

Better Air. Better Life

Air quality monitoring you can trust

Déploiement de capteurs en réseau

Atmos'fair Lyon, 10 Juin 2015



HUMAN HEALTH • ENVIRONMENTAL HEALTH

PerkinElmer at a glance



Global Technology Leader



Focused on human & environmental health



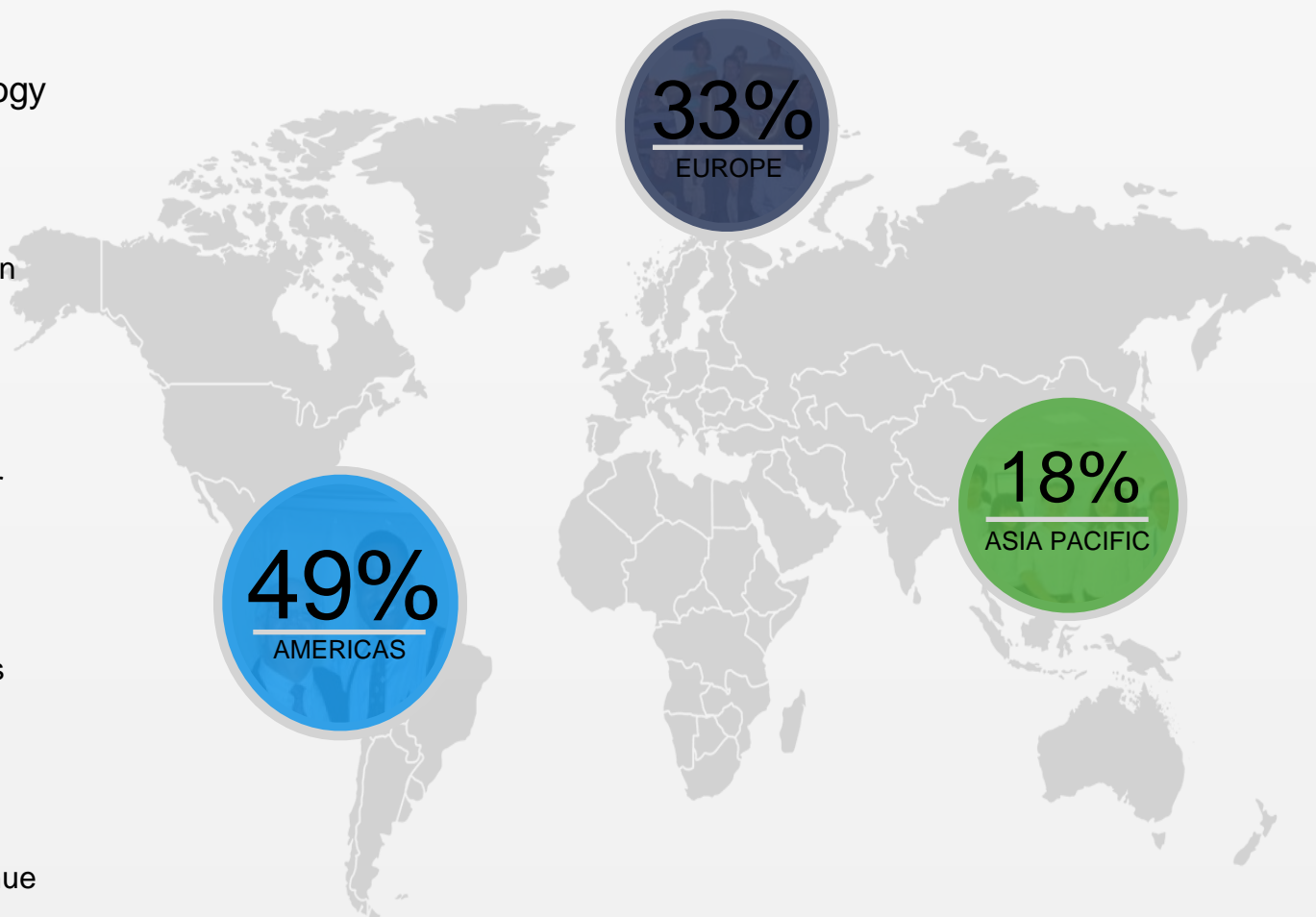
Operations in over 150 countries



7,500+ employees worldwide



\$2.1 billion in revenue





