

open-seneca

air quality sensing powered by citizen science

The team



Charles Christensen

PhD in Computational Microscopy

Coding wizard and creator of our data visualisation platform.



Christoph Franck

PhD in Biotechnology

Lover of outreach events, social media, and grant proposals.



Lorena Gordillo Dagallier

PhD in Paper Diagnostics

The good soul, PCB designer, true citizen-scientist, and secret CEO in the team.



Peter Pihlmann Pedersen

PhD in Experimental Astrophysics

A core contributor to all aspects of open-seneca - hardware, software, and data.



Raphaël Jacquat

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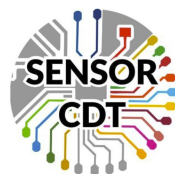
The creative brain behind our outreach materials, and hands-on workshops.



Sebastian Horstmann

PhD in Biomaterials

Hardware minded and problem solver, and key maintainer of our GitHub.



@open_seneca

info@open-seneca.org

The problem

7,000,000 deaths

from exposure to air pollution every year

1.8 years

reduced life expectancy due to particulate matter

91 % of the population

lives in places that exceed WHO air quality guidelines

Not enough data

to understand and tackle the problem heads on

Costly equipment

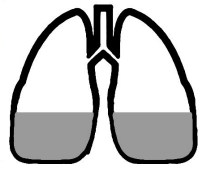
to monitor air pollution

Lack of awareness

about health problems linked to poor air quality

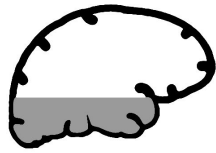
Health and economic impact of PM2.5

air pollution contributes to



29%

of deaths from
lung cancer



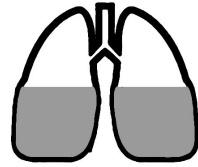
24%

of deaths from
stroke



25%

of deaths from
heart disease



43%

of deaths from
lung disease

- Fine particulate matter (PM2.5) can penetrate deep into the lungs and enter the bloodstream, causing an elevated risk of cardiovascular diseases such as IHD and stroke
- Long-term exposure to PM2.5 linked with increased mortality due to COVID-19

Countries are losing tens of billions of dollars a year through lost work days and welfare costs from premature deaths

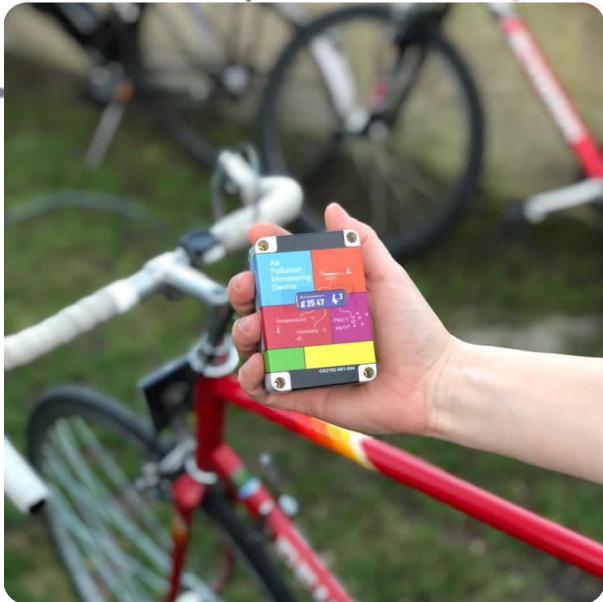
global cost
of air pollution

\$5.1 trillion

	Estimated cost per capita
China	\$175
Italy	\$150
Chile	\$124
Poland	\$82
Malaysia	\$65
Turkey	\$61
India	\$60
Switzerland	\$45

Current monitoring

- Expensive monitoring stations (\$10-100k)
- Specialised and costly maintenance (\$10-30k yearly)
- Fixed locations: low spatial resolution
- Not representative of citizens' exposure to pollution
- Data might not be available to the public



- Low-cost, durable, air quality monitors (\$200)
- Portable sensors: street-by-street spatial resolution
- Measuring personal exposure
- Raising public awareness

