CITIZEN ENGAGEMENT IN AIR POLLUTION: TRANSFORMING SOCIAL, SCIENTIFIC AND TECHNICAL RESEARCH

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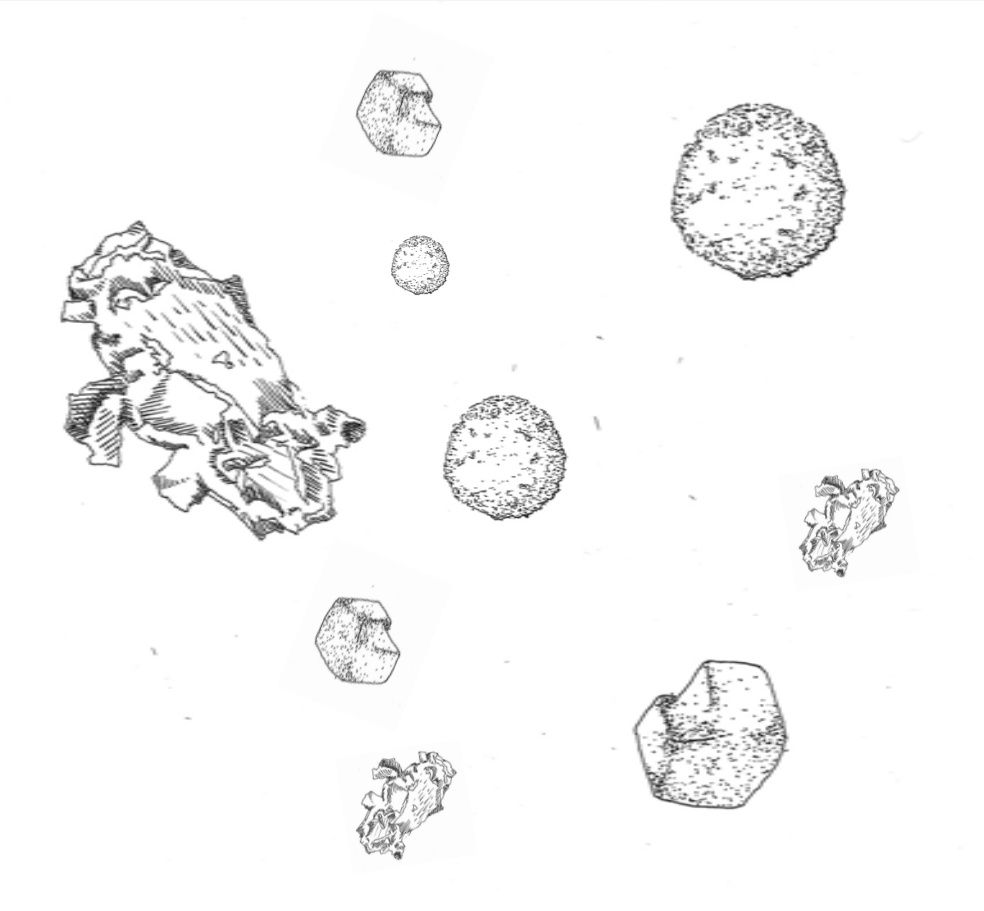
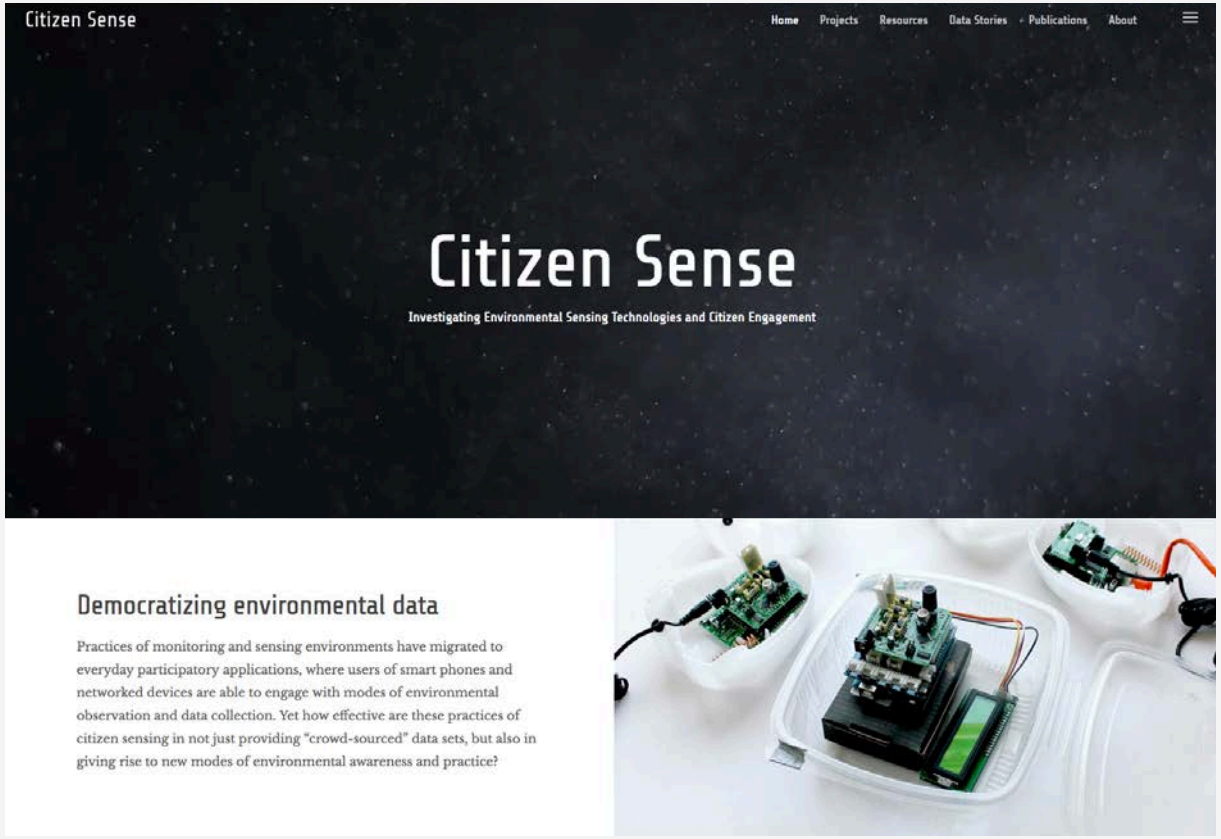
Social Research and Air Quality: STFC, Social Sciences and SAQN, 26 January 2021