We understand air quality

Precise and Selective Analysis
In Lab process (Off Line)
On Line capacity

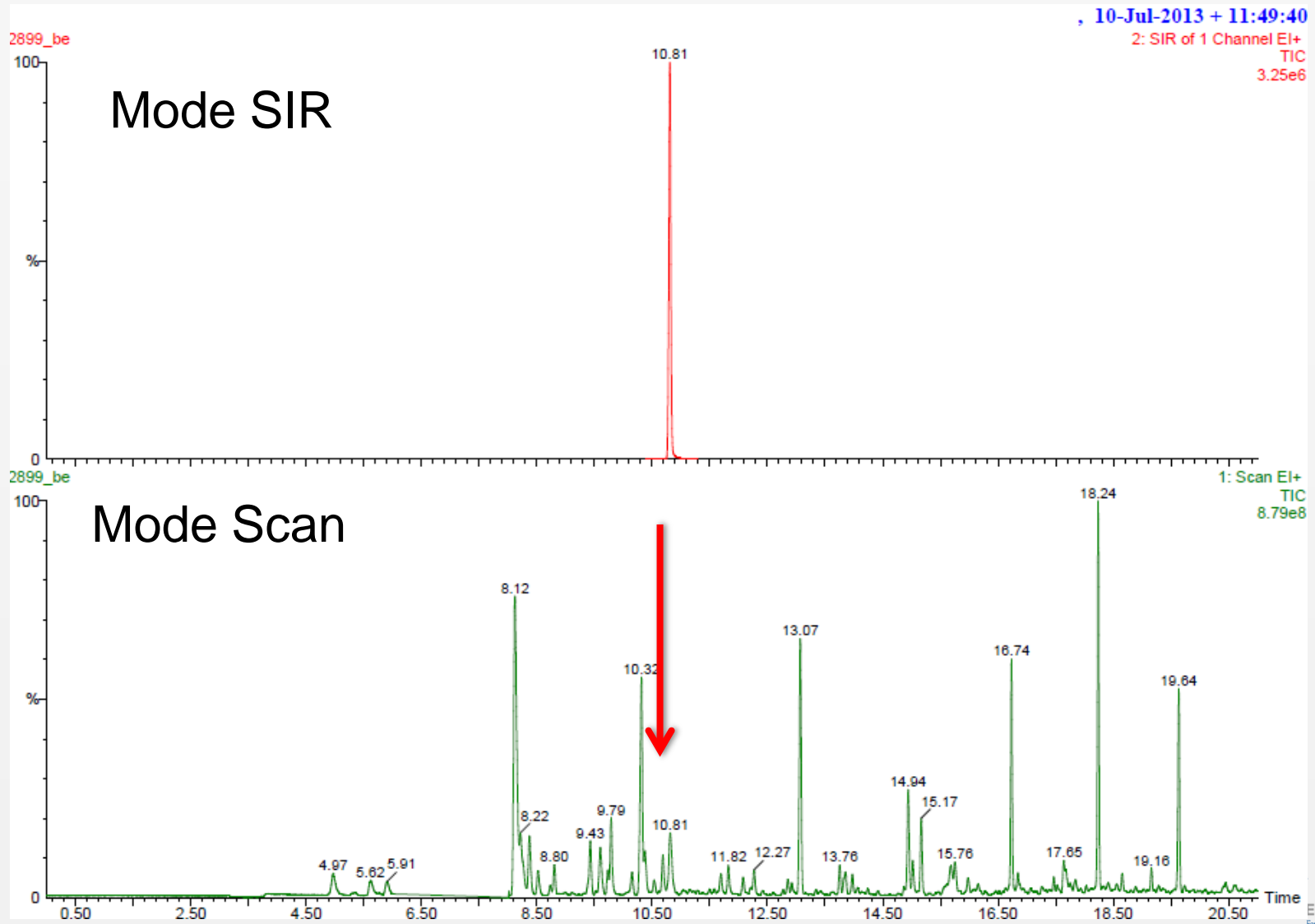


Benzene analysis in real conditions with ATD / GC/MS

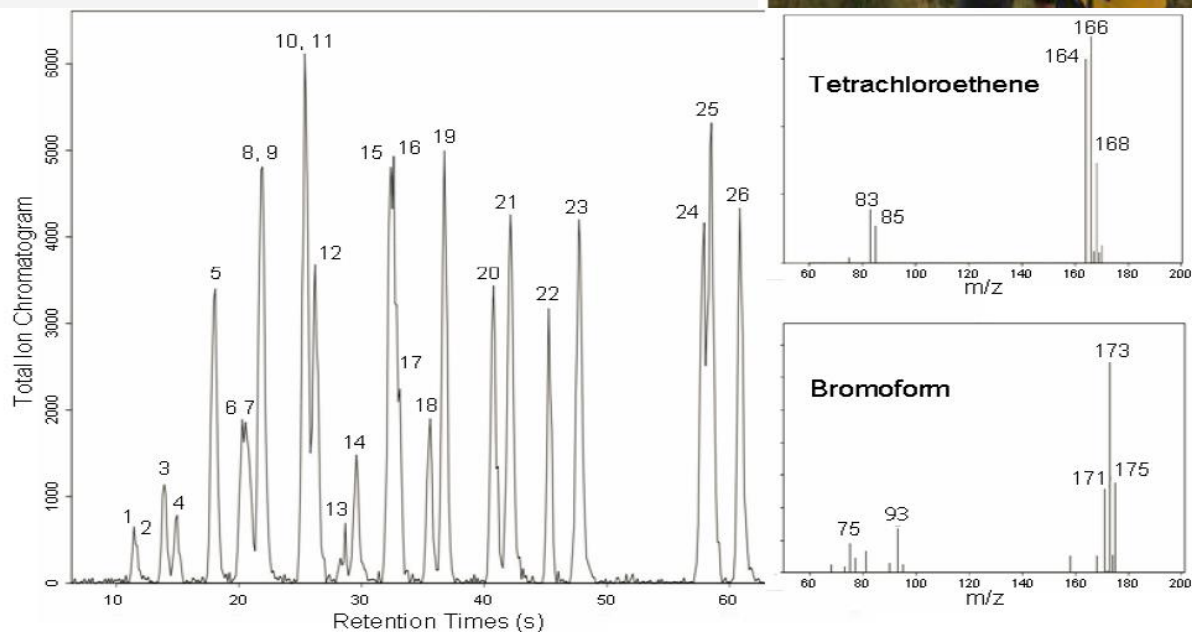
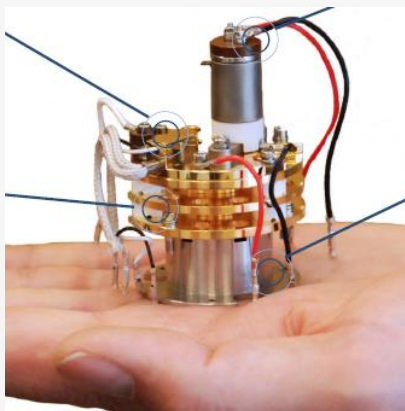


Indoor Calculated concentration : $0,53\mu\text{g}/\text{m}^3$

Benzene is not the major component so need for selective detection :



