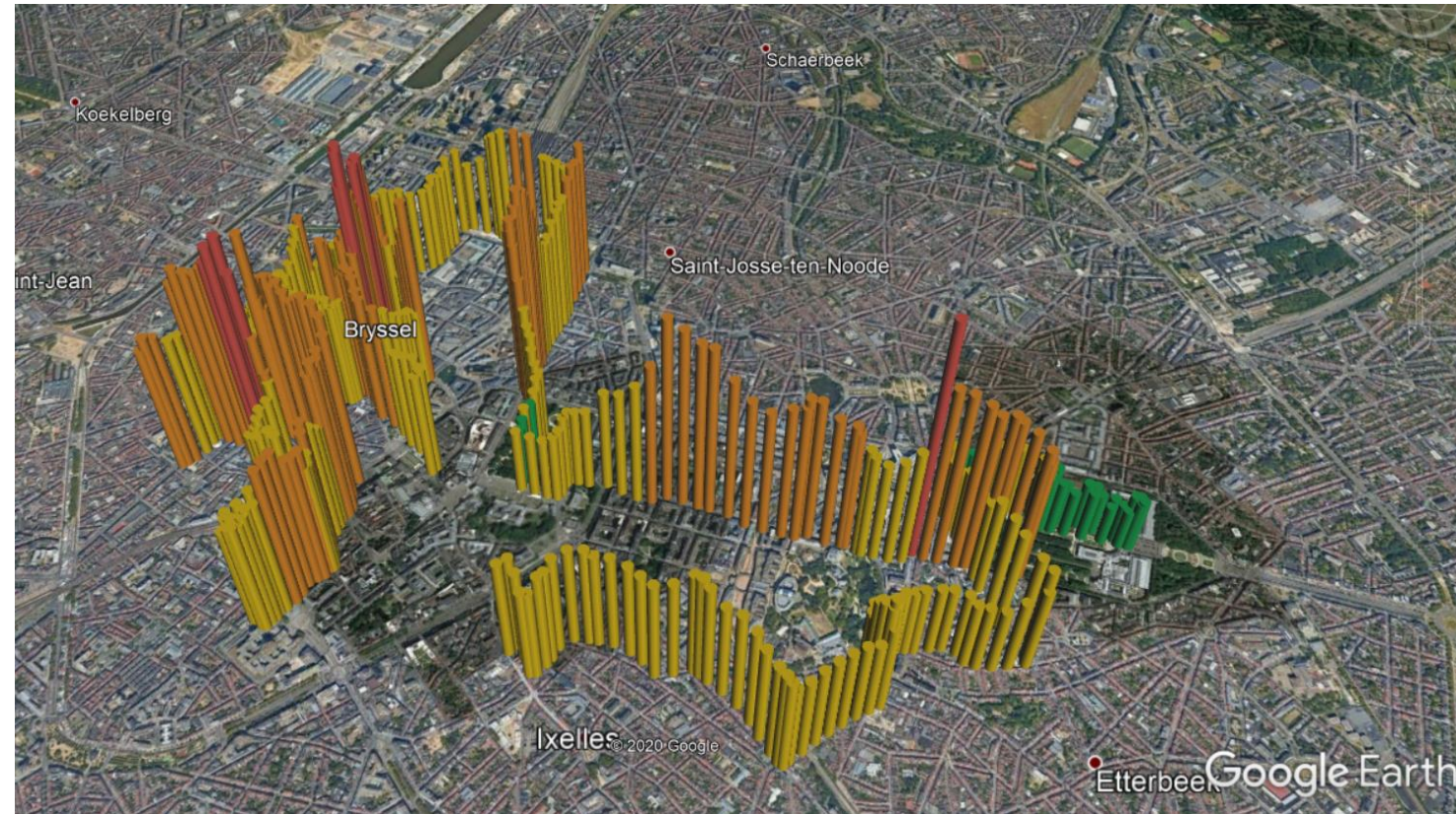
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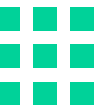
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Big data and machine learning