CITIZEN SENSING AND AIR POLLUTION



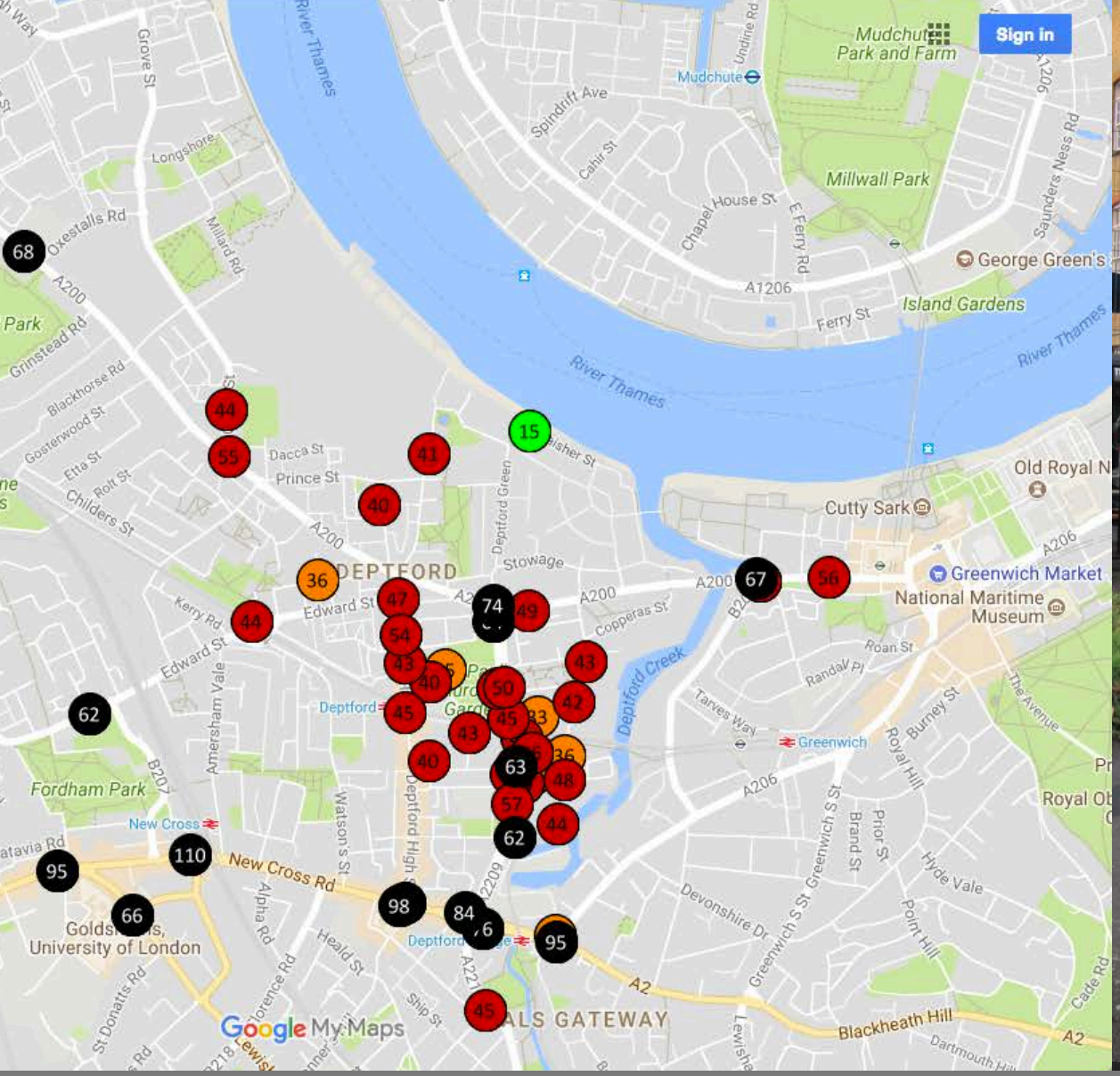
THE PROBLEM OF AIR POLLUTION WORLDWIDE

- Air pollution is a planetary health hazard.
- One of the most important risk factors affecting human health and sustainable development.
- Air pollution is a leading risk factor for non-communicable diseases.
- Can also have indirect health effects and contribute to climate change.



