


# Air Quality Observations

## Partners:

BCC; CCC; Walsall  
Council; Arup;  
Commonwealth  
games; Birmingham  
Hospitals; Cundall

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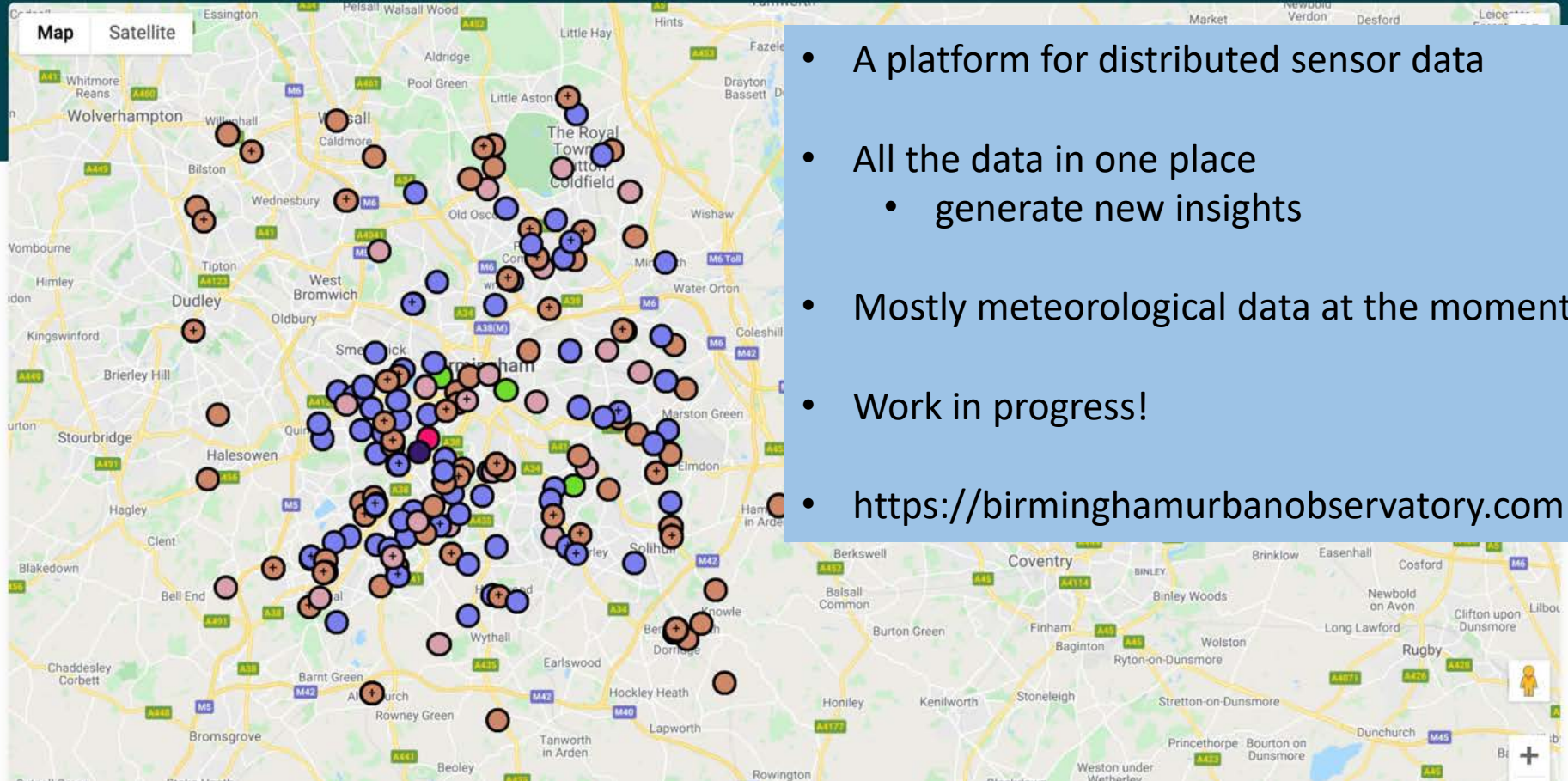
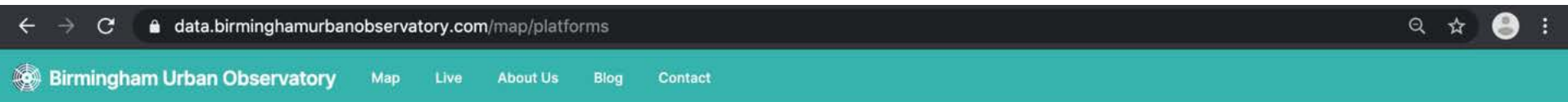