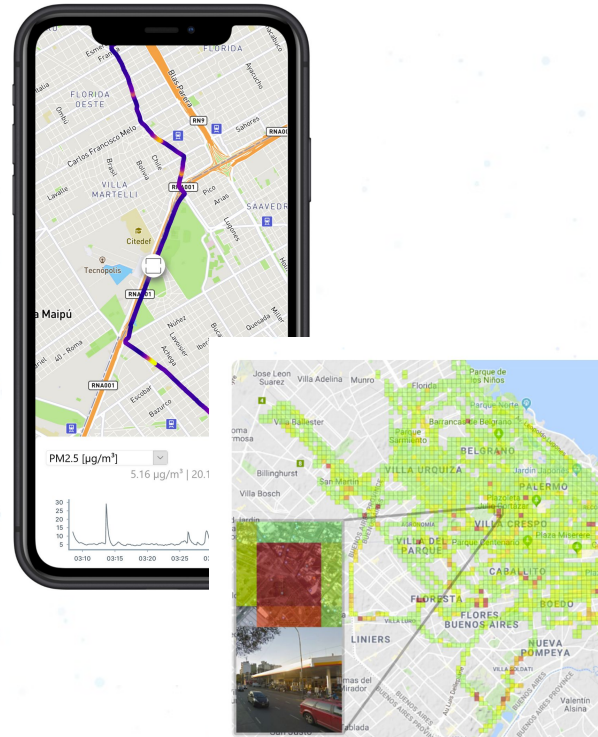
open-seneca

Our solution



A low-cost, portable sensor

- Geotagged PM2.5
- Easy to mount on any vehicle
- Live personal exposure



Data platform

- Personal exposure
- City hotspots
- Engaging for communities and policy makers



Educational approach

- Workshops
- Making air quality personal
- Raising awareness
- Crowdsourcing solutions

Lisbon and Stockholm



WOMEN4CLIMATE
TECH —
— CHALLENGE

VELUX®



- 50 sensors per city
- Local champions to help manage the projects locally
- Open call for citizen scientists
- In-person and home assembly workshops
- Calibration
- 3-6 months data collection
- Data hackathons



Citizen scientists - insights

Great interest to participate: 150+ responses in open call for volunteers



I cycle daily all year round in all weathers, I can help



I'm curious to know more about the air on my way to work



I feel great to be part of this. It would be fun to contribute to a better city!



I am researching the effects of air pollution on several health outcomes



This is something I've been thinking for a long time, what is the air quality really like?



Interested in the environment, sustainable development, traffic issues, health

Citizen scientists - insights

Background knowledge – 45 responses (Lisbon)

Have you ever heard of...?

