



Barcelona Air Quality

Data analysis

Miguel Estepa - Beto Sibileau



Ambient air pollution - WHO matters



- 91% of world population was living at places not meeting WHO levels (2016)
- Estimated of 4.2 million premature deaths worldwide (2016)
- Focus on three evaluations provided by *WHO Air quality guidelines* (2005):
 - Particle matter (PM)
 - Ozone (O₃)
 - Nitrogen dioxide (NO₂)
- New expected release: *WHO Air quality guidelines* (2020)

Air quality guideline values

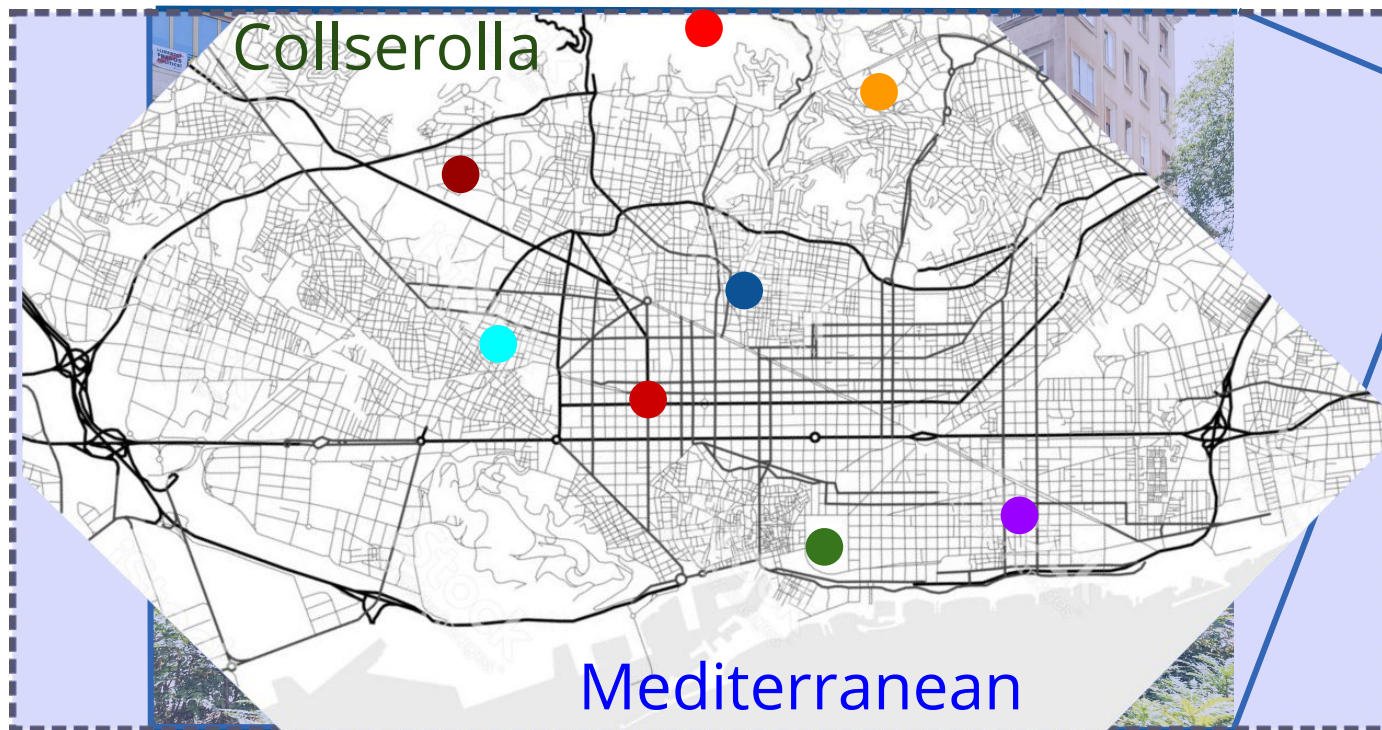
- Particle matter (PM) - complex mixture of particles suspended in the air.
 - Coarse particles (PM₁₀)
 - 20 $\mu\text{g}/\text{m}^3$ annual mean
 - 50 $\mu\text{g}/\text{m}^3$ 24-hour mean
- Ozone (O₃) at ground level - formed by sunlight reaction with pollutants.
 - 100 $\mu\text{g}/\text{m}^3$ 8-hour mean
- Nitrogen dioxide (NO₂) - major sources: combustion process.
 - 40 $\mu\text{g}/\text{m}^3$ annual mean
 - 200 $\mu\text{g}/\text{m}^3$ 1-hour mean



Barcelona Air quality Stations



Ajuntament
de Barcelona



- Gracia
- Eixample
- Ciutadella
- Les Corts
- Poblenou
- Sants
- Vall d'Hebron
- Observatori Fabra