BECAUSE WE UNDERSTAND CHALLENGES

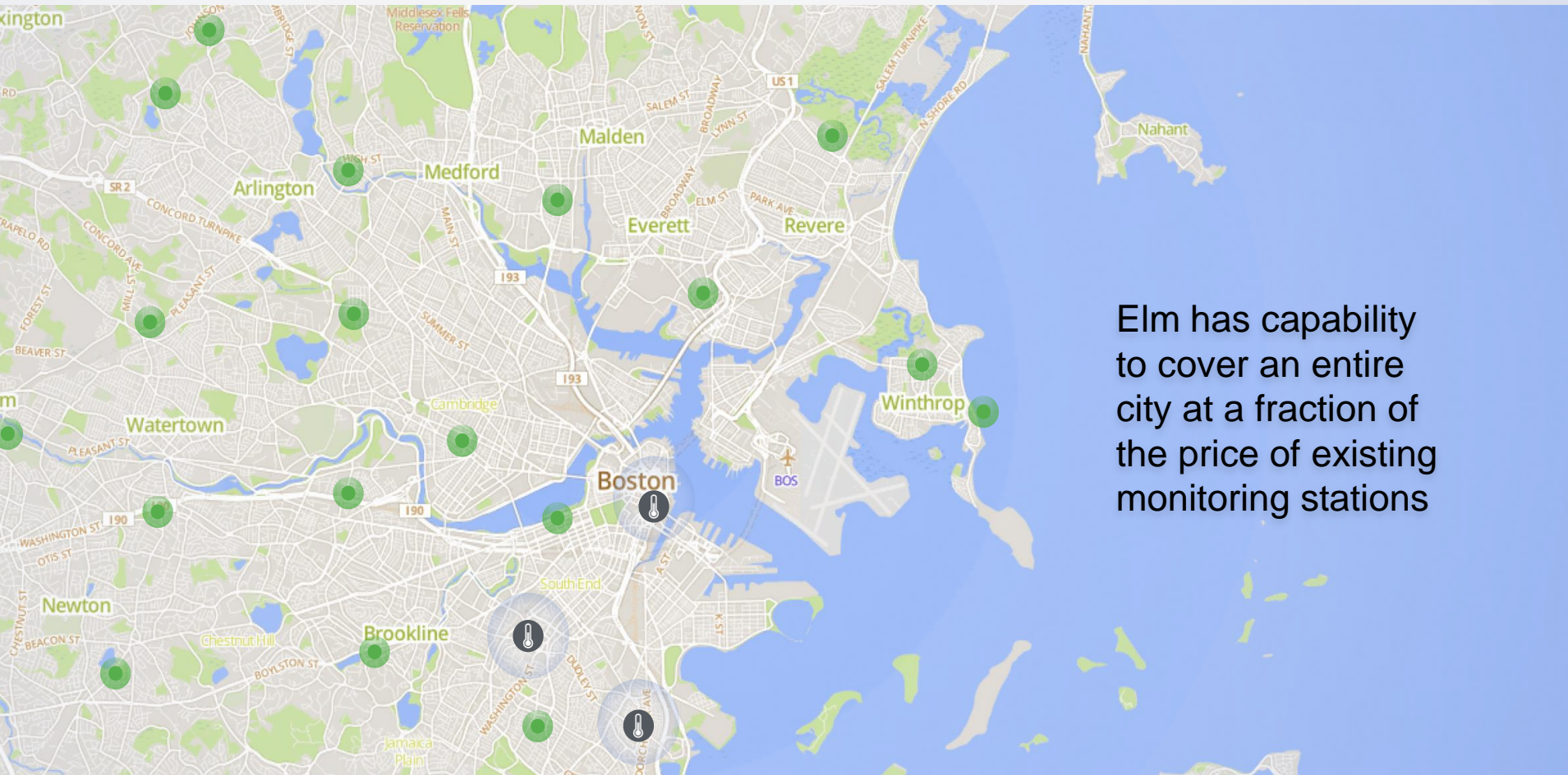


Perkin Elmer acquires Torion Instruments : Portable GC/MS



Introducing the ELM System

Sensor technology is complimentary to monitoring stations



Elm has capability to cover an entire city at a fraction of the price of existing monitoring stations



Monitoring stations



Elm sensors








The ELM Sensors Unit



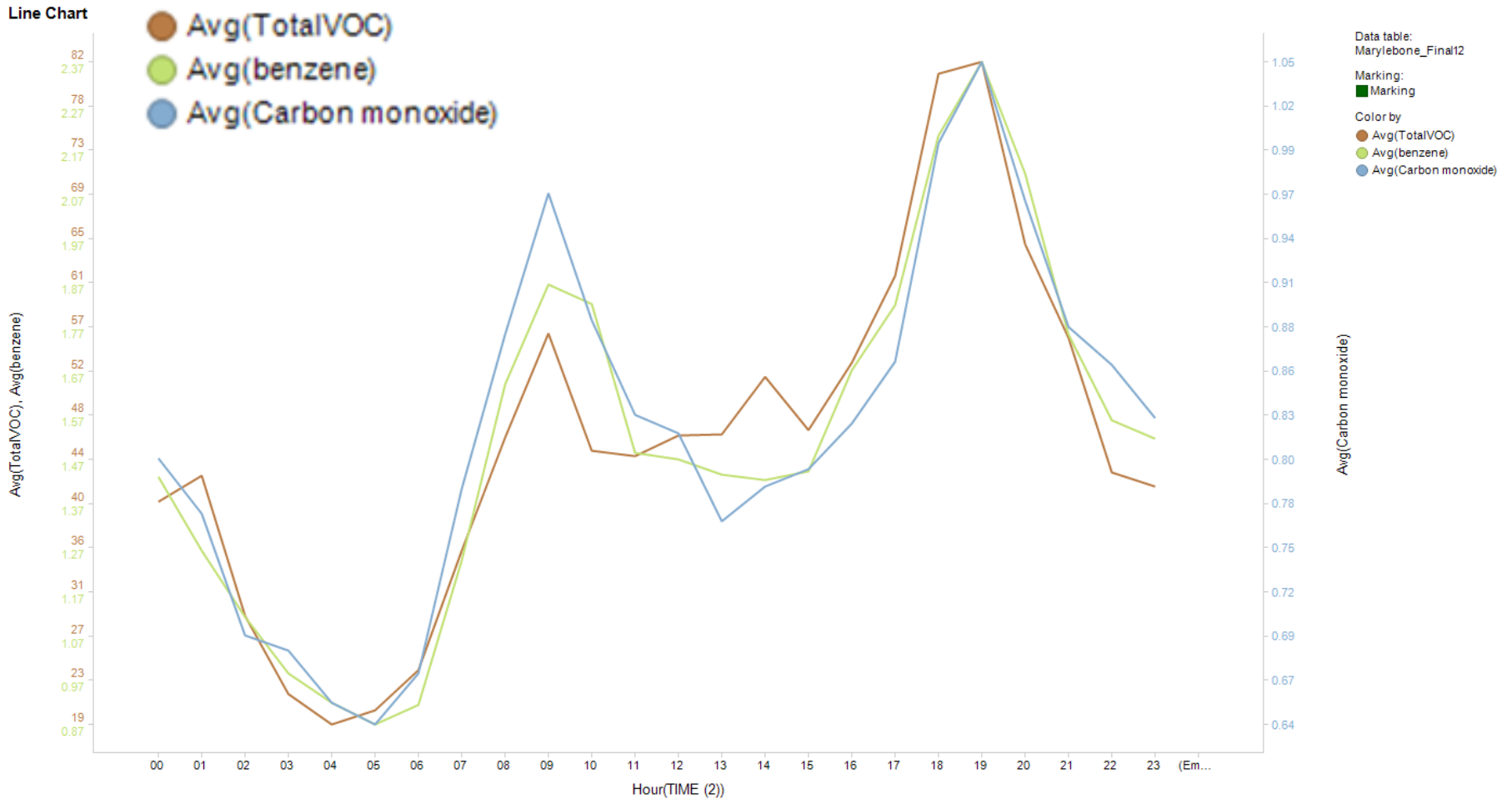
Ozone, TSP (PM's), TVOC, NO₂, Temp, Hum, Noise.