Citizen science

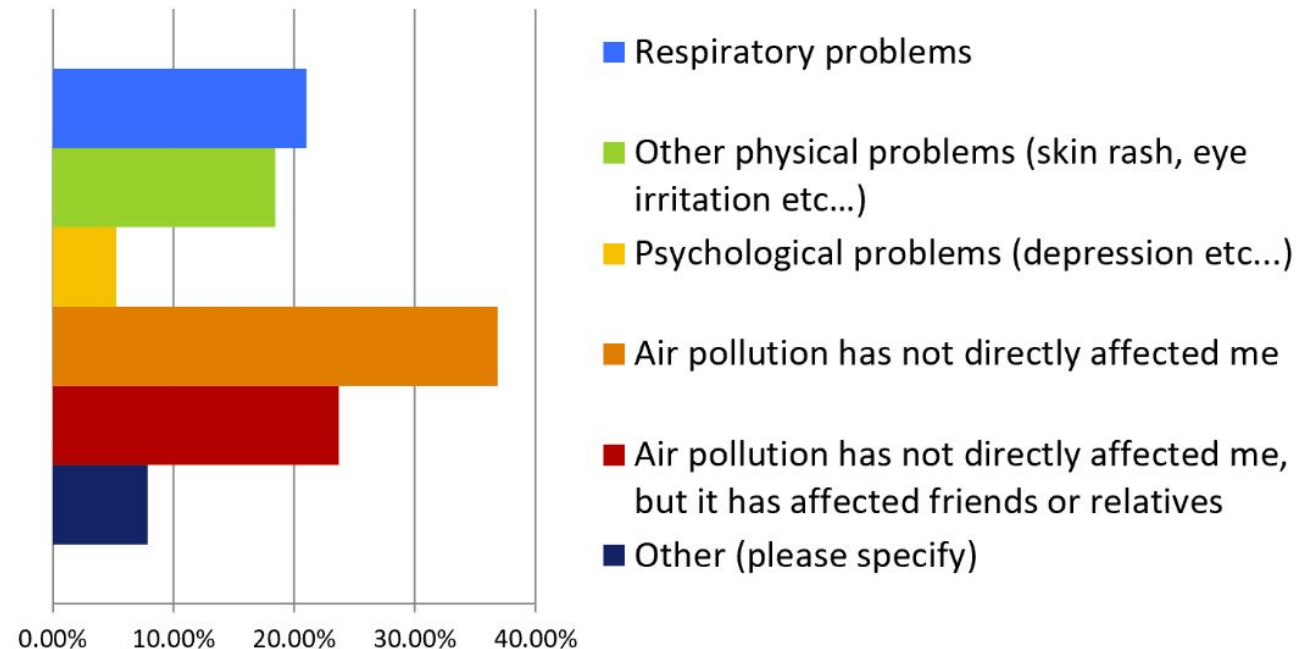


PM2.5



- Yes, and I know what it is
- Yes, but I don't know what it is exactly
- I have never heard of it

How has air pollution affected you?



- Respiratory problems
- Other physical problems (skin rash, eye irritation etc...)
- Psychological problems (depression etc...)
- Air pollution has not directly affected me
- Air pollution has not directly affected me, but it has affected friends or relatives
- Other (please specify)