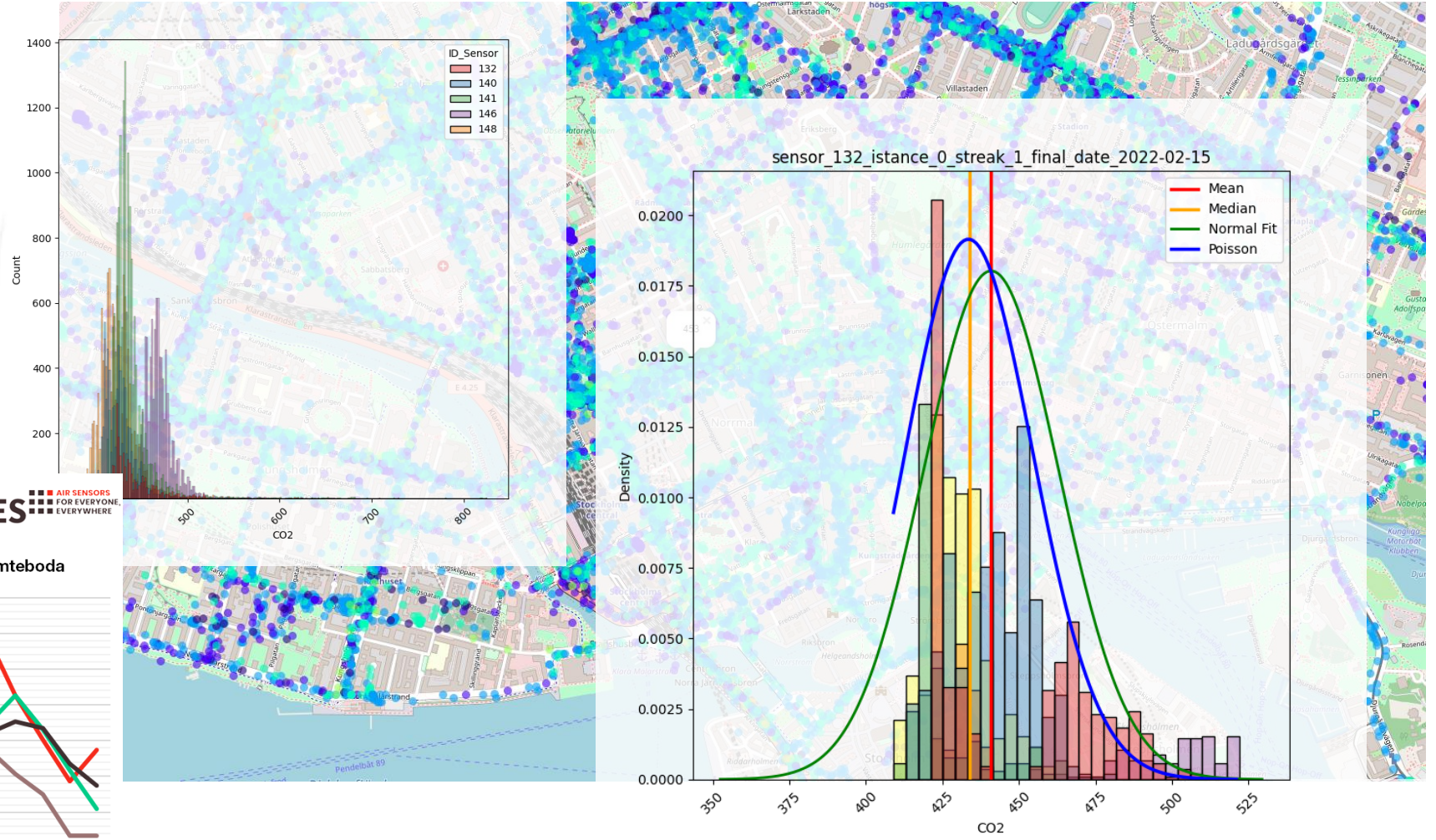
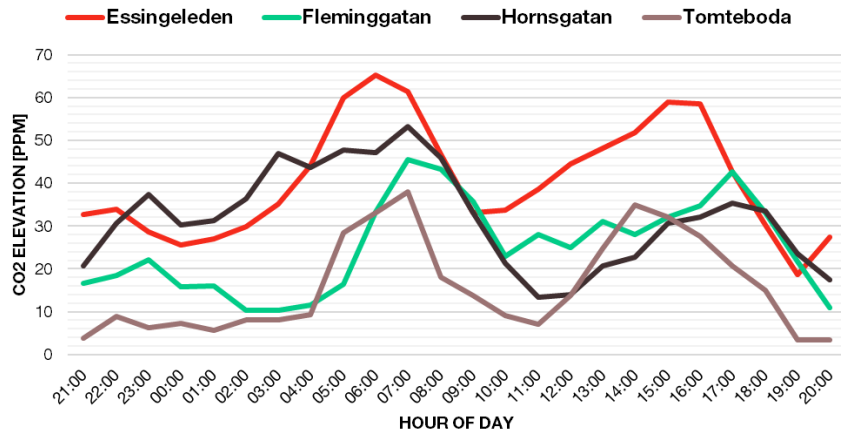