All in One + GSM / Wi-Fi

What does Elm do?

Component	Health Impact		Technology	Det Limits	Interferences
NO₂		Respiratory Irritant	Metal Oxide Sensor	5 – 2000 ppb	Ozone
O₃		Respiratory Irritant	Metal Oxide Sensor	5 – 200 ppb	Limited (Temperature & Humidity)
PM		Respiratory Irritant	Light Scattering	10 – 1000 µg/m ³	Temperature & Humidity
VOC		Toxic	Metal Oxide Sensor	50 – 2000 ppm	Humidity & Hydrogen
Noise		Hypertension	Microphone	55 – 105 dB	N/A
Humidity		Comfort	Dielectric Film	0 – 100 % RH	N/A
Temperature		Comfort	Combination	-40 – 80 °C	Direct Sunlight

ELM VOC Vs CO and Benzene (London)









Filter Settings

Marylebone_Final12

- benzene: (0.10 <= benzene <= 1071.63) and empty values

Multi-sensor monitoring system with the most advanced nano-tech sensors.

-  Low electricity consumption
-  Excellent sensing capabilities
-  Low maintenance
-  Highly compact, durable enclosure
-  Plug-and-play operation
-  Sends information every 20 seconds



Network overview



SENSORY NODES

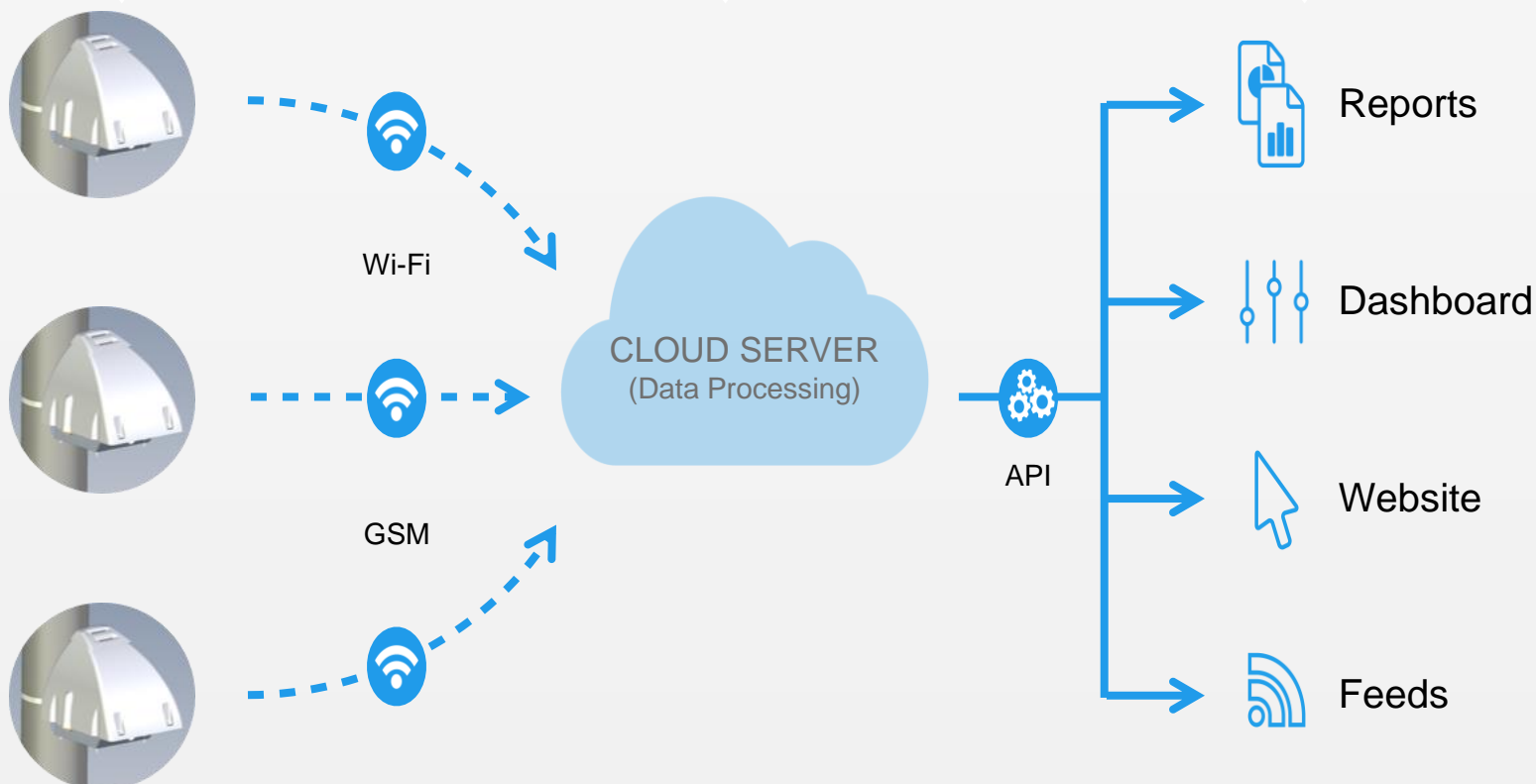
Dispersed data collection: distributed weatherproof, wireless sensor modules

