Air Pollution *in* LOS ANGELES

Team: Lorelei

Members: Haotian Zhang Qianhui you Jing Peng Fan Pan

MOST POLLUTED CITIES IN THE UNITED STATES

Ozone-polluted cities

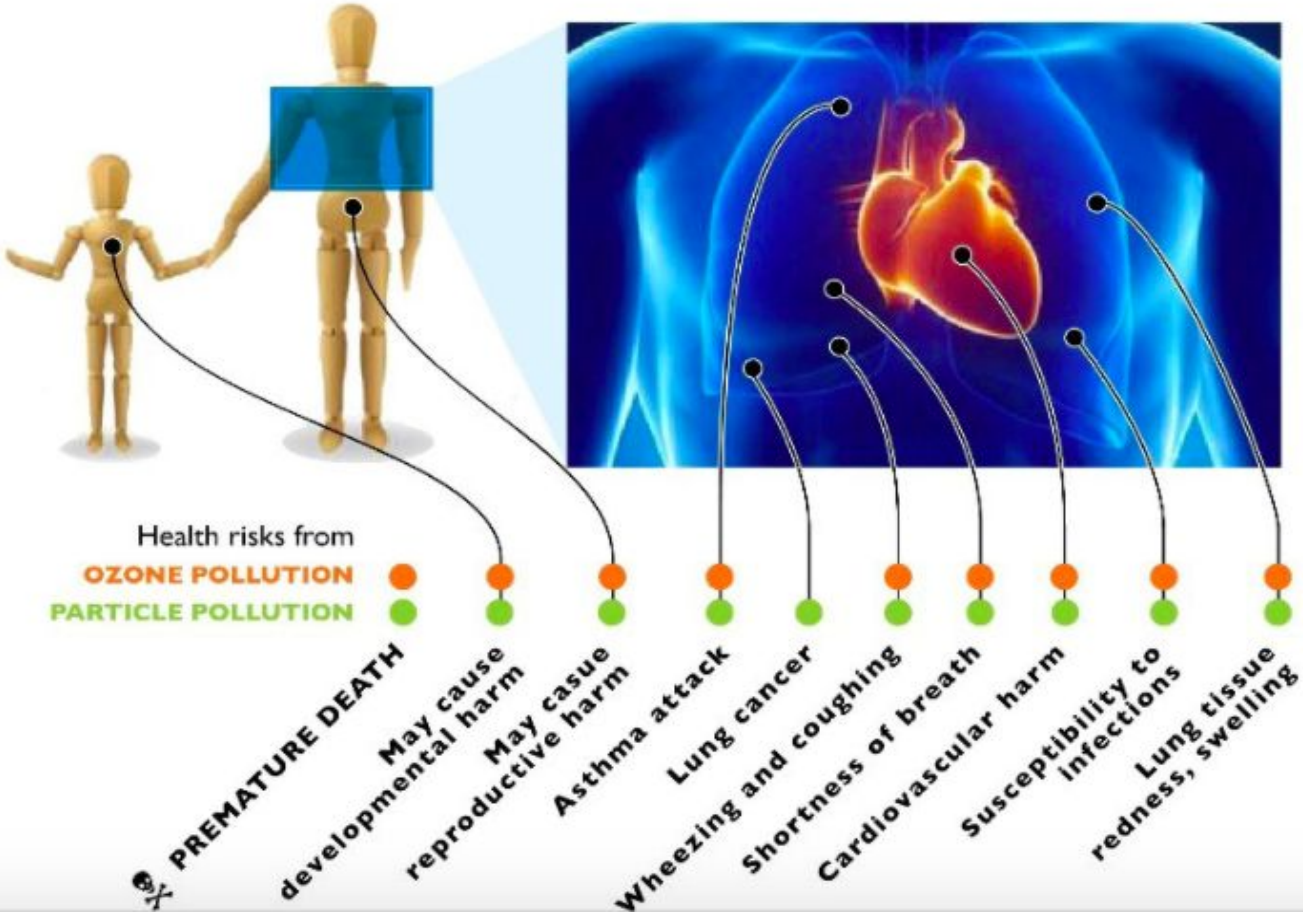
1	Los Angeles, Cali.
2	Visalia, Cali.
3	Bakersfield, Cali.
4	Fresno, Cali.
5	Sacramento, Cali.
6	Houston, Texas
7	Dallas, Texas
8	Modesto, Cali.
9	Las Vegas, Nev.
10	Phoenix, Ariz.