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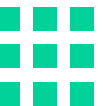
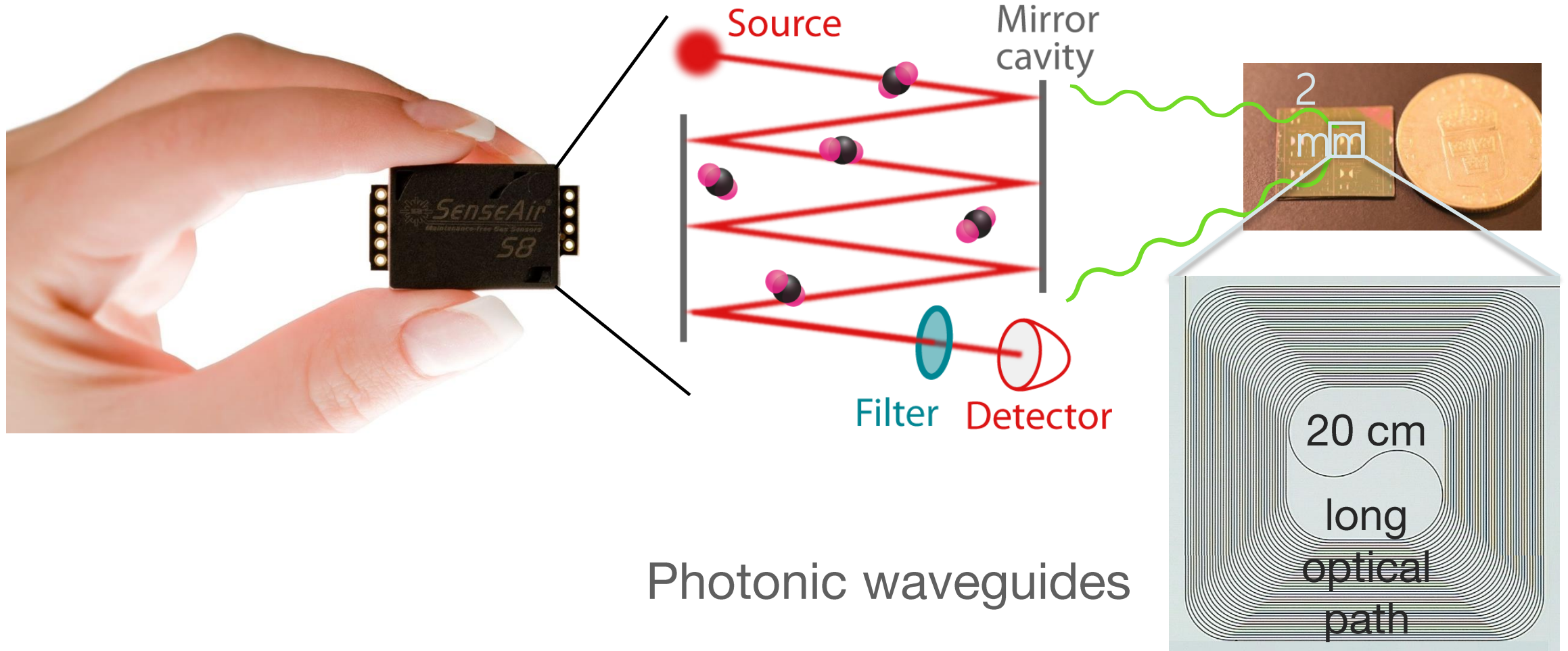