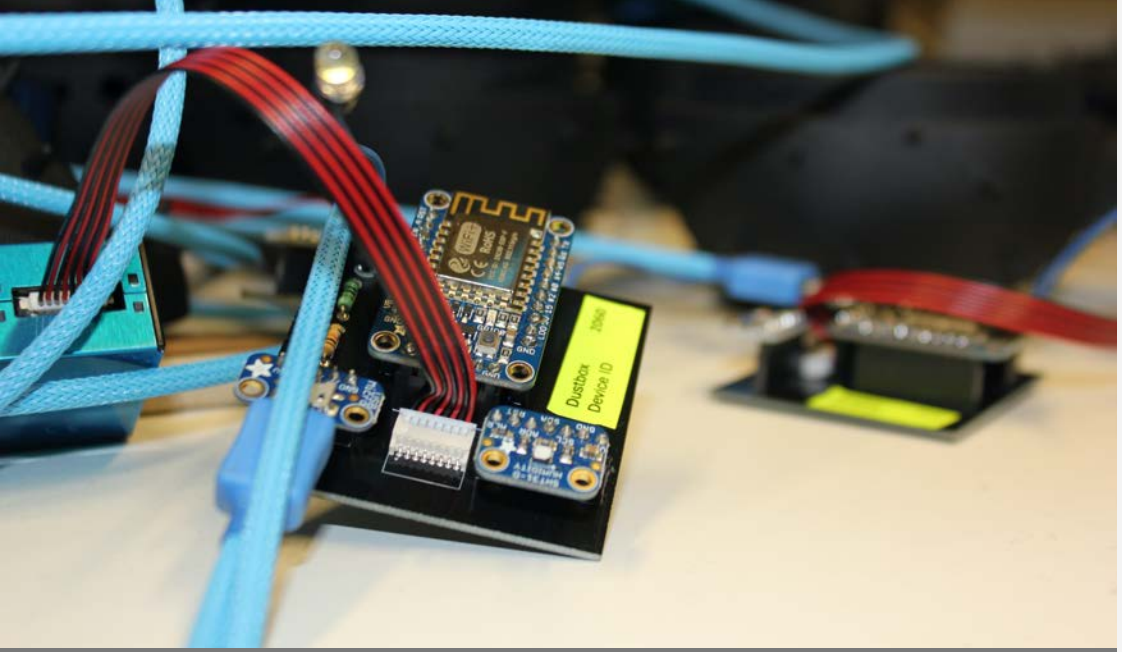
SOCIAL RESEARCH AND AIR QUALITY

- Investigating citizen practices for observing, evidencing and acting on air pollution.
- Testing how or whether digital sensors organize different practices of environmental citizenship.
- Developing participatory and practice-based methods for undertaking engaged social research.
- Collaborating with communities to build capacity for monitoring air pollution, communicating findings, and proposing transformations to environments.



Don't Dump on Deptford's Heart, diffusion tube monitoring (2013-14)

Researching citizen monitoring as social practice

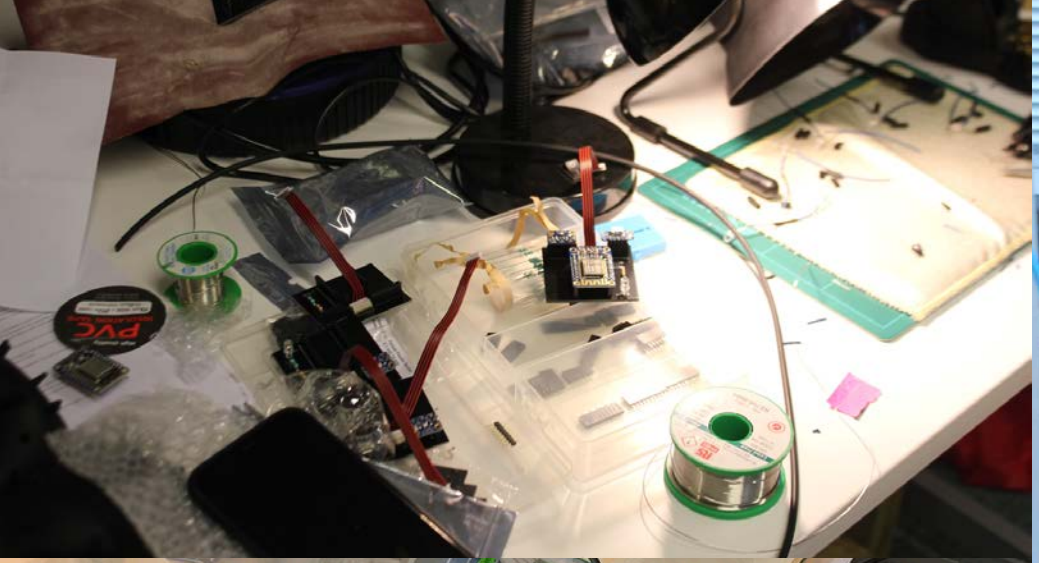


Dustbox 2.0 electronics

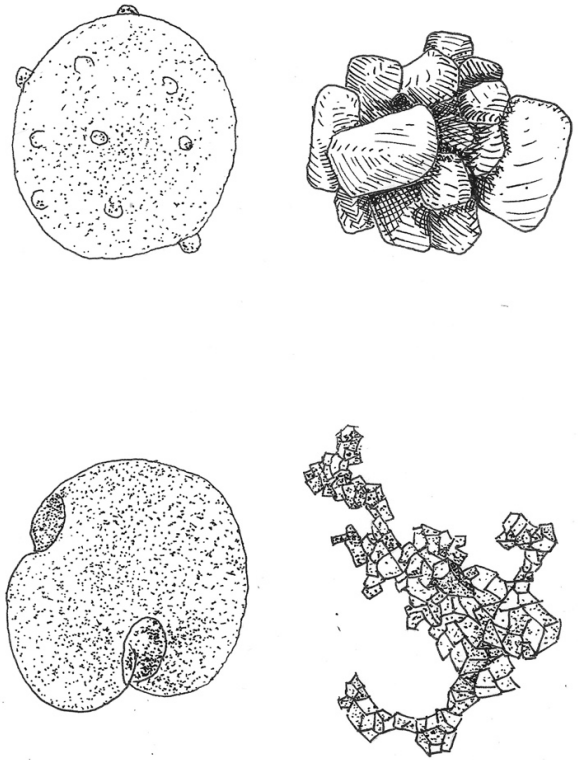
Dustbox 2.0 installation at Dalmain Primary School