Statistics courtesy of a new study by the American Lung Association

Year-round particle-polluted cities

1	Fresno, Cali.
2	Bakersfield, Cali.
3	Visalia, Cali.
4	Modesto, Cali.
5	Los Angeles, Cali.
6	El Centro, Cali.
7	San Jose, Cali.
8	Cincinnati, Ohio
8	Wilmington, Ind.
8	Maysville, Ky.
9	Pittsburgh, Penn.
9	New Castle, Ohio
9	Weirton, W. Va.
10	Cleveland, Ohio

Air pollution remains a major danger to the health of children and adults.



AirNow

Local Air Quality Conditions

Zip Code: Zip Co Go State : California Go My Current Location

AIRNow Home >> California >> **Central LA CO**

Data and Forecasts courtesy of:

Antelope Valley Air Quality Management District, Bay Area Air Quality Management District, California Air Resources Board, Imperial County Air Pollution Control District, Mendocino County Air Quality Management District, Mojave Desert Air Quality Management District, Monterey Bay Unified Air Pollution Control District, Placer County Air Pollution Control District, Sacramento Metropolitan Air Quality Management District, San Diego County Air Pollution Control District, San Joaquin Valley Air Pollution Control District, San Luis Obispo County Air Pollution Control District, Santa Barbara County Air Pollution Control District, South Coast Air Quality Management District, Ventura County Air Pollution Control District, Yolo-Solano Air Quality Management District

Current AQI | Forecast | AQI Loop | More Maps

Tribal Boundaries

The tribal boundaries shown here are provided by the Bureau of Indian Affairs and are intended to be used as a general spatial reference only. They are not a formal determination of tribal boundaries by the EPA.