Stockholm Air Pollution
190515 21:00 to 190516 20:00

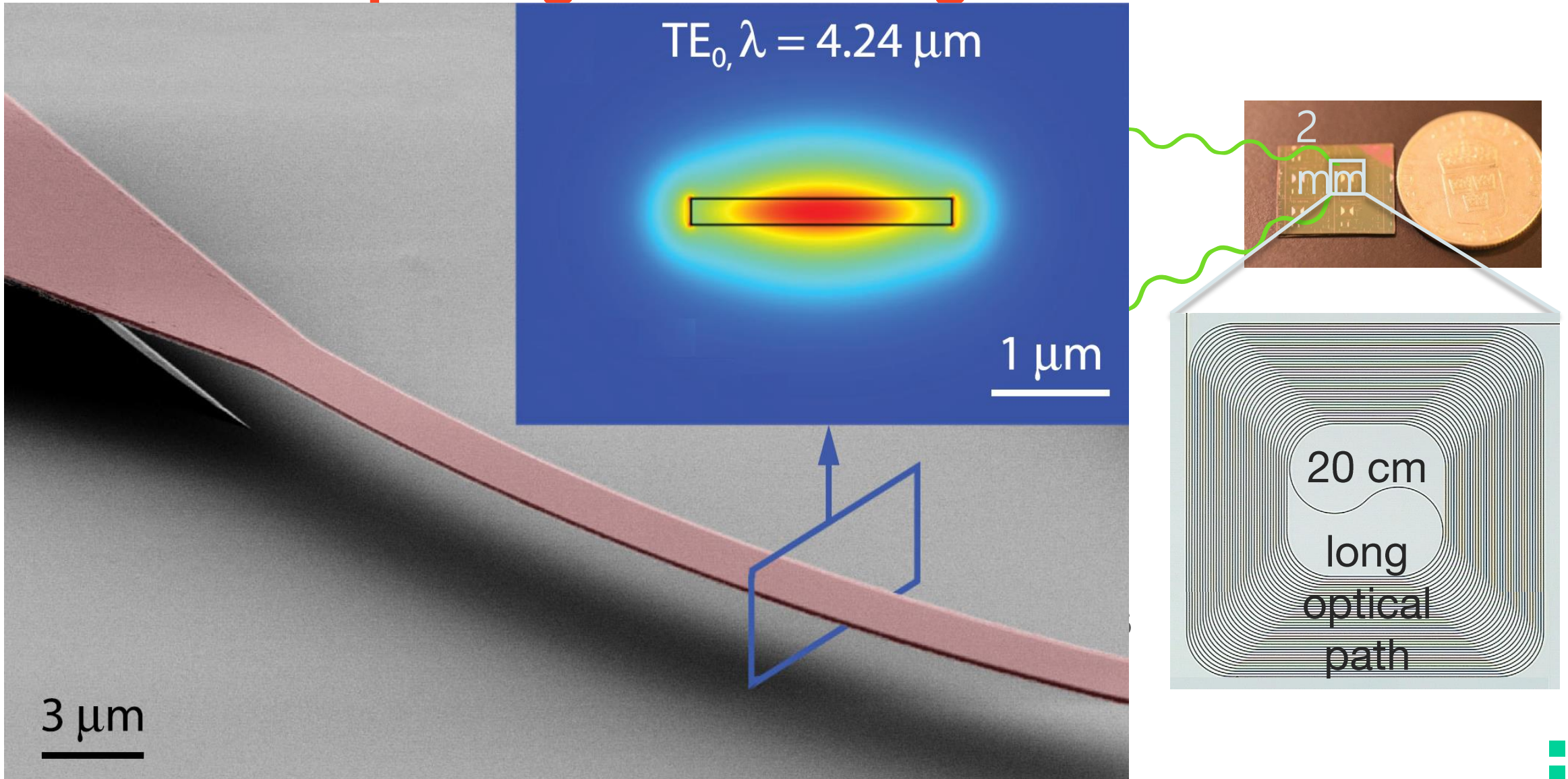
ULISSES AIR SENSORS FOR EVERYONE EVERYWHERE