NETWORK OPERATIONS

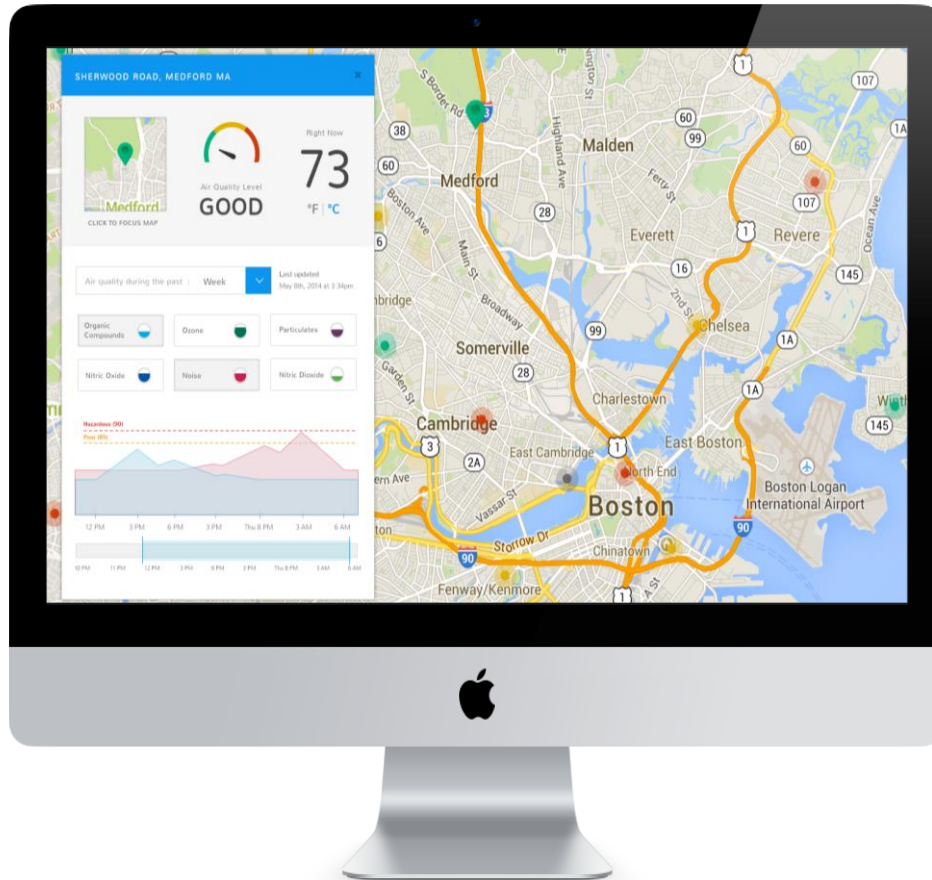
Ingesting, processing, storing and feeding data on cloud infrastructure

USER INTERFACE

Driving decisions through visualization and interpretation of information. On the web, mobile applications and through integrated municipal systems.