Current Conditions

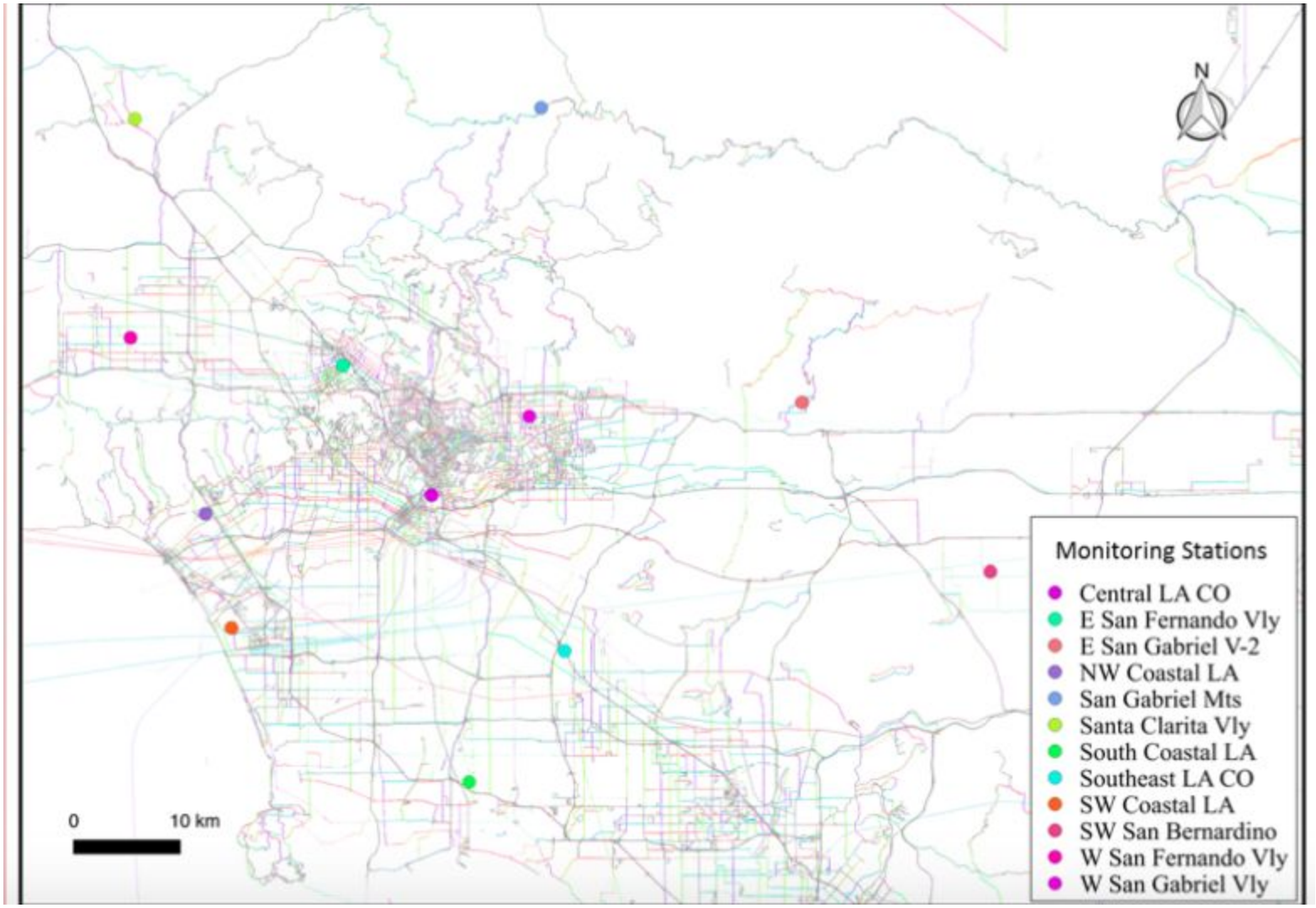
Data Not Available

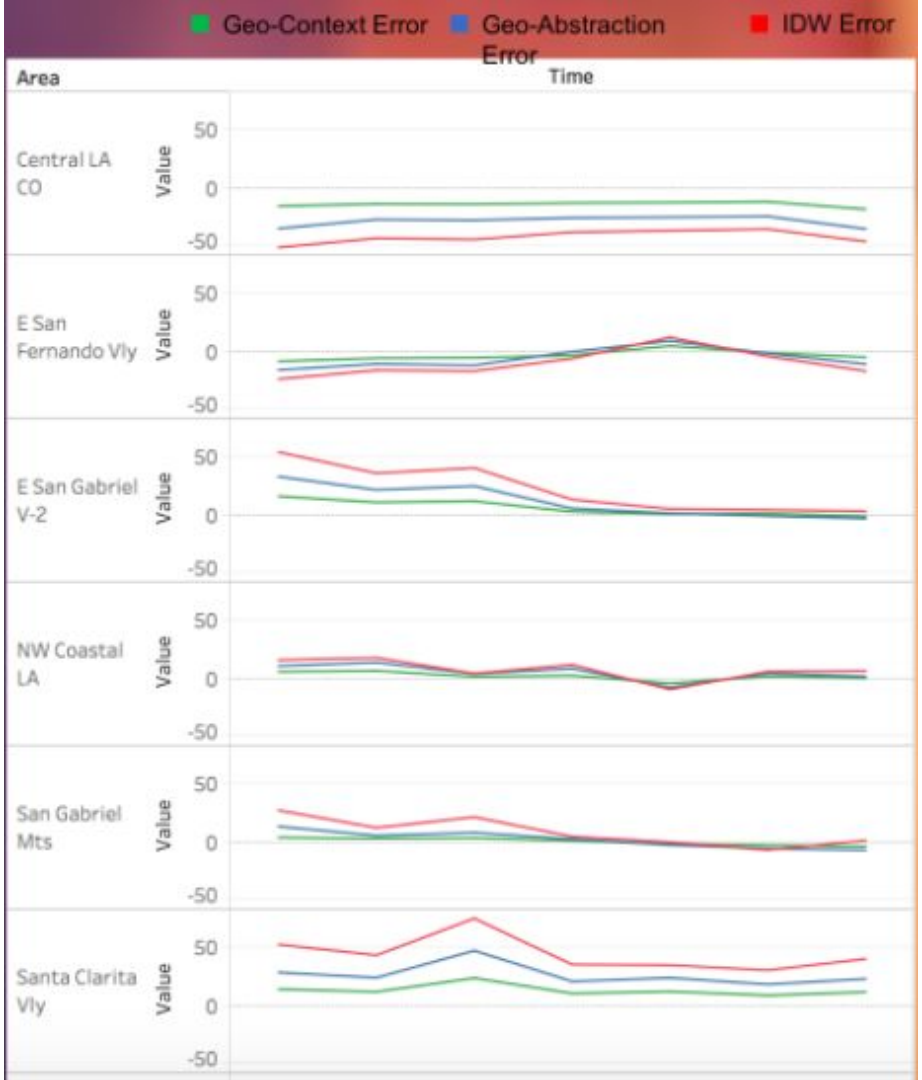
Air Quality Forecast

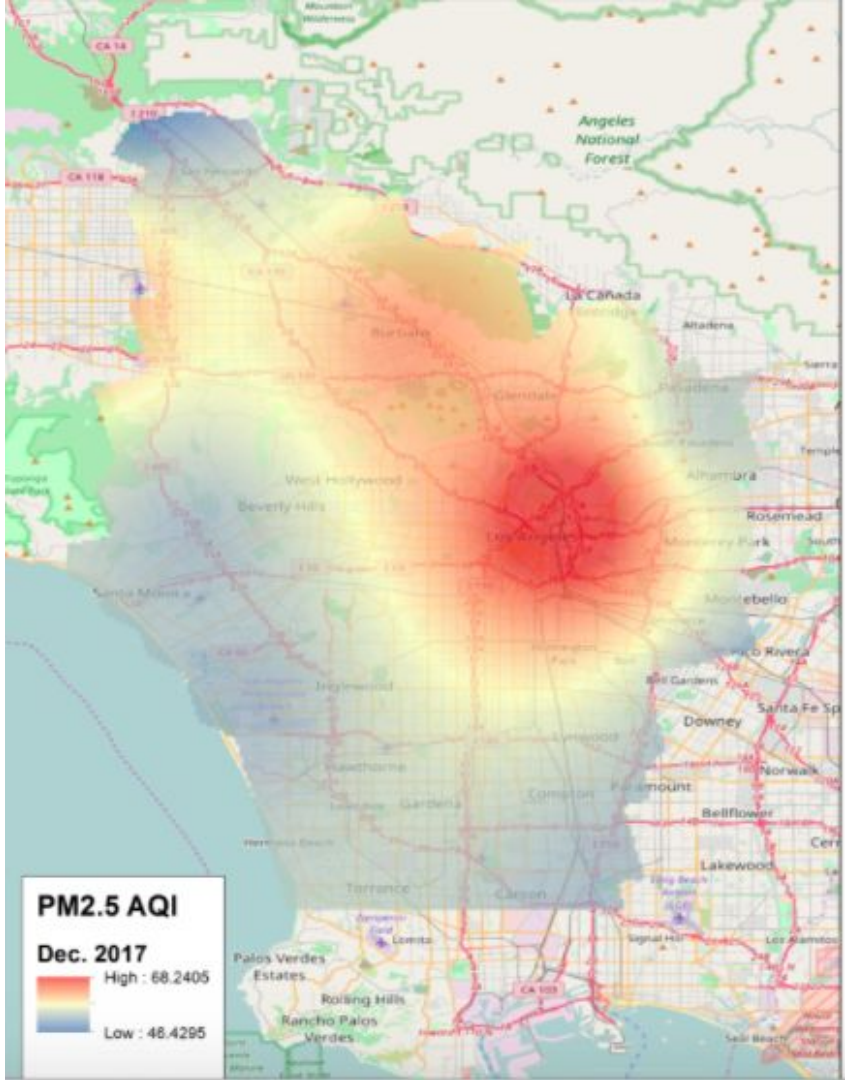
Today	Tomorrow
Air Quality Index (AQI) 74 **Moderate** **Health Message:** Unusually sensitive people should consider reducing prolonged or heavy exertion.	Data Not Available