AIRKIT: A CITIZEN TOOLKIT

- **A citizen-sensing toolkit for community air pollution monitoring that includes:**
- Dustbox 2.0 monitors: Particulate matter sensors in two designs: diesel char and pollen.
- Fieldwork testing: Dustboxes deployed in Forest Hill, London.
- AirKit Logbook: Comprehensive online and print guide to organizing citizen monitoring studies.
- Airsift platform: Website for viewing and analyzing Dustbox 2.0 data.
- Data Stories: Narratives and proposals for air-quality action, with examples using data collected in Forest Hill (as well as previous Citizen Sense research).



Dustbox 2.0 Sensors – designed, calibrated and tested



AirKit Logbook: A resource for understanding air quality, establishing monitoring networks, building sensors, analyzing and storying data

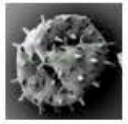
AIRSIFT

DUSTBOXES OBSERVATIONS ANALYSIS STORIES ABOUT SIGN IN

Air pollution is a planetary health emergency. Air quality monitors are not always located where air pollution is occurring, and citizens might have many reasons to gather data to document and analyze air quality

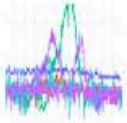
Airsift brings together information for you to set up a citizen-led monitoring project to keep track of air quality in your area.

DUSTBOXES
Particulate matter sensors designed by Citizen Sense to measure and compare air quality.