WM-AIR  
CLEAN AIR SCIENCE FOR  
THE WEST MIDLANDS

# Air Quality Observations

- Aim is to increase the observational capability of air pollution across the West Midlands
- Using a variety of techniques to complement existing capacity:
  - Low Cost Sensors
  - Mobile Monitoring
  - Use of the new AQ supersite at the UoB and ARUN
    - Source apportionment

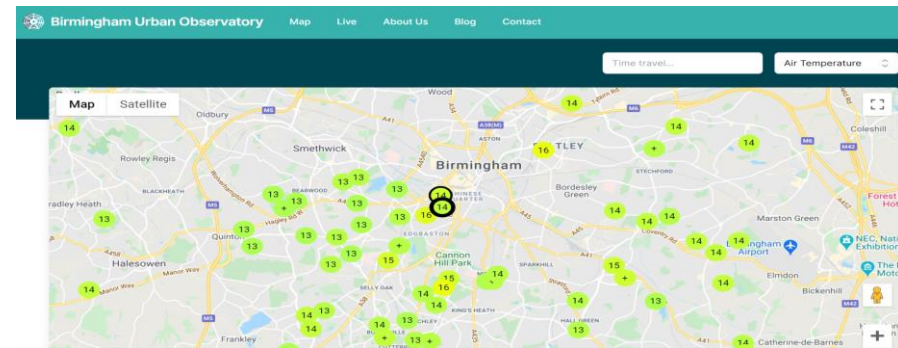
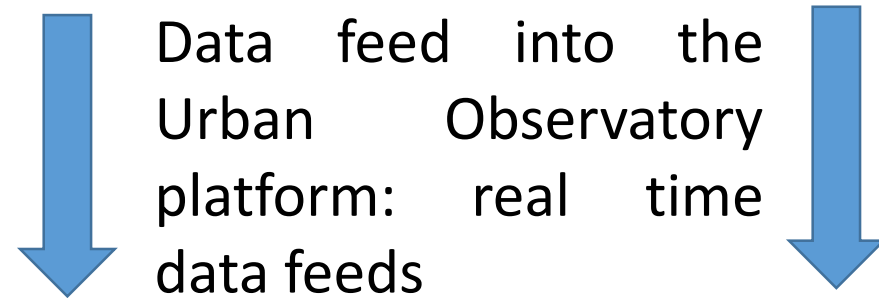
# Birmingham Urban Observatory