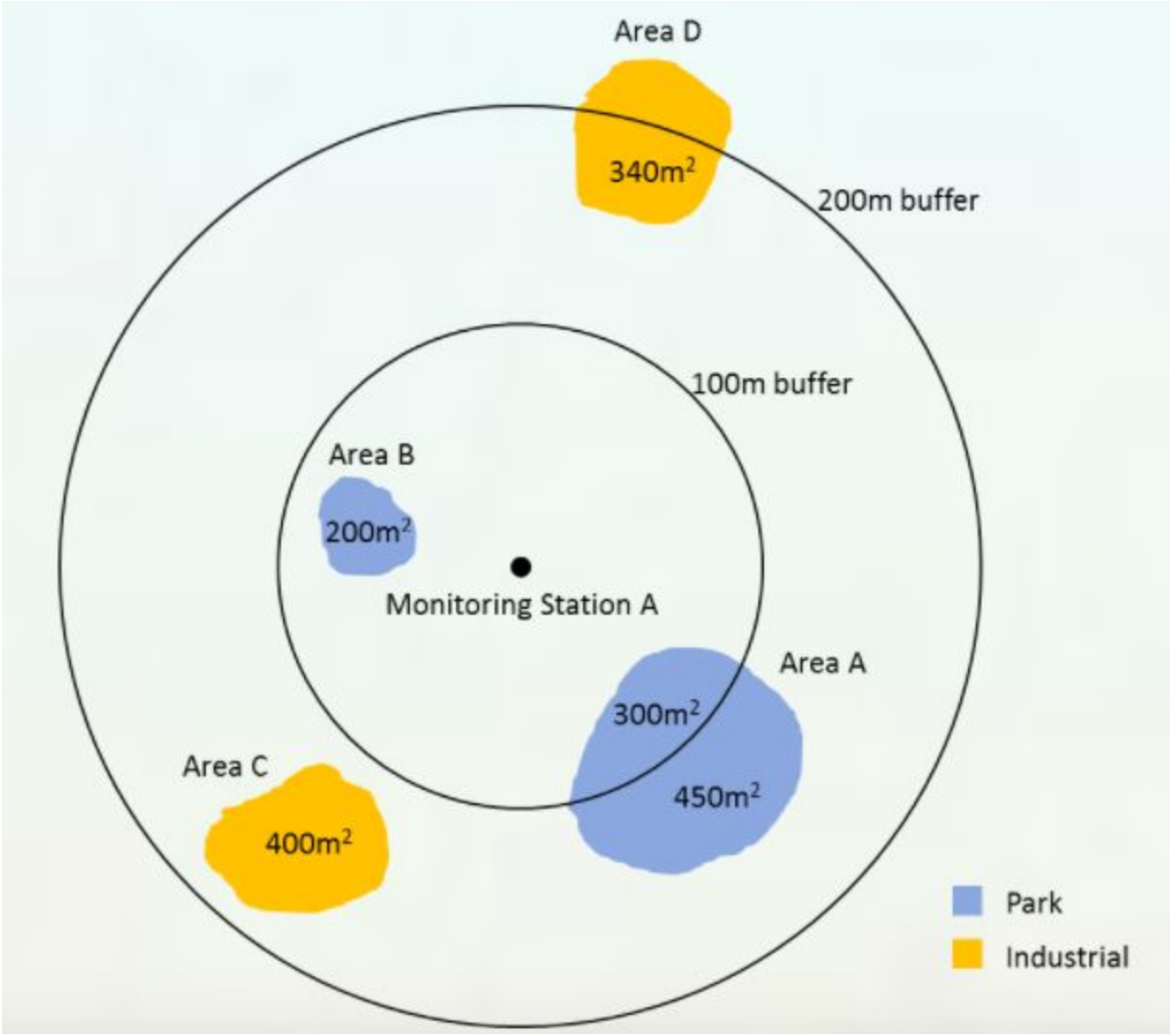
AQI - Pollutant Details

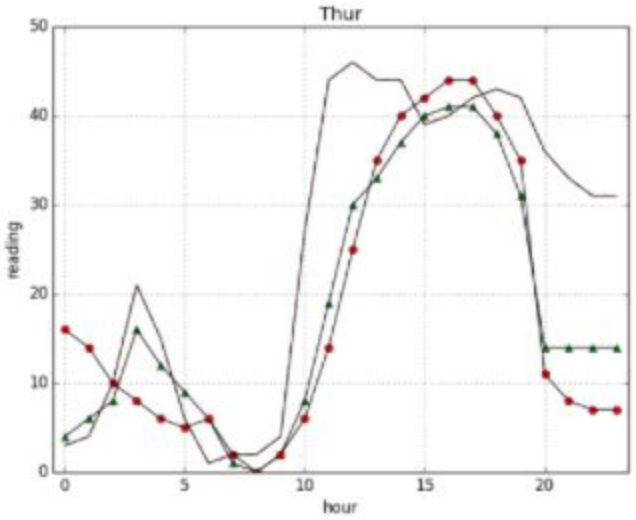
Carbon Monoxide	15	Good	Data Not Available
Nitrogen Dioxide	20	Good	
Ozone	37	Good	
Particles	34	Good	

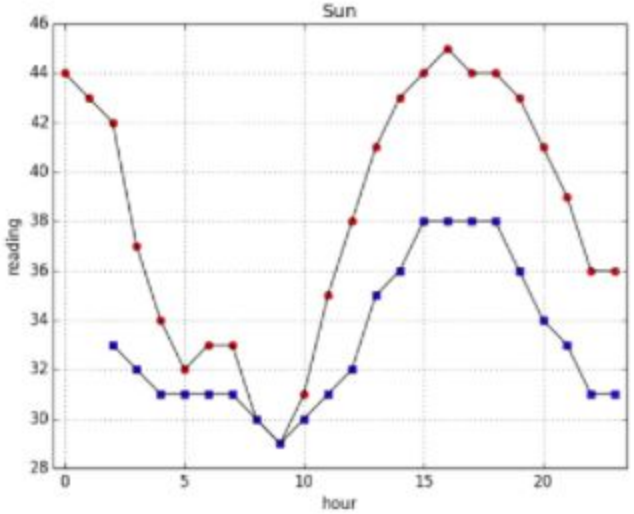

N
Monitoring Stations
Central LA CO
E San Fernando Vly
E San Gabriel V-2
NW Coastal LA
San Gabriel Mts
Santa Clarita Vly
South Coastal LA
Southeast LA CO
SW Coastal LA
SW San Bernardino
W San Fernando Vly
W San Gabriel Vly
0
10 km


Geo-Context Error
Geo-Abstraction Error
IDW Error
Area
Time
Central LA CO
E San Fernando Vly
E San Gabriel V-2
NW Coastal LA
San Gabriel Mts
Santa Clarita Vly
Value
50
0
-50


PM2.5 AQI
Dec. 2017
High : 68.2405
Low : 48.4295