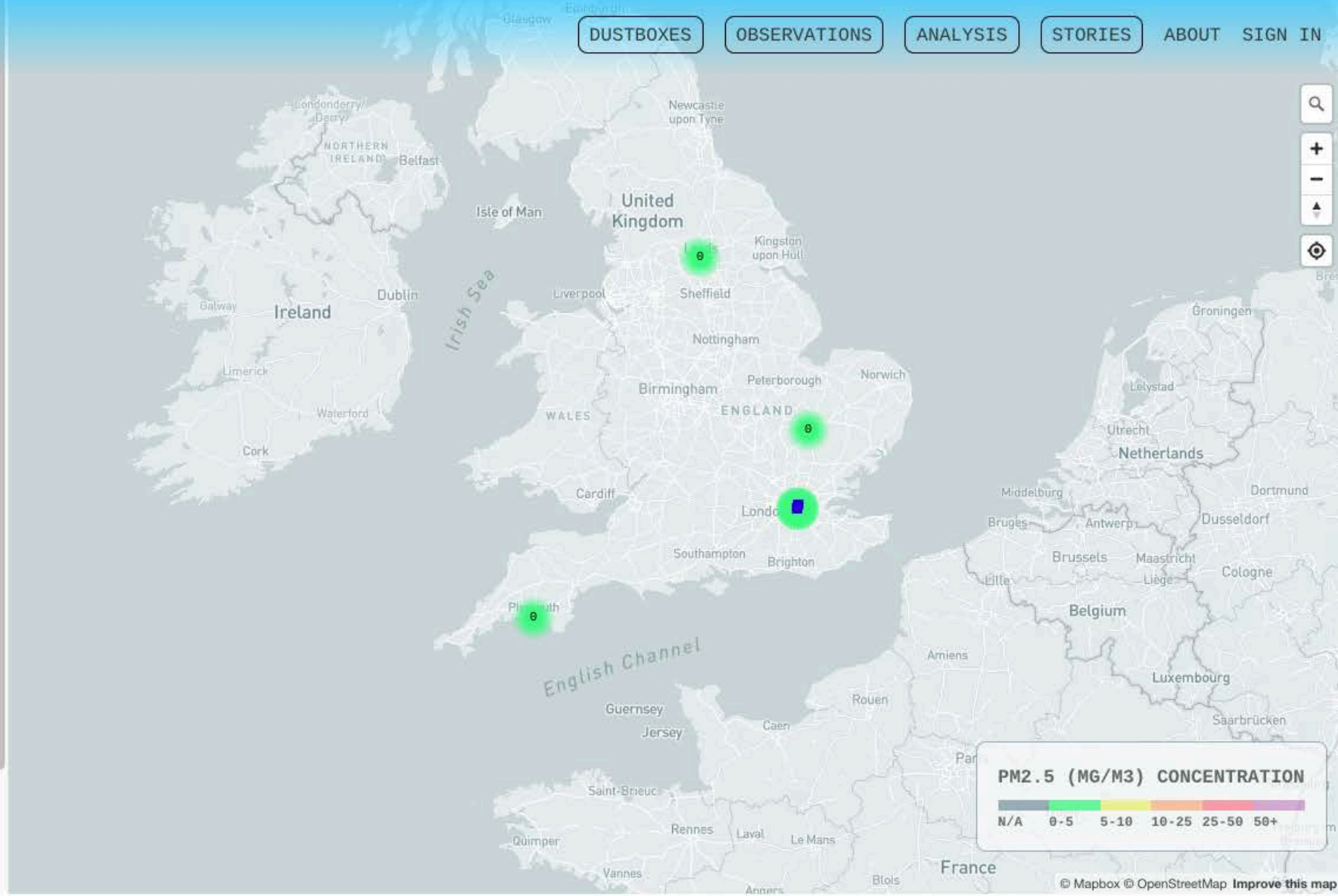


OBSERVATIONS
Gather and browse evidence that might indicate pollution or other activity is occuring.

