CS5010: Semester Project
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Project "AQB", AirQualBeijing

2012 China National Air Quality Action Plan

Goal: Improve the air quality of the entire country by 2017.

AQI	Air Pollution Level	Health Implications	Cautionary Statement (for PM2.5)
0 - 50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk	None
51 -100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
101-150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
151-200	Unhealthy	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects	Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion
201-300	Very Unhealthy	Health warnings of emergency conditions. The entire population is more likely to be affected.	Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.
300+	Hazardous	Health alert: everyone may experience more serious health effects	Everyone should avoid all outdoor exertion

https://aqicn.org/city/beijing/

Citation: Zhang, S., Guo, B., Dong, A., He, J., Xu, Z. and Chen, S.X. (2017) Cautionary Tales on Air-Quality Improvement in Beijing. Proceedings of the Royal Society A, Volume 473, No. 2205, Pages 20170457

Data set: “Beijing Multi-Site Air-Quality Data Data Set” from the UCI Machine Learning Repository

Description:

6 main air pollutants: PM2.5, PM10, SO2, NO2, CO, and O3

6 meteorological variables: temp., pressure, dew point temp., precipitation, wind direction and speed

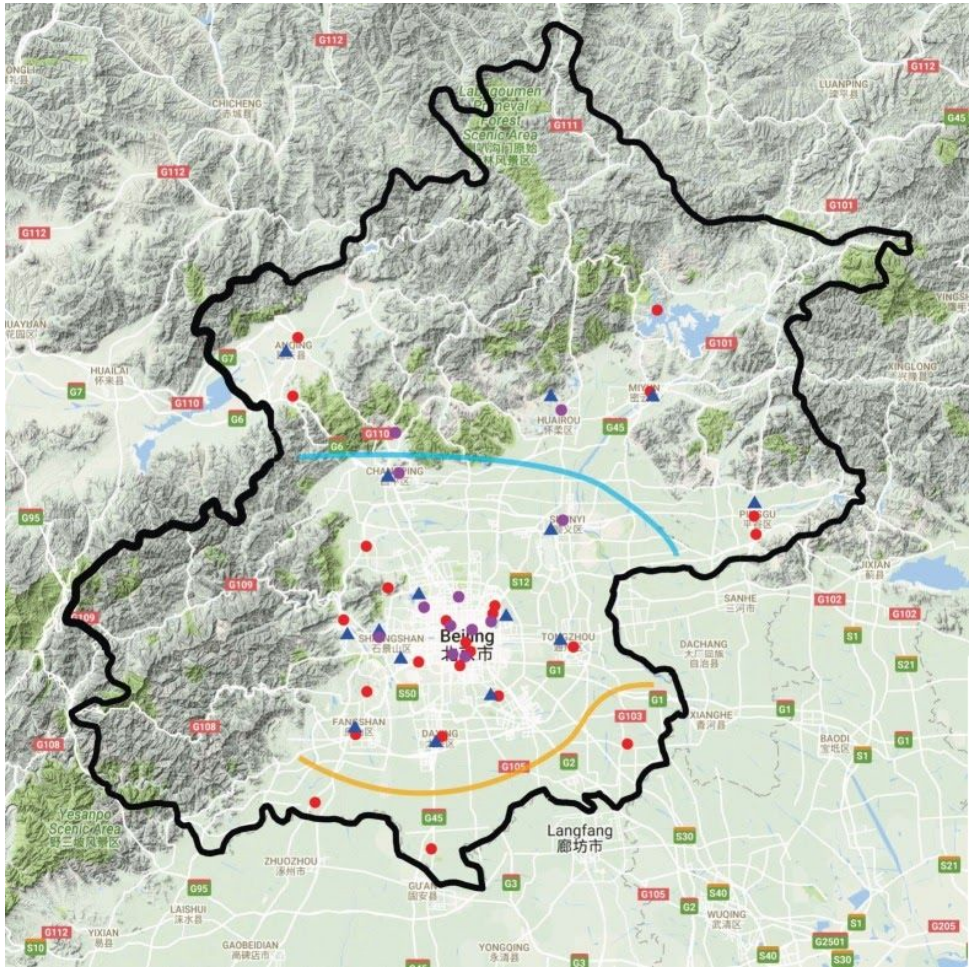
Measurement

12 monitoring sites in Beijing: Aotizhongxin, Changping, Dingling, Dongsi, Guanyuan, Gucheng, Huairou, Nongzhanguan, Shunyi, Tiantan, Wanliu, and Wanshouxigong

Timeframe

March 1, 2013, to February 28, 2017

Air Quality Monitoring sites (purple dots)



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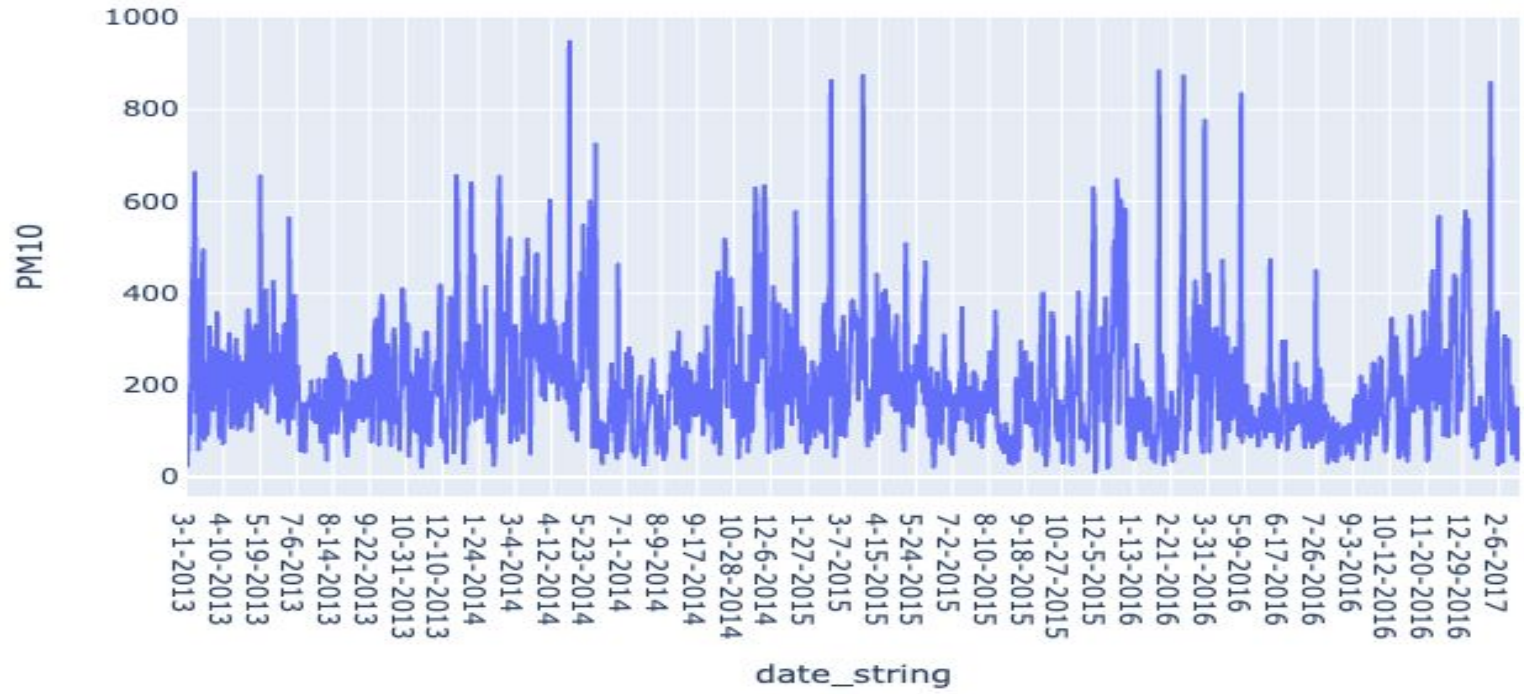
- Data Loading and Cleaning