Angeles National Forest
La Cañada
Pasadena
Alhambra
Rosemead
Beverly Hills
West Hollywood
Hollywood
Downey
Norwalk
Bellflower
Lakewood
Torrance
Carson
Palos Verdes Estates
Rolling Hills
Rancho Palos Verdes


Area D
340m²
200m buffer
100m buffer
Area B
200m²
Monitoring Station A
Area A
300m²
450m²
Area C
400m²
Park
Industrial

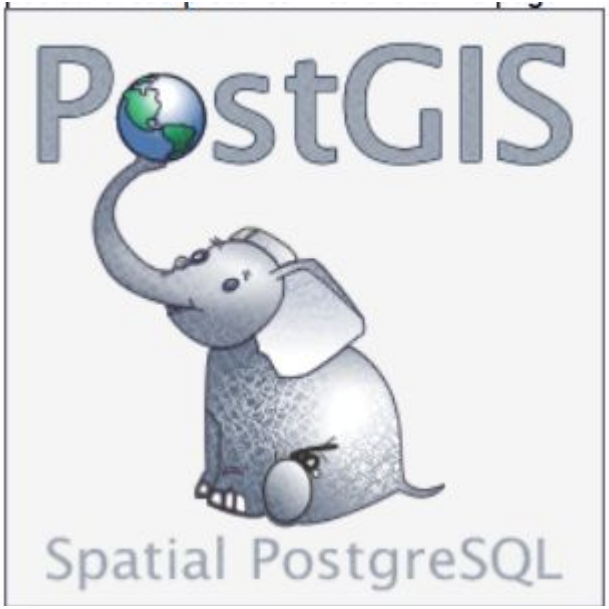

Thur
reading
hour
0
5
10
15
20
0
10
20
30
40
50


Sun
reading
hour
0
5
10
15
20
28
30
32
34
36
38
40
42
44
46


Current AQI (Combined PM and O_3)
Tuesday, October 10, 2017 11:00 PM PDT
5
Santa Clarita
San Fernando
210
Simi Valley
Malibu
Los Angeles
110
Anaheim
405
Irvine
5
15
210
San Bernardino
Chino
Riverside
Banning
215
Santa Ana
Temecula
0 4.2 8.5 17 Miles