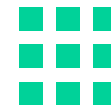
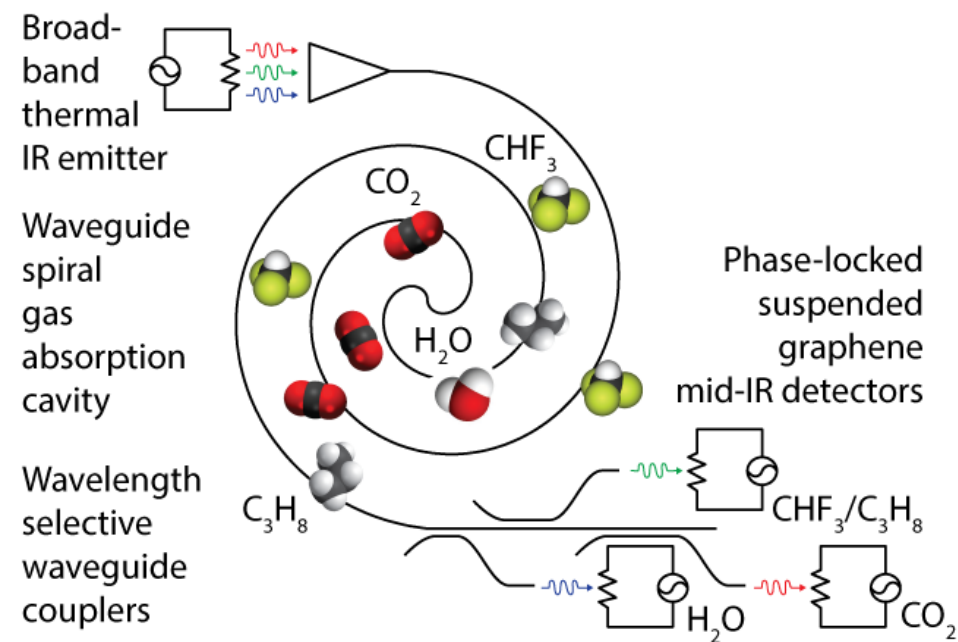
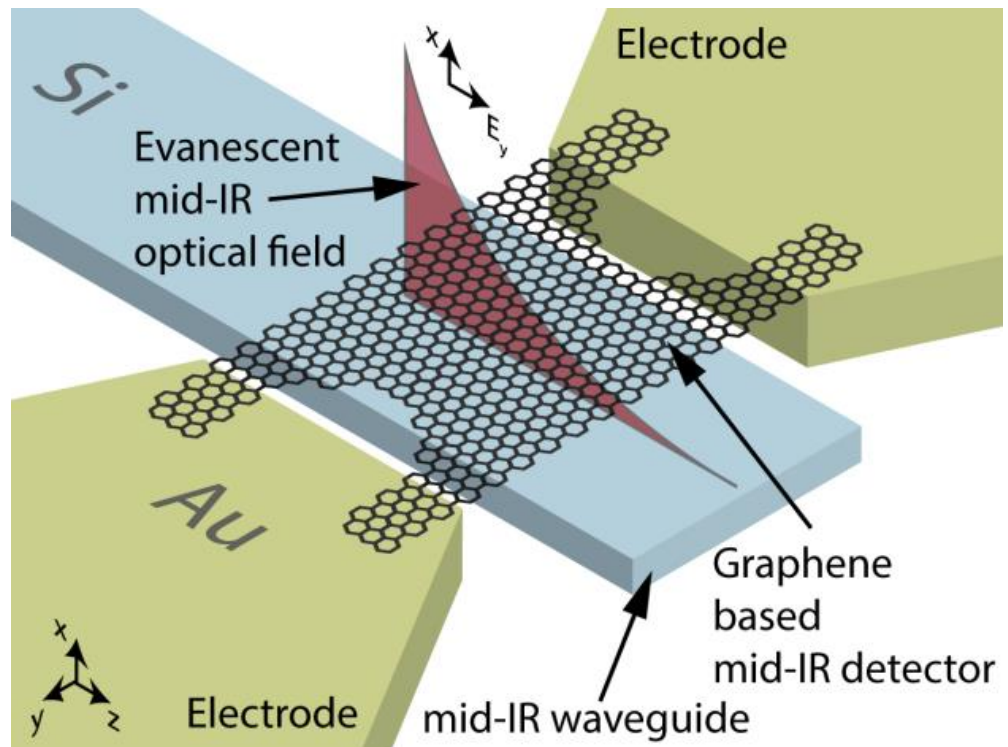
Chip integrated NDIR gas sensors