- Data Exploration:
    - Initial queries focused on Pollutants/Month/Year/Weather Station
    - Histograms/Scatterplots

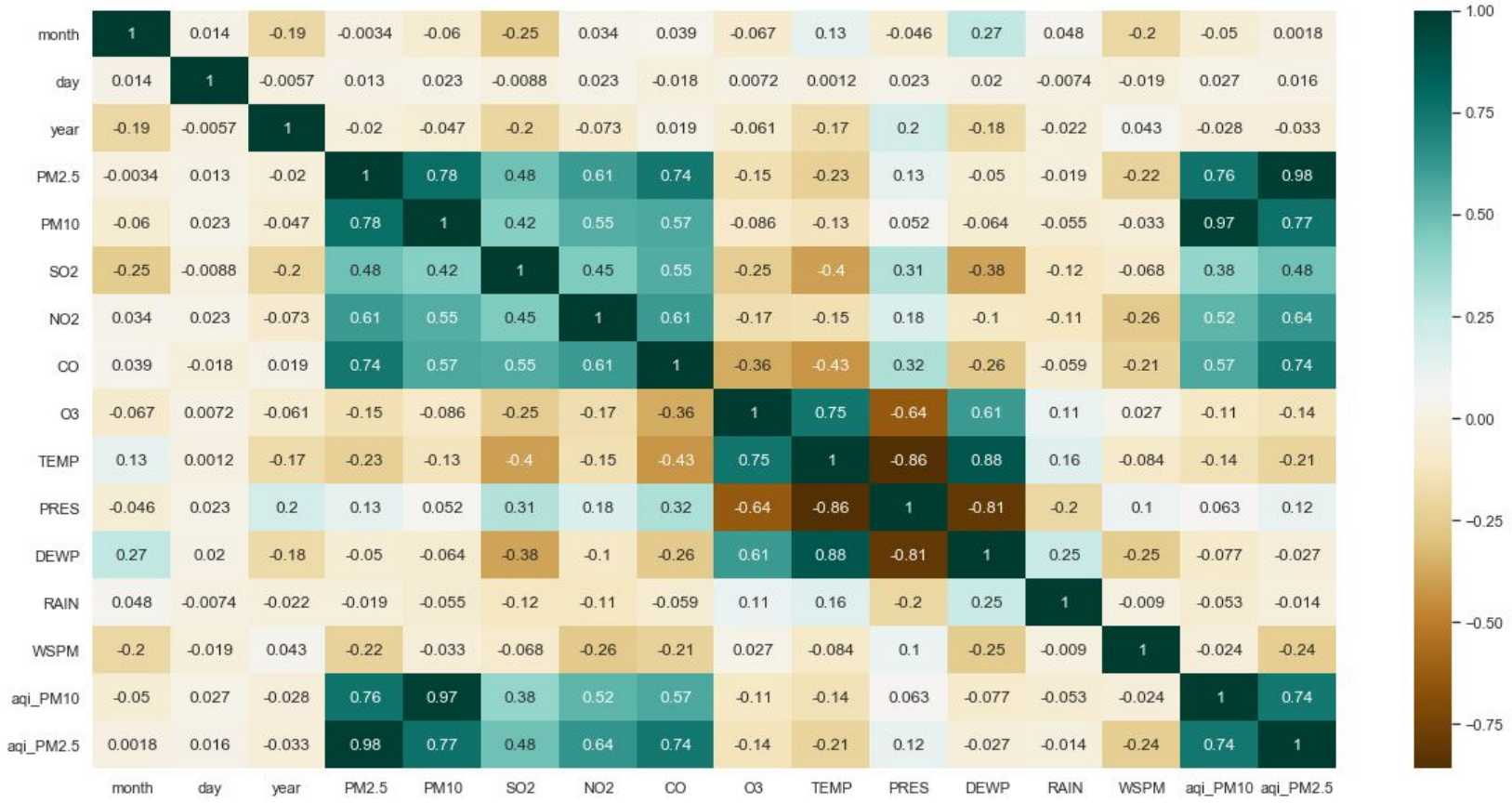
Data Queried from the program: Aotizhongxin Collection Site