node
JS


D3

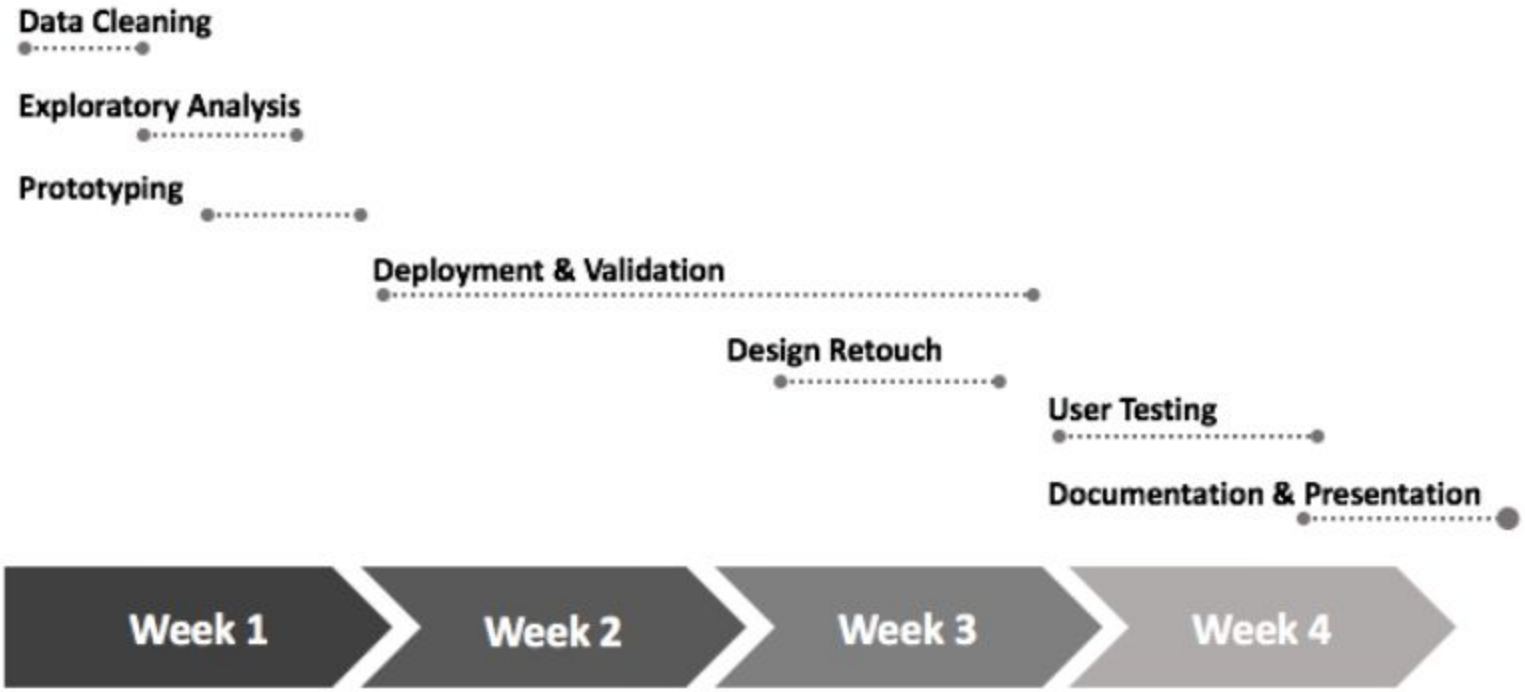

PostGIS
Spatial PostgreSQL


HTML
CSS


Spark


APACHE
kafka

PROJECT TIMELINE



Fan Pan
data modeling &
visualization programming

Gabby You
aesthetics design &
visualization programming

Mining Public Datasets for Modeling Intra-City $PM_{2.5}$ Concentrations at a Fine Spatial Resolution