BCN Air quality - Empowered by Data

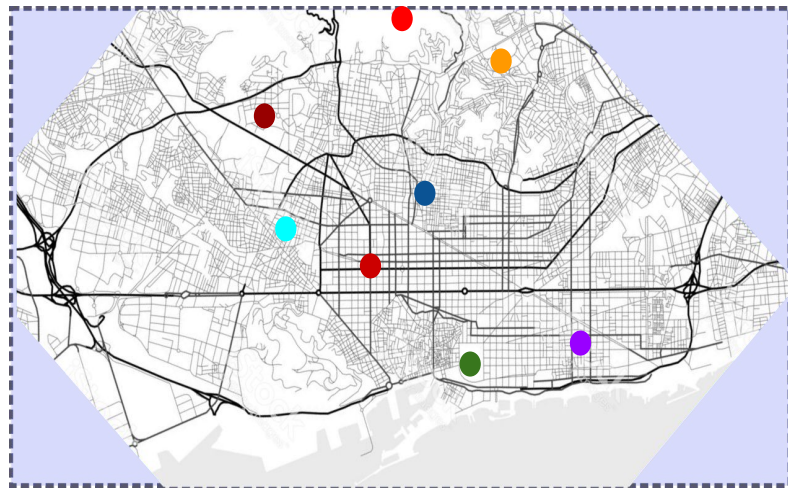


- Source: BCN Open DATA (Barcelona's City Hall service)
- Input: 2019 monthly results (annual report NOT yet released)
- Special care with data frames! → (Jan - March) != (April - Dec)
- Locations: yearly average of pollutants at different stations
- Months: variations along seasons/holidays

Barcelona Air quality 2019 - Locations

- Year average on ground level Stations
- Not all Stations measure all pollutants
- Analysis → WHO guideline levels

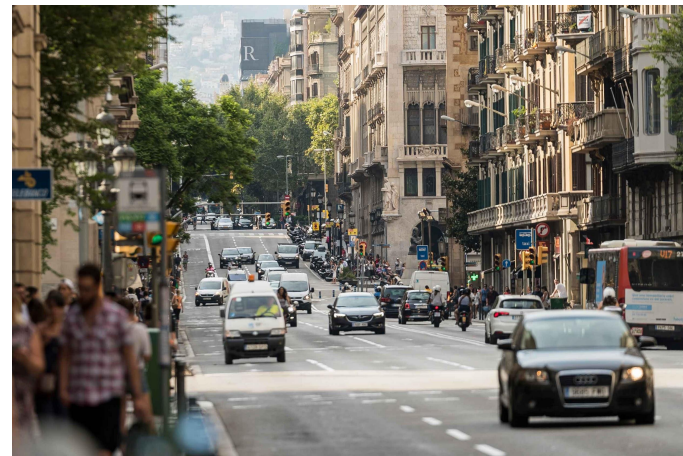
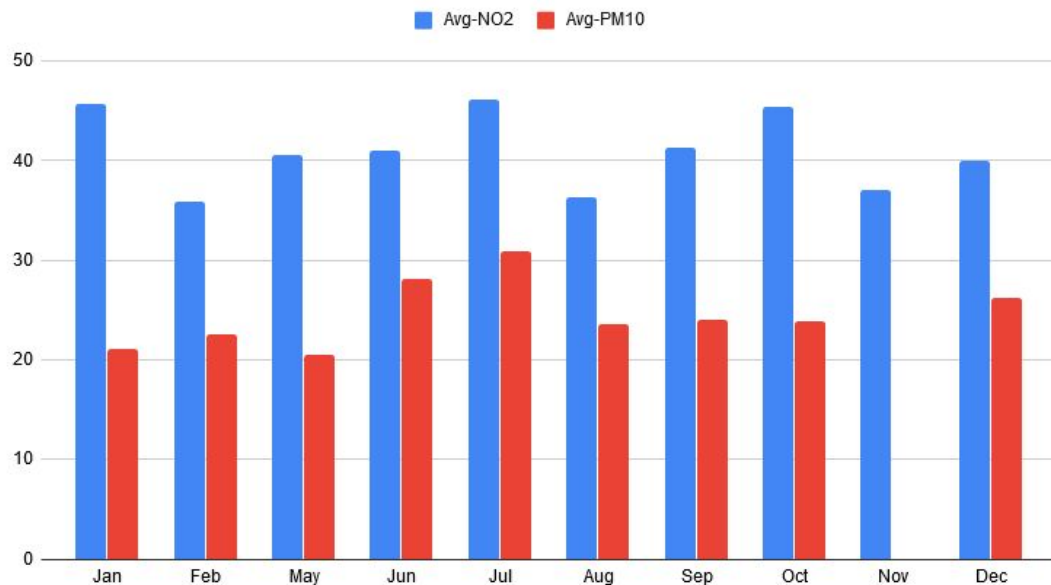
	NO ₂	PM ₁₀
Ciudadella	30.83	--
Eixample	47.91	27.33
Gracia	40.96	24.51
Les Corts	26.13	20.97
Poblenou	34.66	29.96
Sants	28.93	--
Vall d'Hebron	27.19	25.48



Air quality Gracia 2019 - Monthly evolution

- Address: Via Augusta & Travessera Gracia

Avg-NO2 and Avg-PM10



Concluding Project Remarks

- Example (Metro Diagonal) ↓
- Gracia (Via Augusta & Trav. Gracia) ↓
- WHO PM₁₀ guidelines → 🤖
- Future improvements:
 - Give insights about COVID 🧑‍⚕️
 - Give insights about seasons and hour of the day.



Data & Air Quality - What we learned

- Data is not perfect
- Answers before tools
- Know when to stop
- Better **1 strong** concept than 1.000 small ideas

Data & Air Quality - Barcelona



Thank you
for your
attention!

Questions?