PM10 Pollutants against date (March 2013 - March 2017)

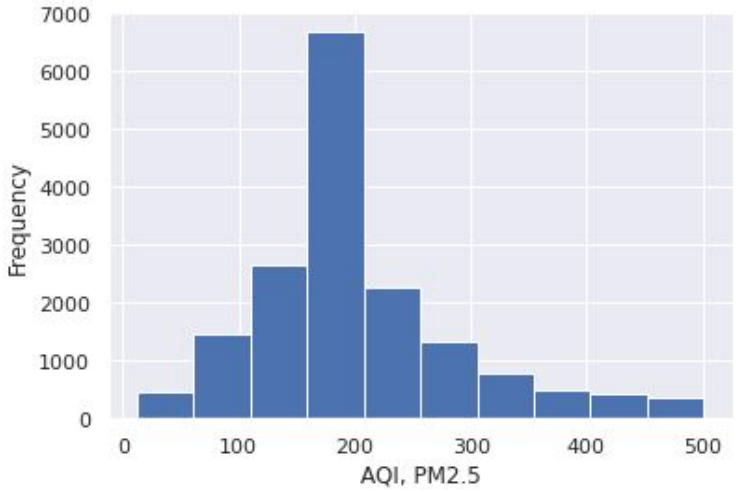


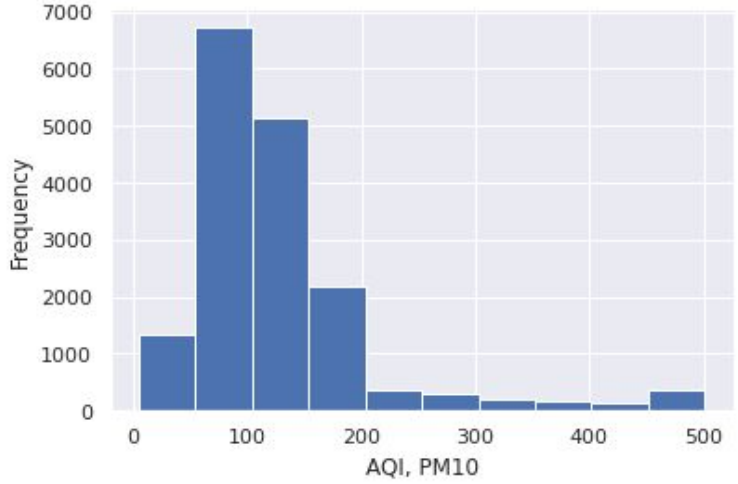
More data queried from the program:

Correlation / Heat Map of Data at Aotizhongxin Collection Site



Histograms of AQI Values for Particulate Matter Across All Stations



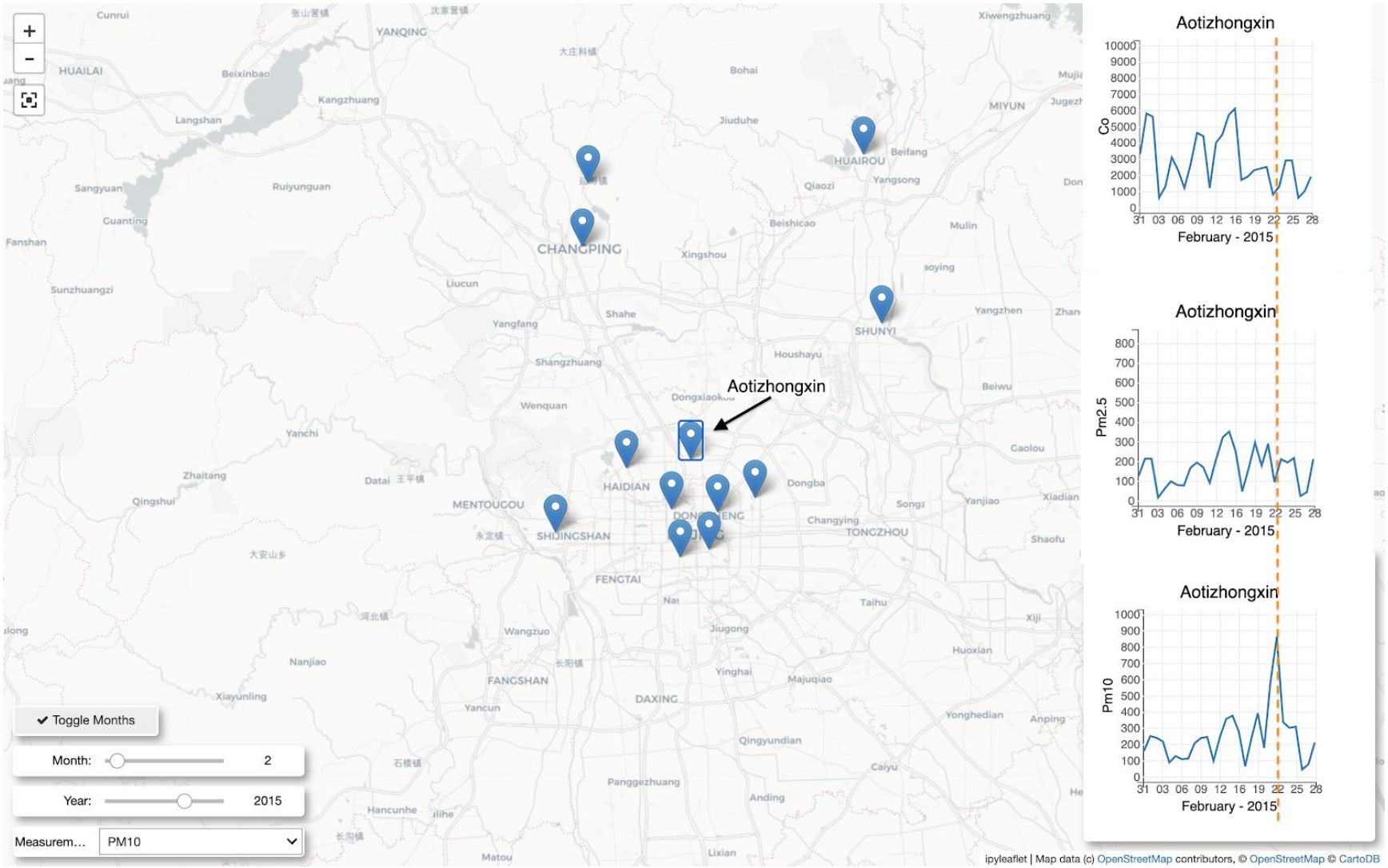


- We wanted more from our data than static graphs.
- We wanted to be able to query by month, year, pollutant, weather station, temperature, wind speed….
- We wanted to be able to interactively query air quality and weather data for visual interpretation.