Sensor assembly workshops

To learn about air pollution, health impact, and build an air quality monitor



@FabLab Lisboa

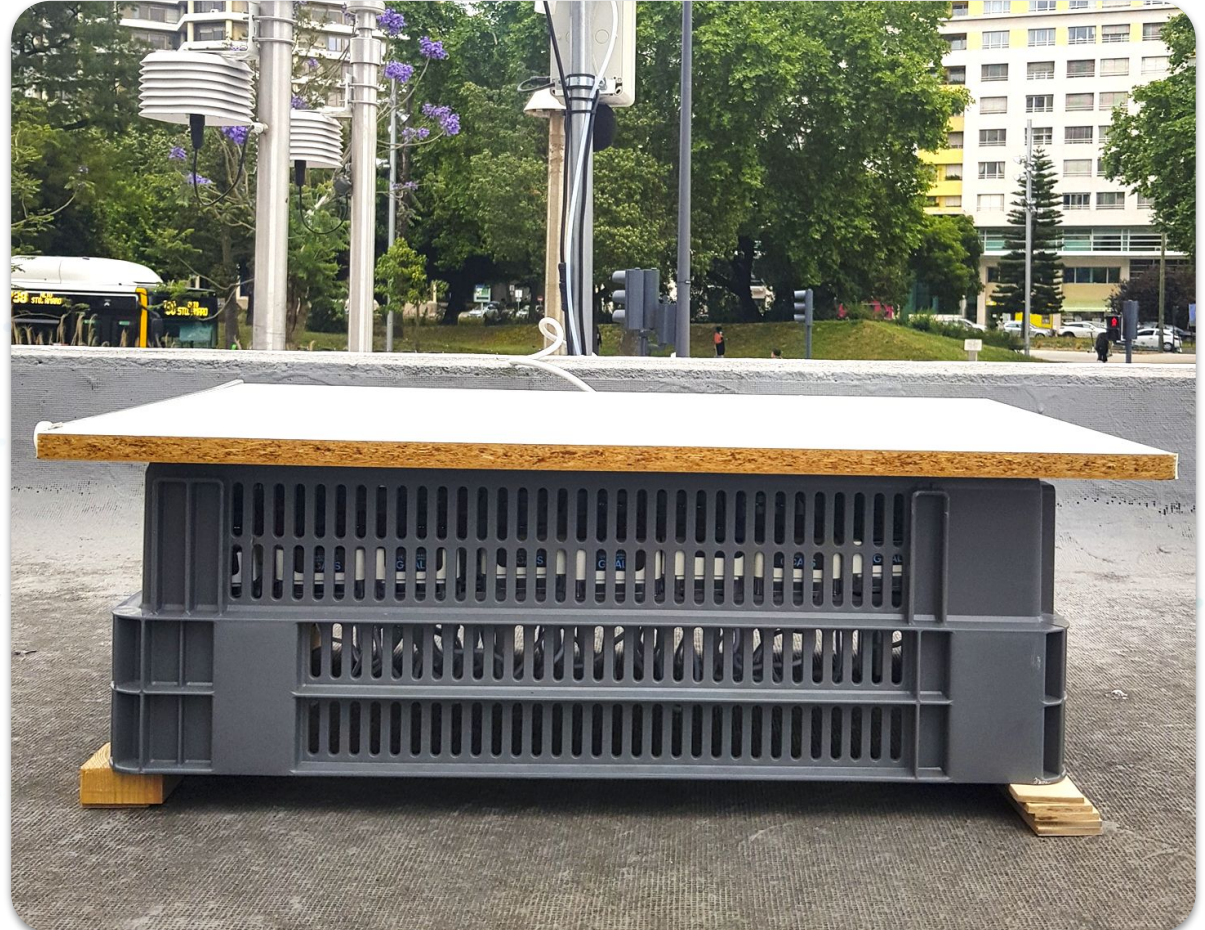