Yijun Lin
Spatial Sciences Institute
University of Southern California
yijunlin@usc.edu

Fan Pan
Spatial Sciences Institute
University of Southern California
fanpan@usc.edu

Yao-Yi Chiang
Spatial Sciences Institute
University of Southern California
yaoyic@usc.edu

Dimitris Stripelis
Information Sciences Institute
University of Southern California
stripeli@isi.edu

José Luis Ambite
Information Sciences Institute
University of Southern California
ambite@isi.edu

Sandrah P. Eckel
Department of Preventive Medicine
University of Southern California
eckel@usc.edu

Rima Habre
Department of Preventive Medicine
University of Southern California
habre@usc.edu

ABSTRACT

Air quality models are important for studying the impact of air pollutant on health conditions at a fine spatiotemporal scale. Existing work typically relies on area specific, expert-selected pollution emission, dispersion and transport features (e.g., meteorology) for building the model for each combination of study area, pollutant types, and spatiotemporal scales. In this paper, we present a data mining approach that utilizes publicly available OpenStreetMap (OSM) data to automatically generate an air quality model for the concentration of fine particulate matter less than 2.5 µ m in aerodynamic diameter at various temporal scales. Our experiment shows that our ultimate (expert-free model) could generate accurate $PM_{2.5}$ concentration estimates, which can be used to improve air quality models that traditionally rely on expert-selected input. Our approach also quantifies the impact on air quality from a variety of geographic features (i.e., how various types of geographic features such as parking lots and commercial buildings affect air quality and from what distance) representing mobile, stationary and area (natural and anthropogenic) air pollution sources. This approach is particularly important for enabling the construction of context-specific spatiotemporal models of air pollution, allowing investigations of the impact of air pollution exposure on sensitive populations such as children with asthma at scale.

CCS CONCEPTS

• Information systems → Spatial-temporal systems;

KEYWORDS

$PM_{2.5}$ Concentration, Air Quality Model, Geospatial Data Mining

ACM Reference format:

1 INTRODUCTION

Fine particulate matter ($PM_{2.5}$) consists of particles less than 2.5 m in aerodynamic diameter that once inhaled can penetrate the respirable region of the lungs and contribute to respiratory and cardiovascular disease. Typical primary sources of contributions to fine particulate matter include stationary and moving vehicle exhausts, burning sources (e.g., wood-burning stoves and wildfires), refineries, and power plants. Secondary $PM_{2.5}$ is also formed as a result of photochemical reactions in the atmosphere in the presence of precursor gases and solar radiation. Epidemiological studies have shown associations between exposure to $PM_{2.5}$ and various health conditions, including lung and respiratory disease [33], such as asthma [5, 6]. In the 1993 landmark air pollution "Harvard Six Cities Study" [4] and other recent studies [16], researchers reported associations between the levels of exposure to fine particulate concentrations and the risk of mortality and morbidity for cities all over the world. As a result of this scientific evidence and several other similar studies, many countries have set national ambient mass-based air quality standards for $PM_{2.5}$. In the United States, the Environmental Protection Agency (US EPA) set $PM_{2.5}$ standards and established the air quality index (AQI) to communicate relative health risk levels of current pollution levels compared to the standard, which is converted by $PM_{2.5}$ concentration. The US AQI ranges from 0 to 500 and consists of six categories: "Good", "Moderate", "Unhealthy for Sensitive Groups", "Unhealthy", "Very Unhealthy", and "Hazardous". From an ambient pollutant concentration value, one can calculate the corresponding AQI and its health risk category for each type of regulated air pollutant. For example, a 20 g/m^3 $PM_{2.5}$ measurement corresponds to an AQI of 68 and is in the "Moderate" category, which means that "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." A 40 g/m^3 $PM_{2.5}$ measurement corresponds to an AQI of 110 and is in the "Unhealthy" category.

Untitled

Haotian Zhang
data pipeline &
visualization programming

Jing Peng
web development &
visualization programming