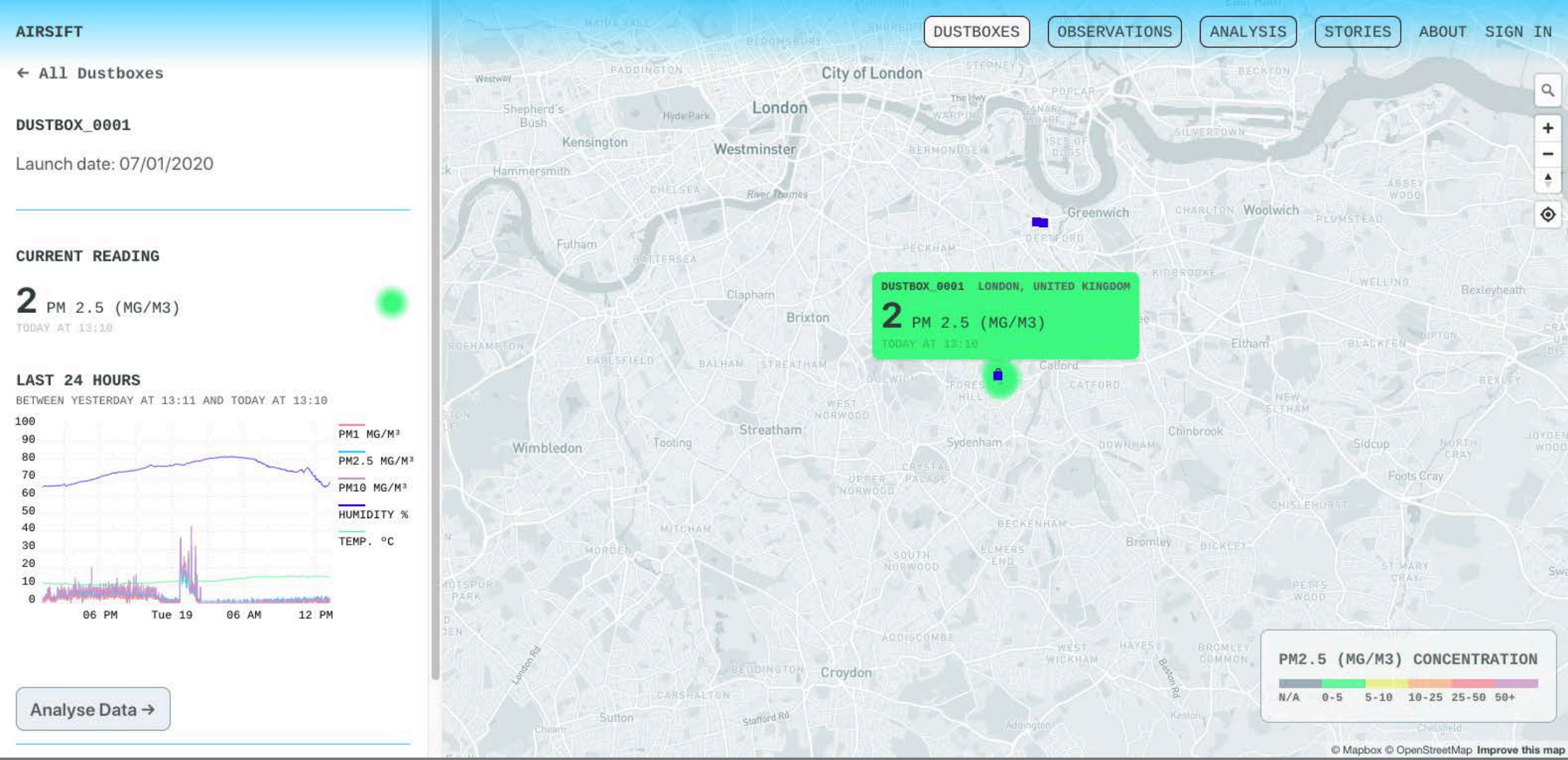
ANALYSIS
Explore Dustbox data, create plots and identify air pollution problems.