Air quality information – for everyone



New Web Interface

LIVE NOW
ELM.PERKINELMER.COM

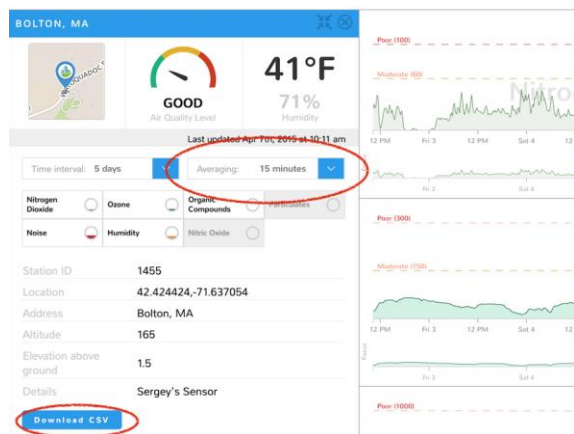
Tibco Spotfire

BIG DATA HANDLING

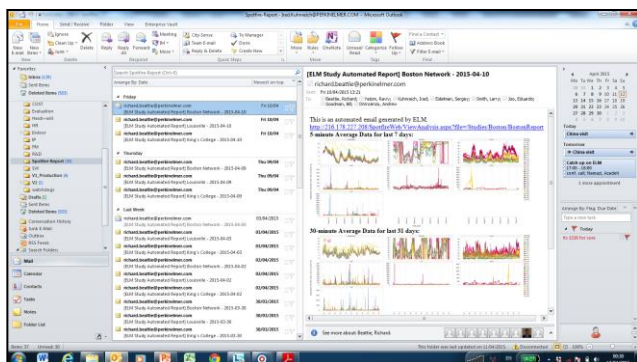
Key Web Services



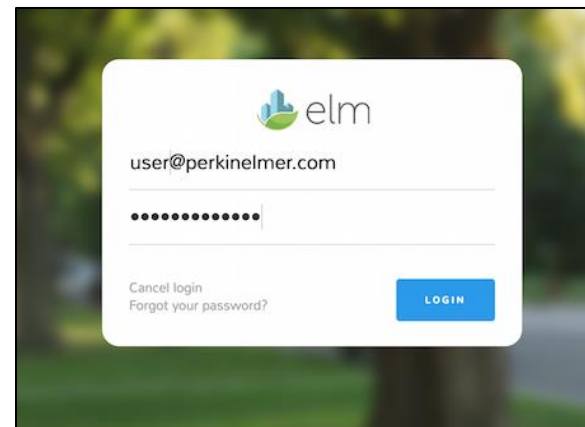
Sensor's Webpage



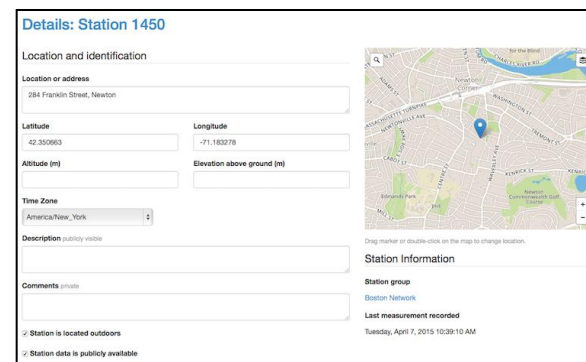
Email Notifications



Data Privacy Management



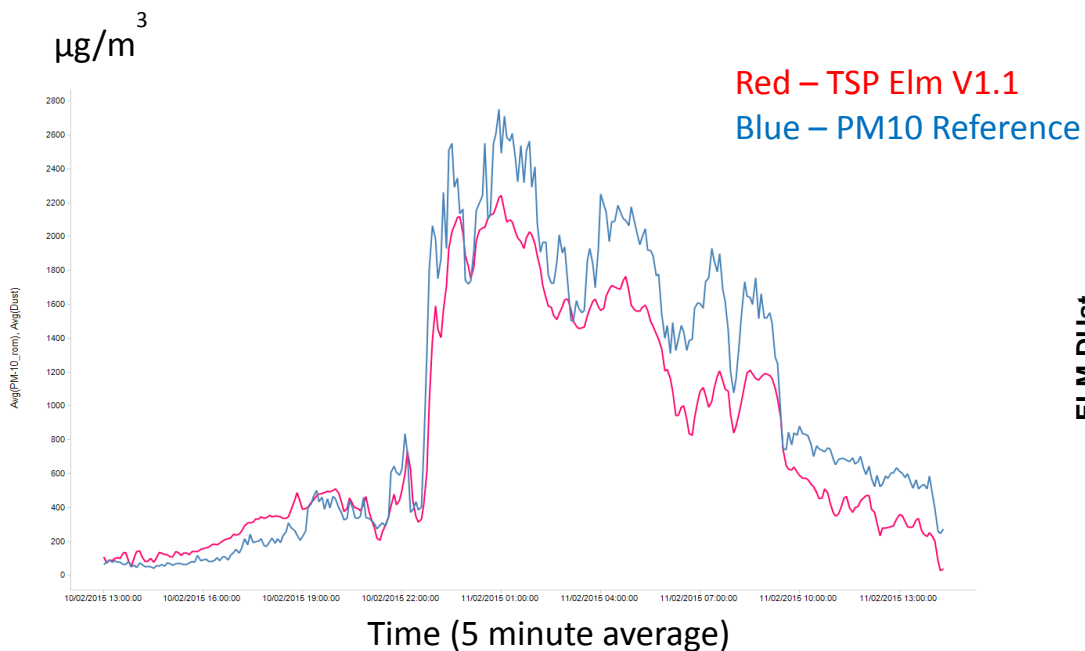
Sensor Administration



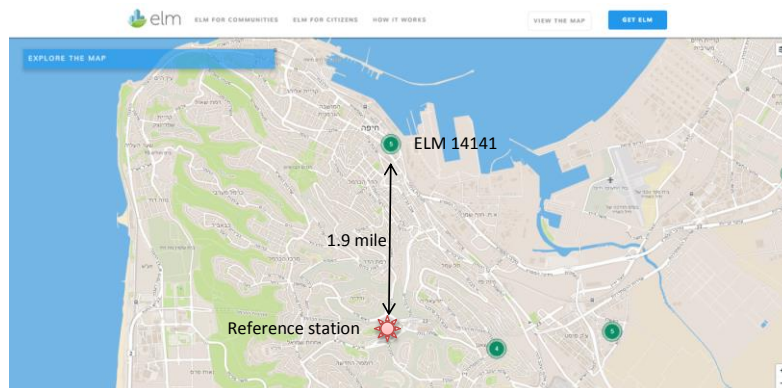
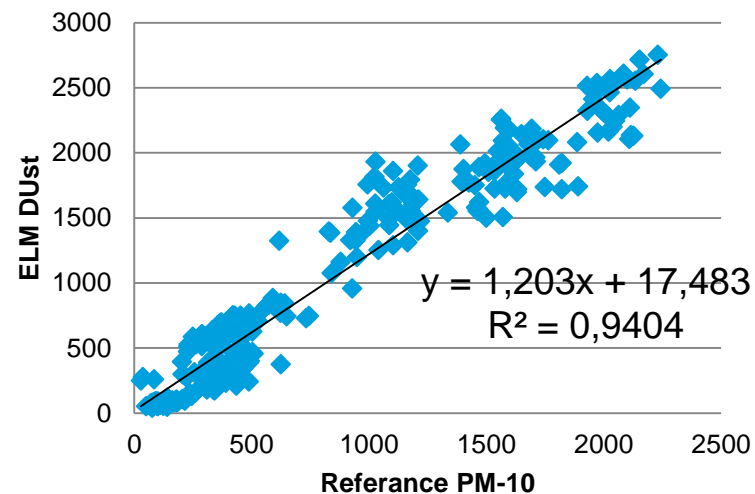


The ELM System Data

Dust Storm Sensing (Israel)

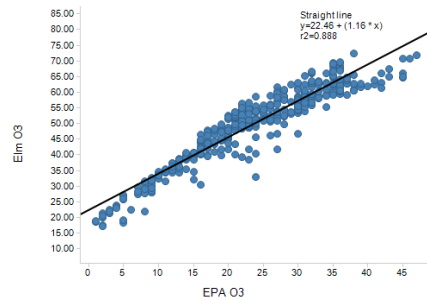


**Corelation: 5 min average
data (ug/m^3)**

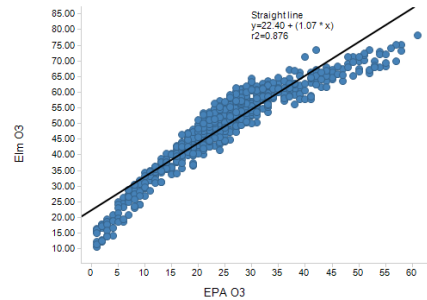


Elm O3 vs EPA O3 Boston (10 months)