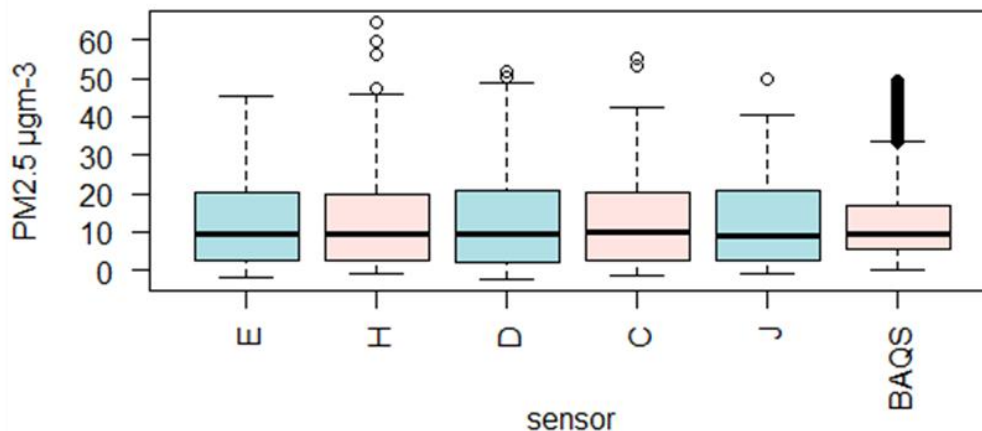
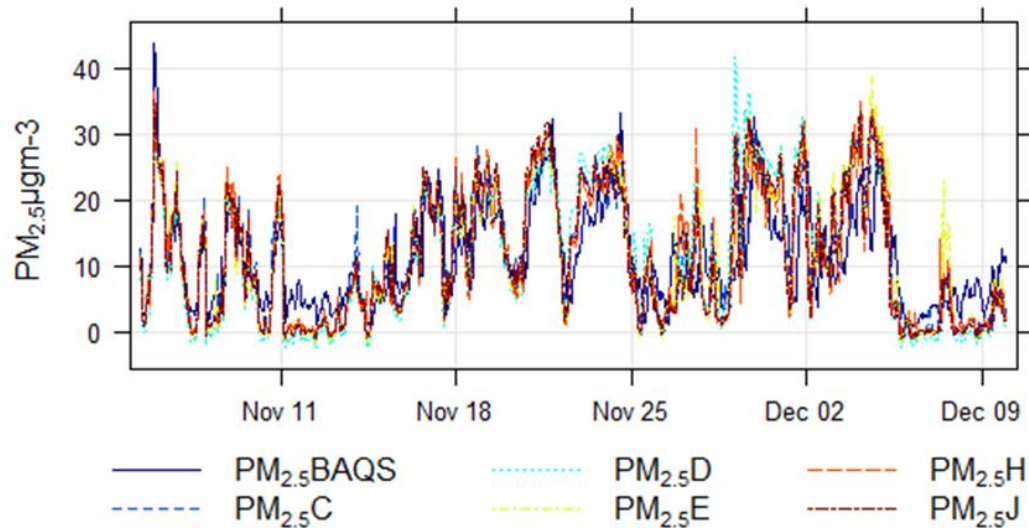
- A platform for distributed sensor data
- All the data in one place
  - generate new insights
- Mostly meteorological data at the moment
- Work in progress!
- <https://birminghamurbanobservatory.com>

# Low cost PM sensors

- 'Low cost' IoT based sensor
- Measures  $PM_{10}$   $PM_{2.5}$   $PM_{10}$  T & RH
- Samples every 15 minutes
- Self contained
  - Power 4x1.5v Batteries (approx. life of 3-6 months)
  - Communications Sigfox
- Semi Mobile:
  - Dimensions 17x13x13cm
  - Weight approx. 1.5kg
  - Mounting on existing street furniture – 10m installation!