STORIES
Draw together different kinds of evidence to narrate the impact that air pollution is having in an area.



Airsift platform: Mapping Dustboxes, adding observations, analyzing data, creating data stories

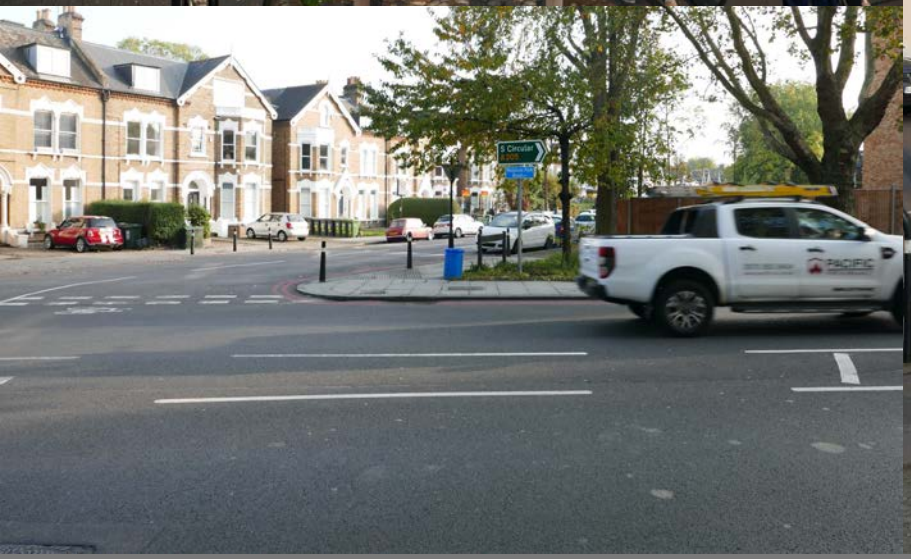


Airsift platform: Mapping data, analyzing data, adding observations, creating data stories

COMMUNITY COLLABORATION

THE PROBLEM OF AIR POLLUTION IN LONDON

- Localized sources: transport (particularly diesel), industry, construction, cooking and heating all contribute significantly to London-wide levels.
- Regional sources: Heavy industry and agriculture outside the UK. These emissions are thought to account for an urban background of approximately 10 $\mu g/m^3$.
- When long-range pollution episodes do occur in London, they are generally carried on easterly winds.
- Global sources contribute but are harder to quantify.