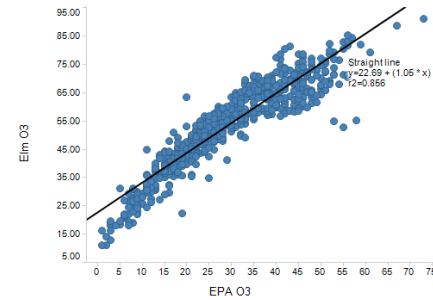
05-2014



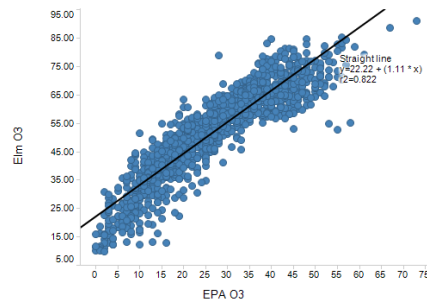
6-2014



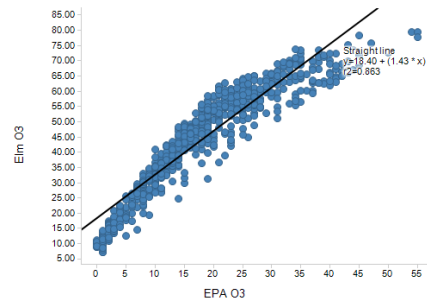
07-2014



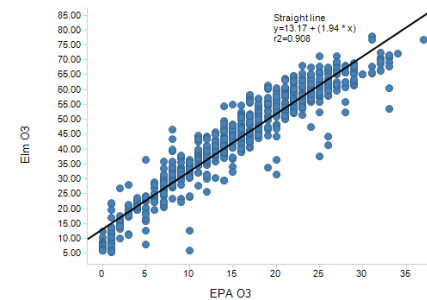
8-2014



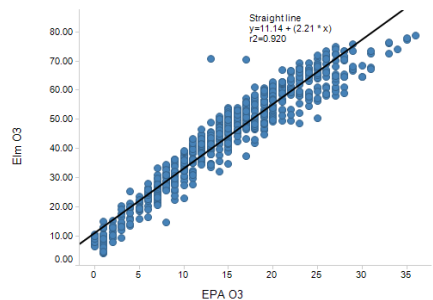
9-2014



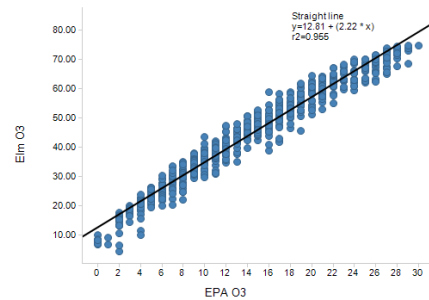
10-2014



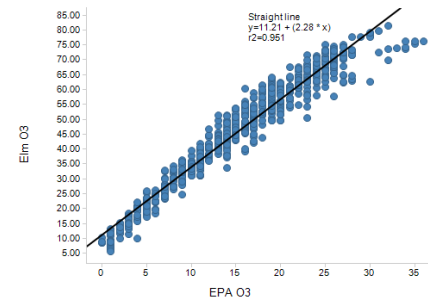
11-2014



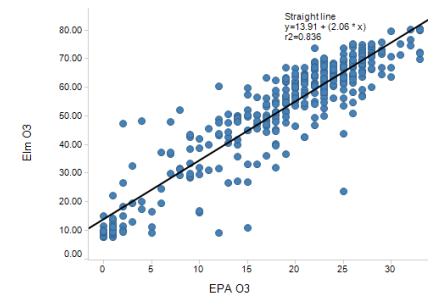
12-2014



01-2015

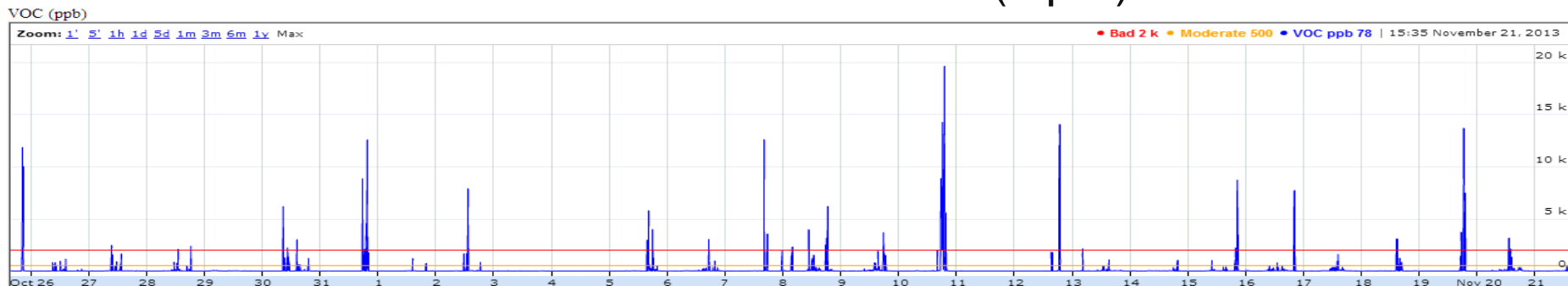