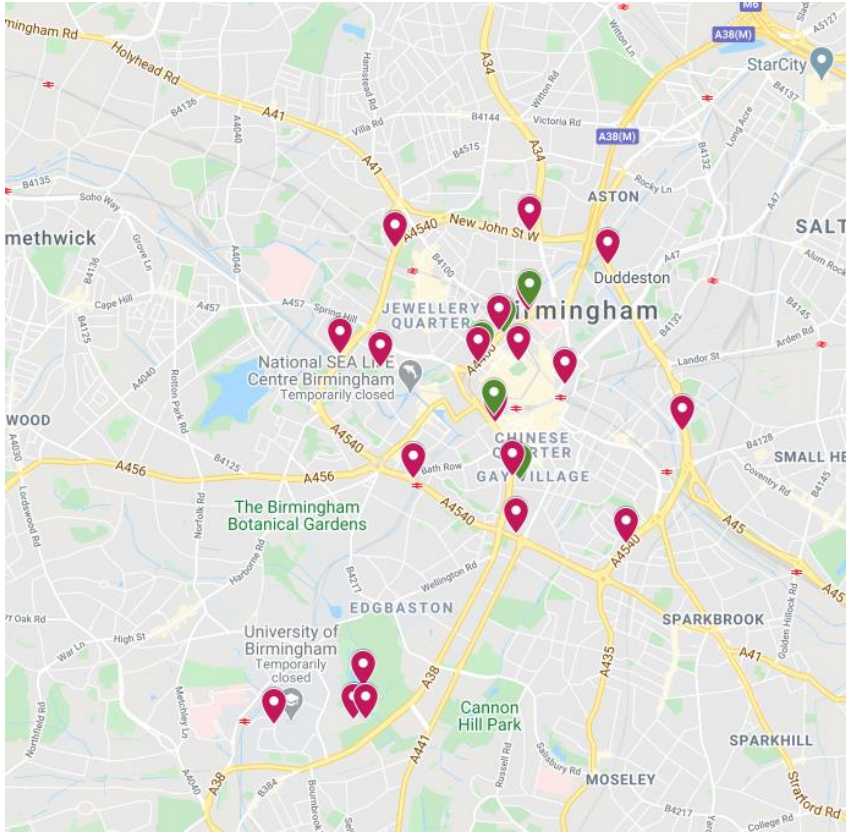


# Low cost sensors



- Good agreement with reference instrument - Fidas
- To be deployed late autumn 2020
- Lots of interest in them!

# Deployment



*Proposed monitoring sites at Birmingham.*

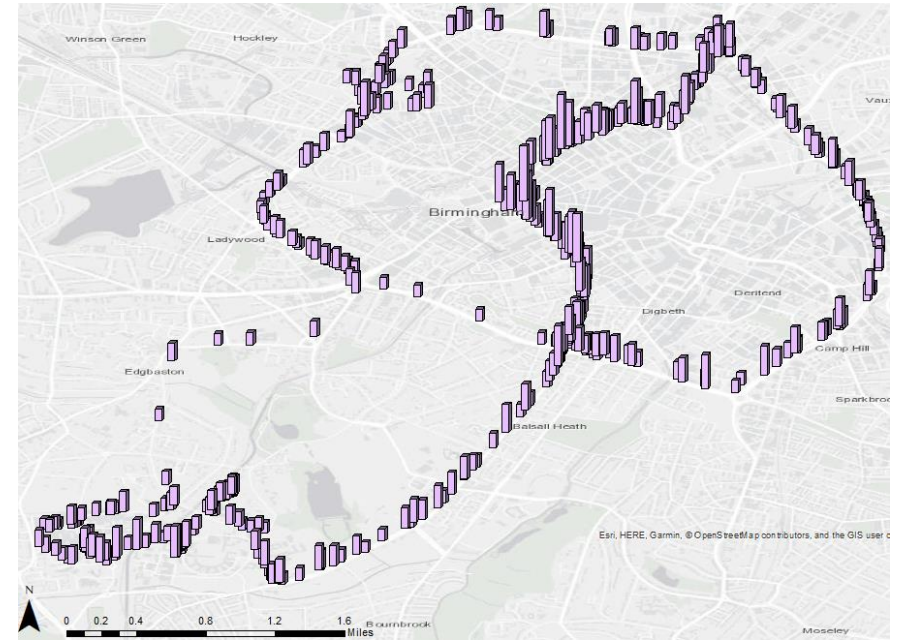
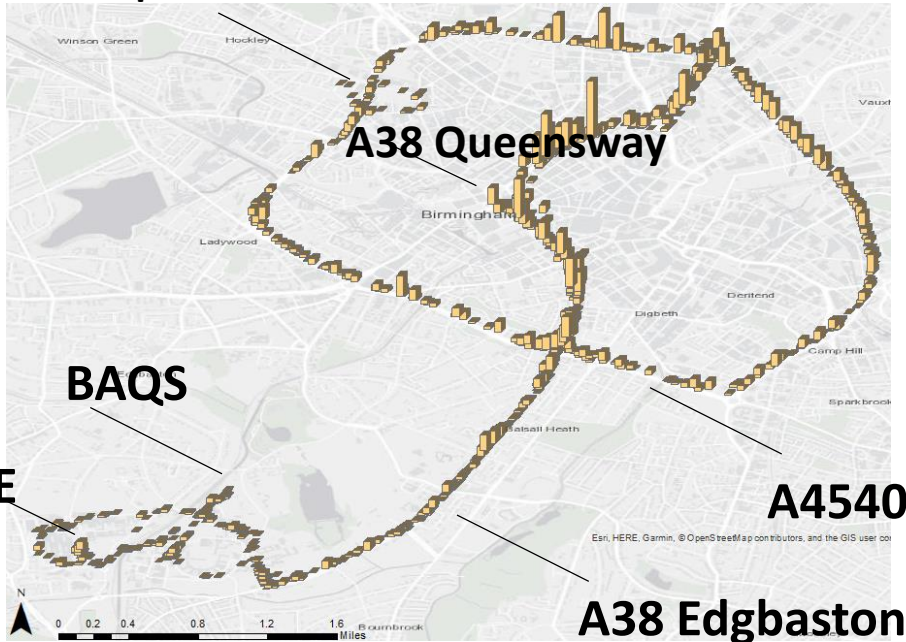
- Ongoing discussions with BCC, CCC, Walsall and Commonwealth games
- Zephyrs and emotes in collaboration with Urban Observatory - collocated with existing sites across Birmingham
- Semi-mobile sensors will target additional areas of interest