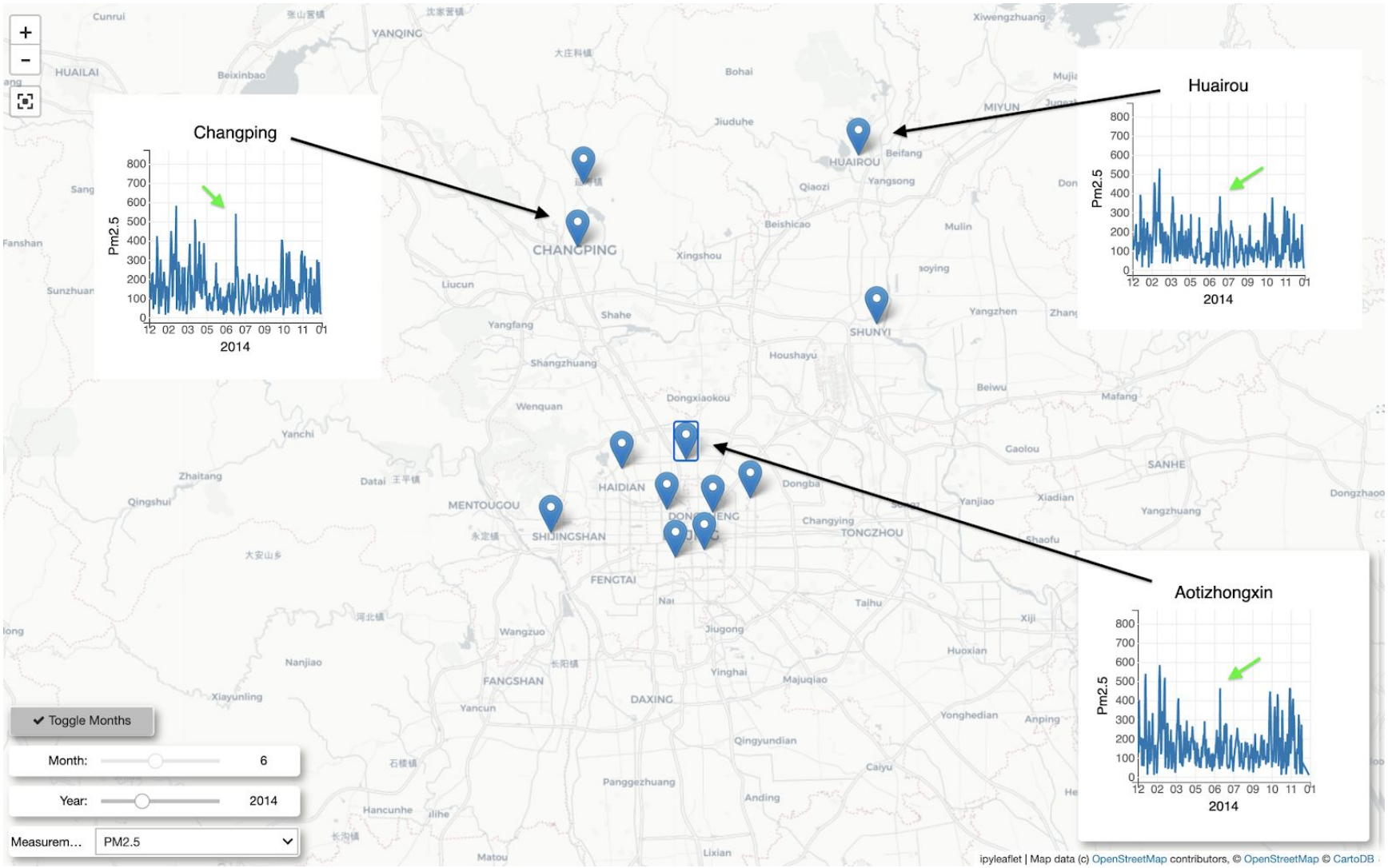
The inception of a visualization application:

AirQualBeijing

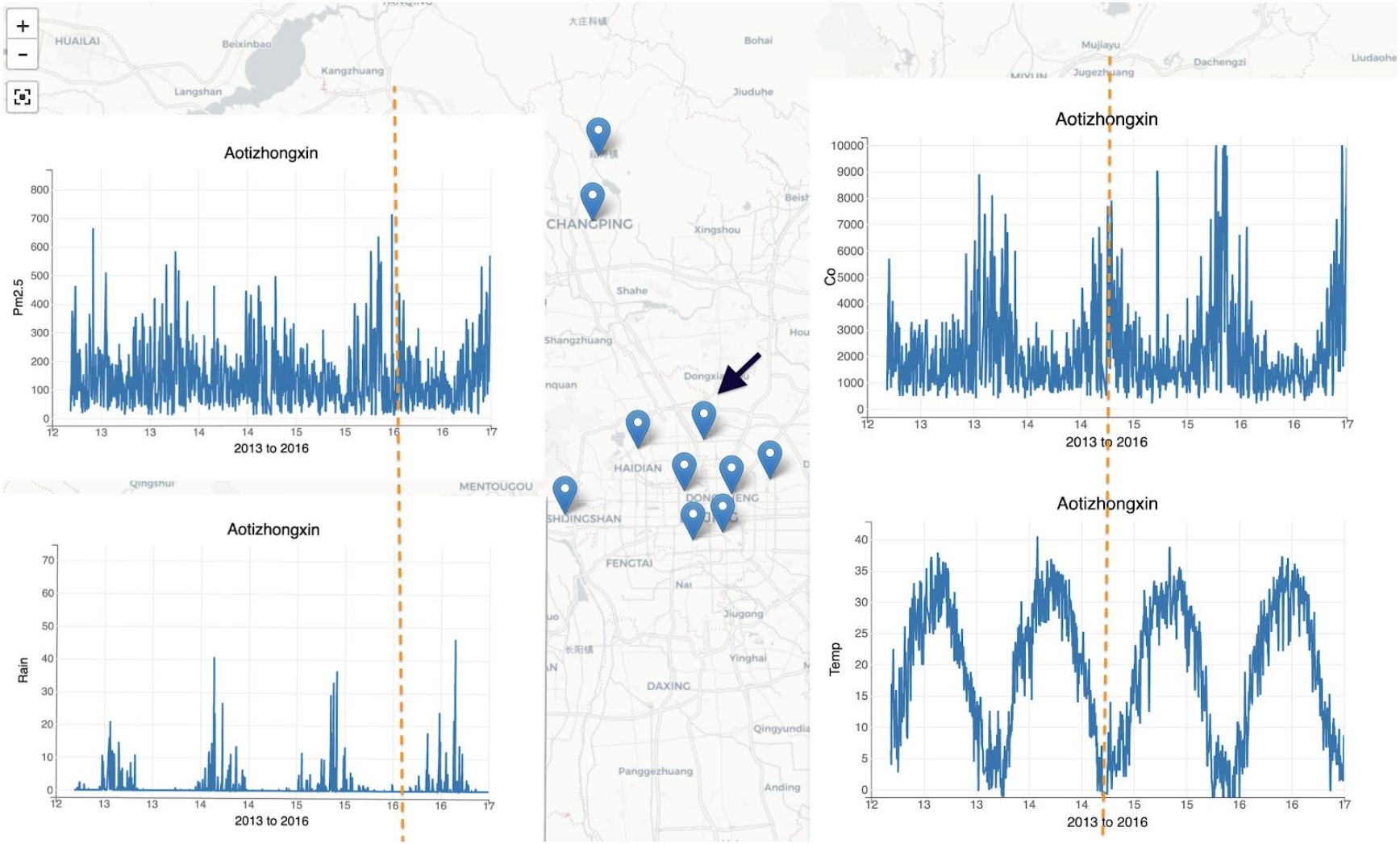
‘AQB’



Hover over an individual weather station and query a variety of pollutants/data by month or year.



Hover over multiple weather stations and query the same pollutant. Query by month or by year.



Hover over an individual weather station and query a variety of pollutants/data from 2013-2016.

Testing:

- Unit tests
- Visual Tests
  - Matched weather station sites with map in AQB
  - Tested drop down and toggle menu in AQB
- Confirmation of Data
  - Cross checked raw data with queried data points
  - Compared calculated AQI with installed ‘aqi’ library

Concluding Remarks……..