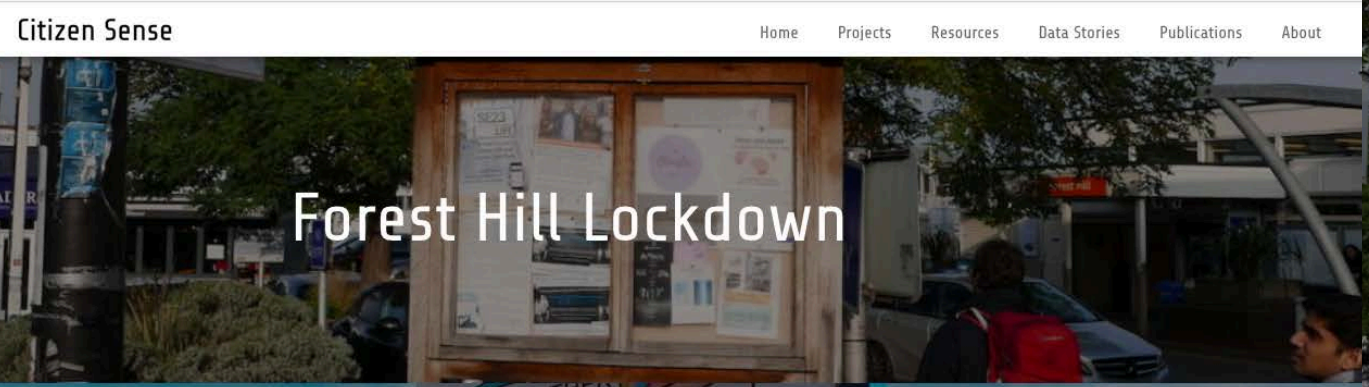
Fieldwork – Walk in Forest Hill

Fieldwork – Installing Dustboxes

MONITORING SETUP

- Range of monitors set up in Forest Hill, London, capturing data from February 2020
- Sensor installation interrupted due to Covid
- Installed on lampposts, in collaboration with Lewisham Council

Locations of Dustboxes and possible sources of pollution



3. Characterizing The Problem

When is the source most evident?
Using time plots, it is possible to analyse the time of day, week and month when pollution levels are elevated. Time plots aggregate $PM_{2.5}$ concentrations according to time, so that key patterns such as rush hours and traffic, as well as possible construction or industry sources, along with regional pollution events due to seasonal variation, are evident.

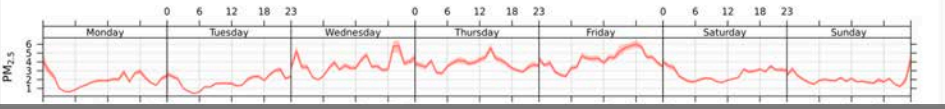


Figure 4: Dustbox 2060. Time plot showing PM2.5 concentrations between 07 February 2020 and 30 June 2020 (units: µg/m3).

From 2019 to 2020, Citizen Sense collaborated with participants in Forest Hill, London, to monitor air quality using the AirKit toolkit. This data story describes differences in pollution levels observed during the first lockdown due to Covid-19 from March to July 2020. As noted in the Brockley Rise Data Story, there were noticeable reductions in air pollution in London during the first lockdown, especially of nitrogen dioxide (NO_2). However, decreases in $PM_{2.5}$ were less pronounced during

https://datastories-covid.citizensense.net/

Covid Data Stories

OPPORTUNITIES FOR SOCIAL RESEARCH AND AIR QUALITY

- Building citizen-oriented infrastructures for monitoring and acting on air pollution
- Experimenting with techniques for interpreting data and developing interoperable datasets
- Organizing and acting on citizen proposals for transforming environments
- Aligning air quality science and policy with citizen engagement to ensure more democratic, just and pluralistic approaches
- Transforming social, scientific and technical research through public engagements with air quality

CREDITS AND CONTACT

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citizensense.net | @citizen_sense

Thanks to residents and participants in Forest Hill, London, including Clean Air SE23, the Horniman Museum, the Dalmain Primary School, and Lewisham Council.

AirKit Collaborators: Common Knowledge, Lau Thiam Kok, Tassos Noulas, and Andrea Rinaldi. For more information on project contributors, see Citizen Sense People.

Funded through ERC 313347 (Citizen Sense) and ERC 779921 (AirKit)

European Research Council

Established by the European Commission

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