@KTH Stockholm

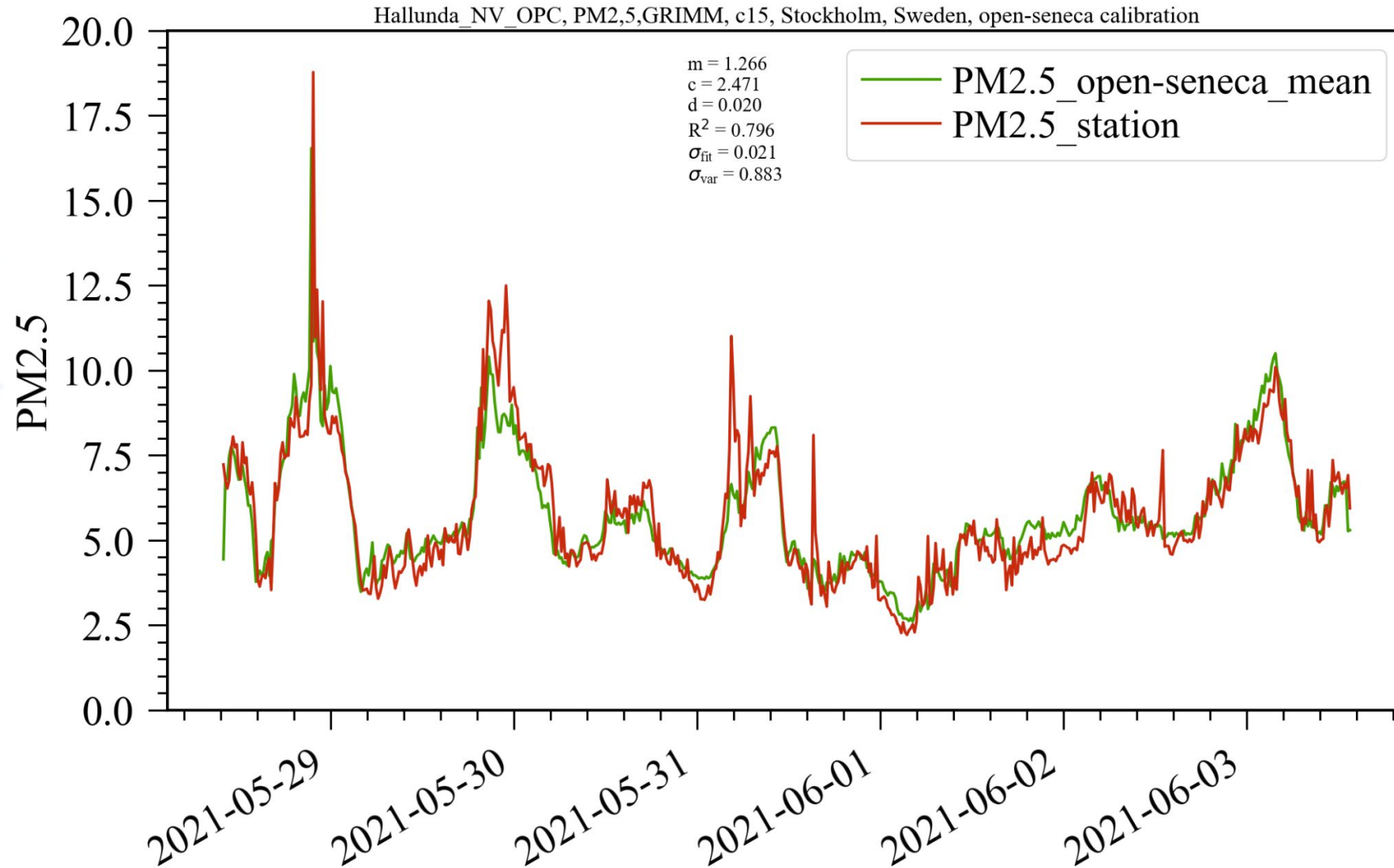


@home

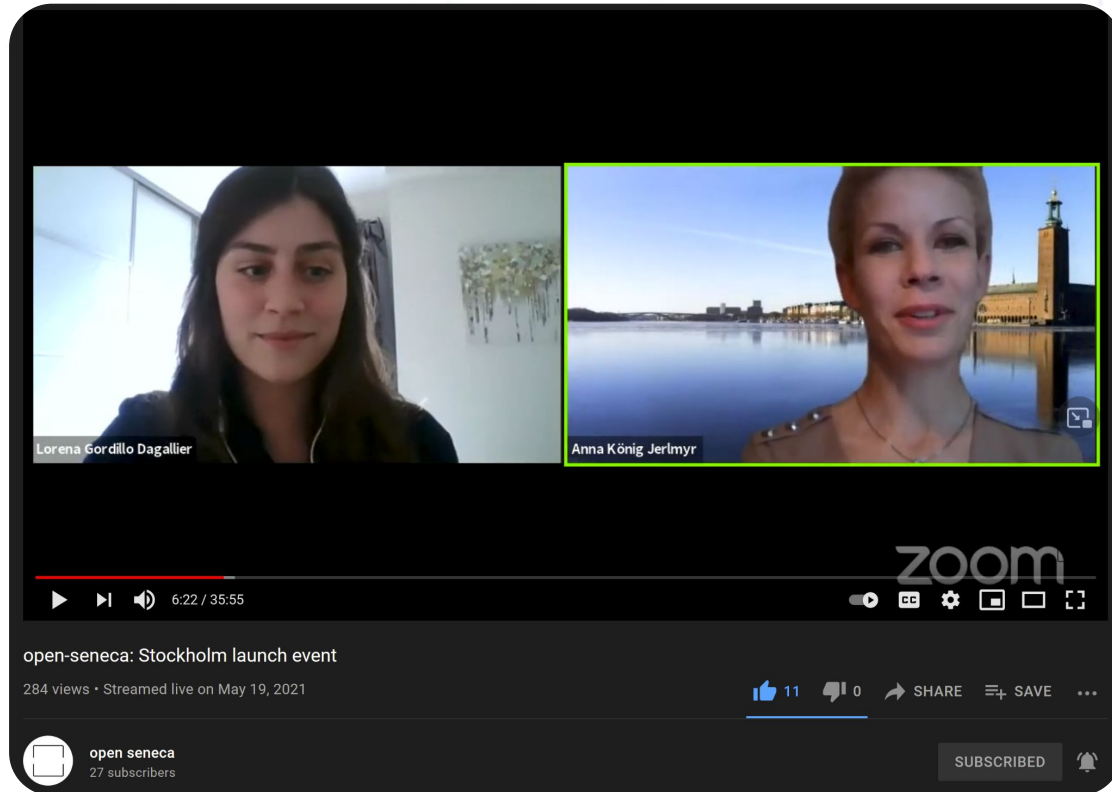
Calibration