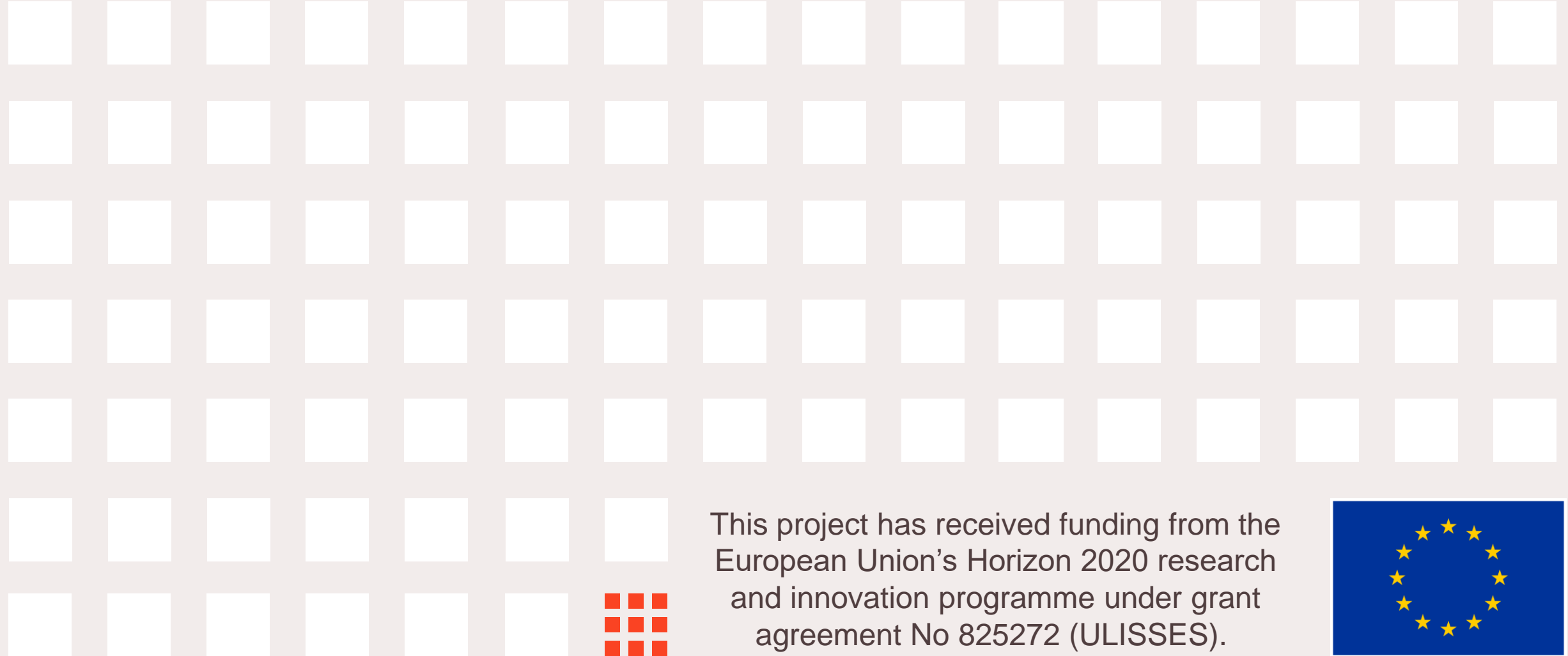
Chip integrated NDIR gas sensors



Chip integrated NDIR gas sensors



Thank you for your attention!



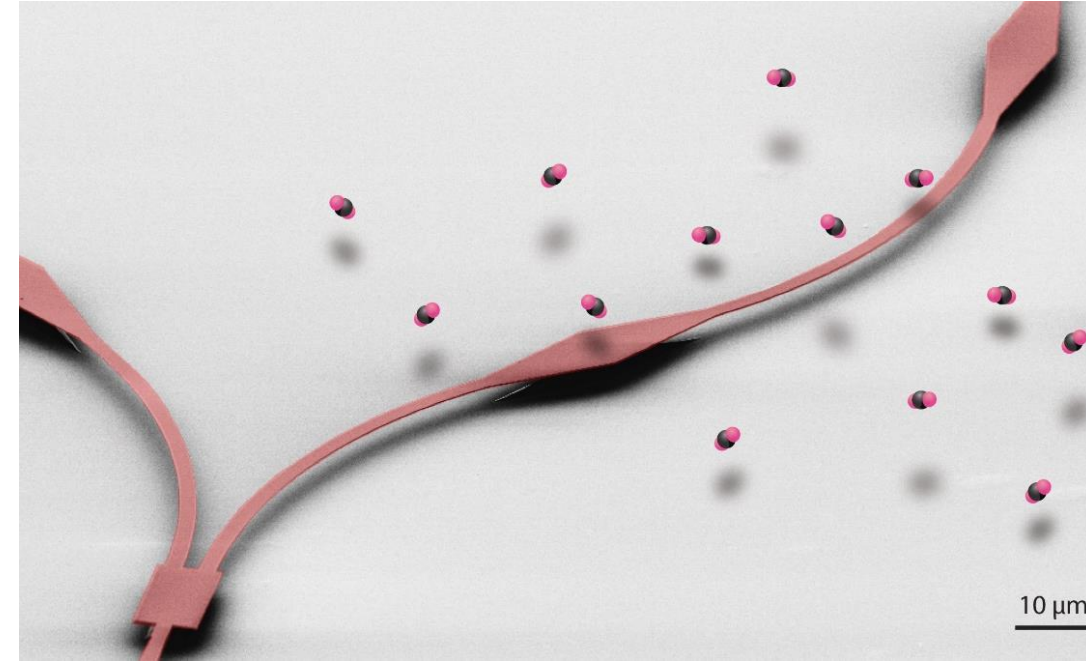
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 825272 (ULISSES).



The experts are here!

What else do you want to
know more about or discuss?

Please raise your hand!



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know more about or discuss?

Text questions or topics to:

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