# Mobile measurements

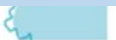
Jewellery Quarter  
8-loop

NO<sub>2</sub>

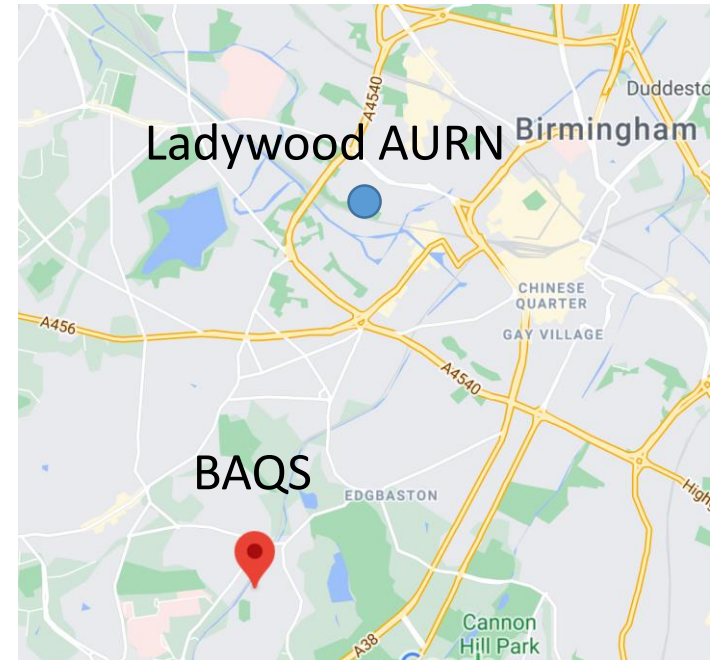
PM<sub>2.5</sub>



- Highest con. in and around the A38 Queensway tunnels.
- Temporal variation of NO<sub>x</sub>, PM and CO<sub>2</sub> levels was noted across different measurement days.