Results after calibration



Launch events



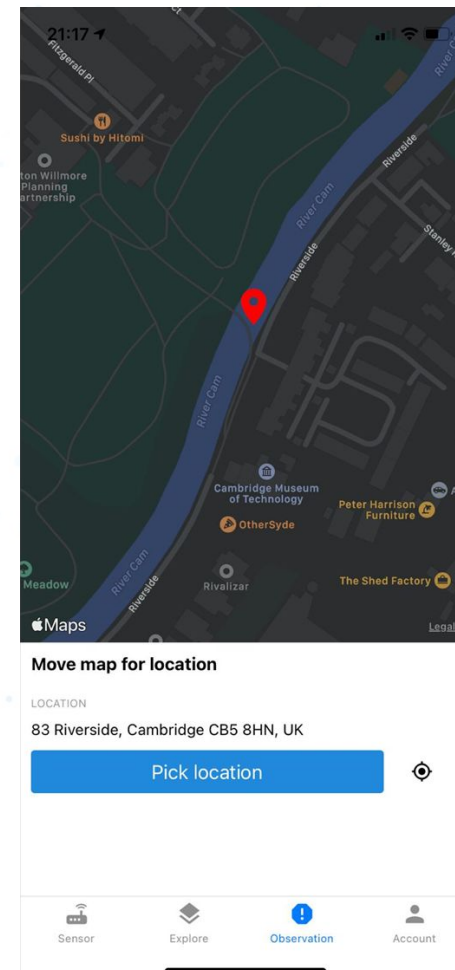
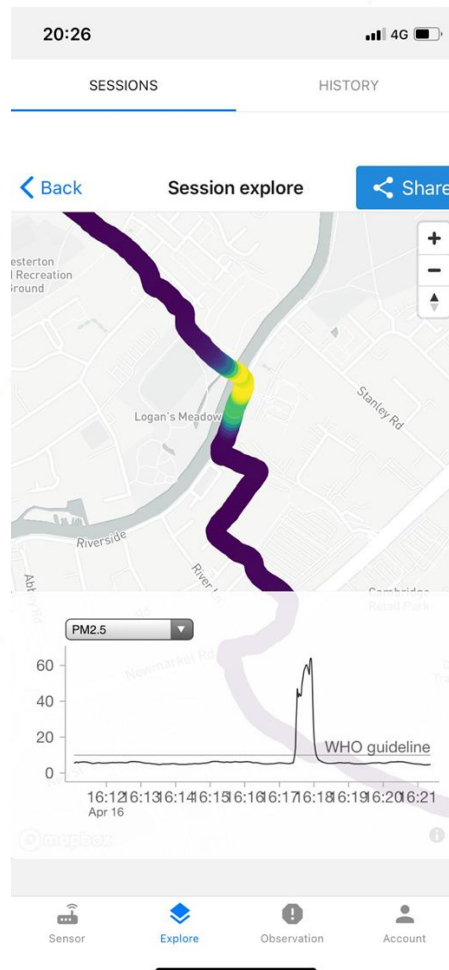
Stockholm - 19th May