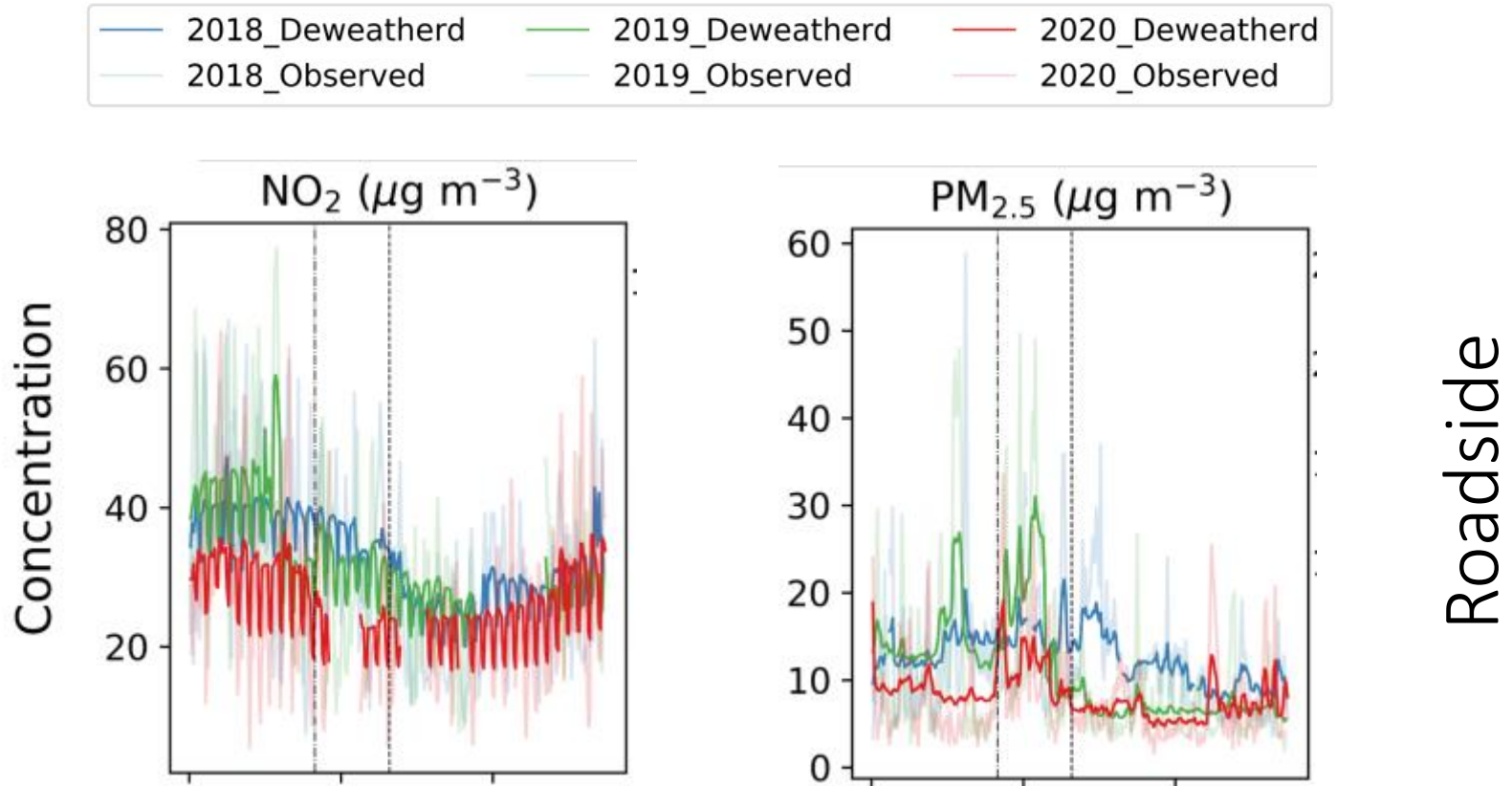
# PM source apportionment



- PM collected on filters at two locations
- Chemical composition to be analysed
- Source apportionment (e.g. traffic, industry, wood burning etc.)
- Effect of Covid-19 lockdown to be analysed
- BAQS feeding to BCC AQ sites



# Machine learning to study COVID effect on AQ



- Roadside NO<sub>2</sub> saw clear decreases but bounce back after lockdown; increased emission after Aug?
- PM<sub>2.5</sub>: no clear trend; very complex

-Thank you for your attention-

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