Lisbon - 2nd July

Data collection

PM2.5 data on daily commutes and personal observations



21:18

Describe your observation

Location: 83 Riverside, Cambridge CB5 8HN, UK

Assessment of air quality

(1/4) Low air pollution level

(2/4) Medium pollution level

(3/4) High pollution level

(4/4) Severe pollution level

Comment

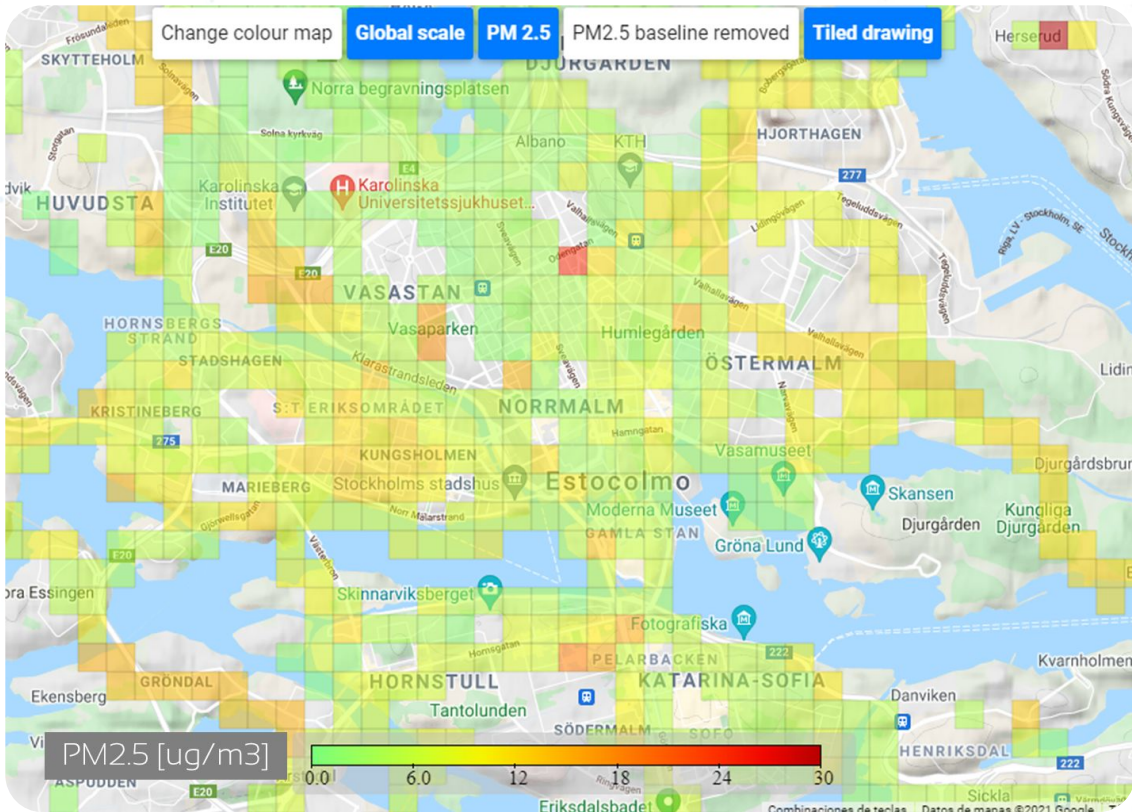
Riverboat burning coal.

Submit

Cancel

Sensor Explore Observation Account

Early results



The screenshot shows a Twitter interface with a dark theme. The left sidebar contains navigation options: Home, Explore, Notifications, Messages, Bookmarks, Lists, Profile, and More. The main content area displays two tweets from the user @chartersazevedo. The first tweet, dated July 2, is a reply to @sasealves and @open_seneca, with the text "Agora tenho! Fui buscá-lo hoje!". It includes a video thumbnail of an "Air Pollution Monitoring Device" showing real-time data for AQI, Temperature, Humidity, and PM2.5. The second tweet, also dated July 2, is a reply to @open_seneca with the text "It's alive!". The right sidebar shows trending topics such as "Forza Italia", "#ENGITA", and "Italians", along with "Topics to follow" including "Stanford University", "Funny Tweets", "Data science", "Video games", and "Open source".

Thank you



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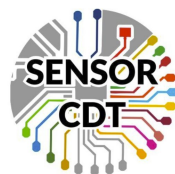
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