02-2015

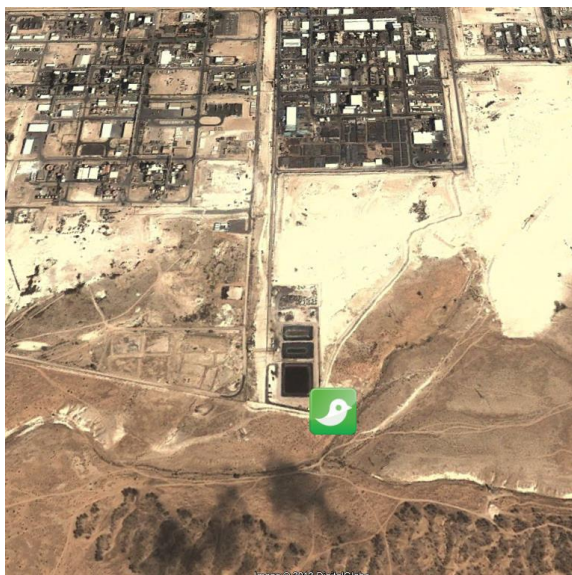


VOC Sources Direction Finding

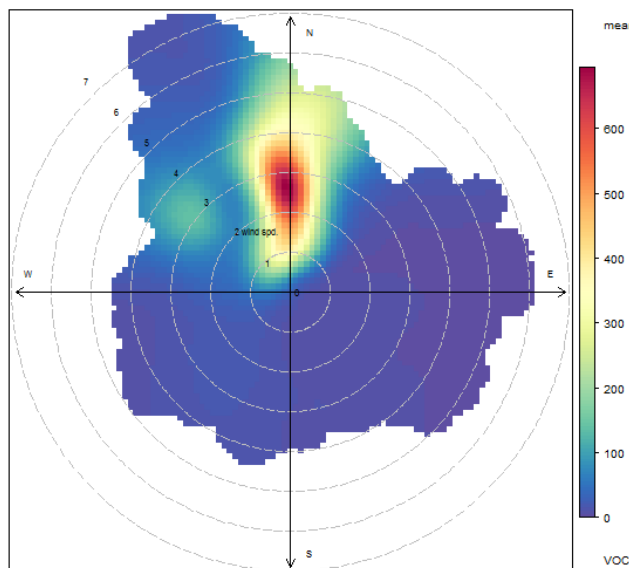
Time series VOC data (input)



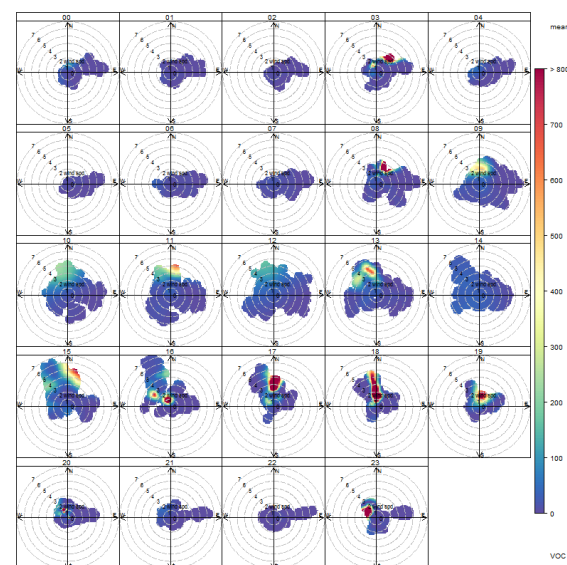
Location



Source direction



Time analysis

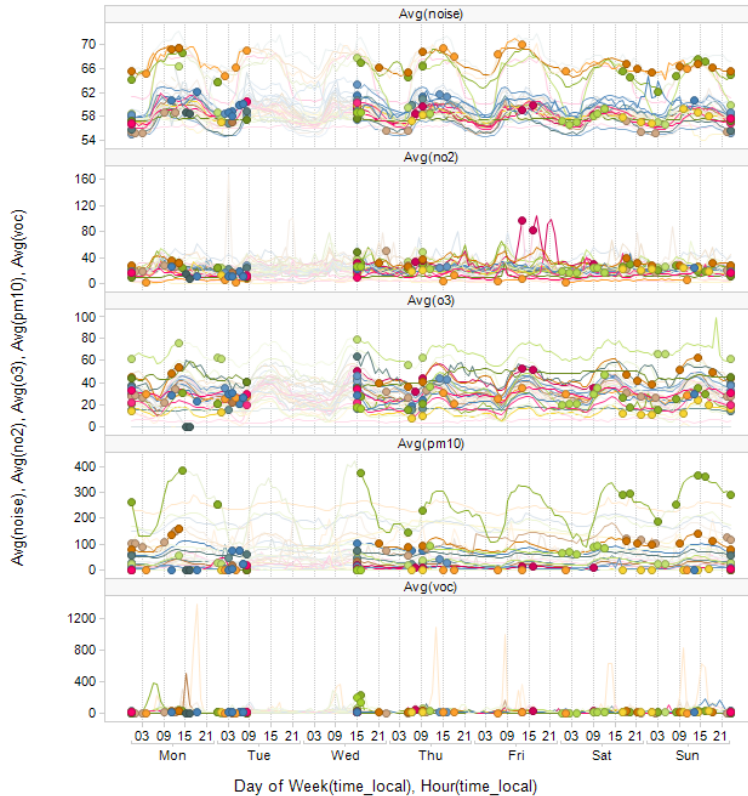




Spotfire Network Management Capabilities

City Full Range View (Boston)

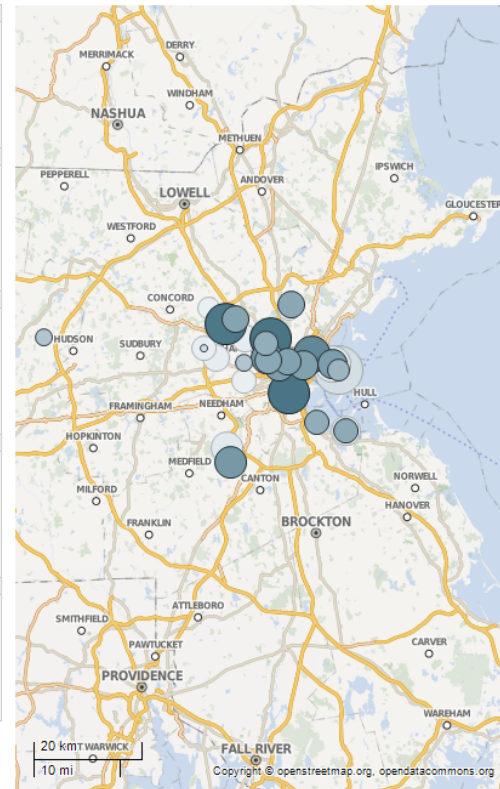
30min Averages - All



30min Averages - All

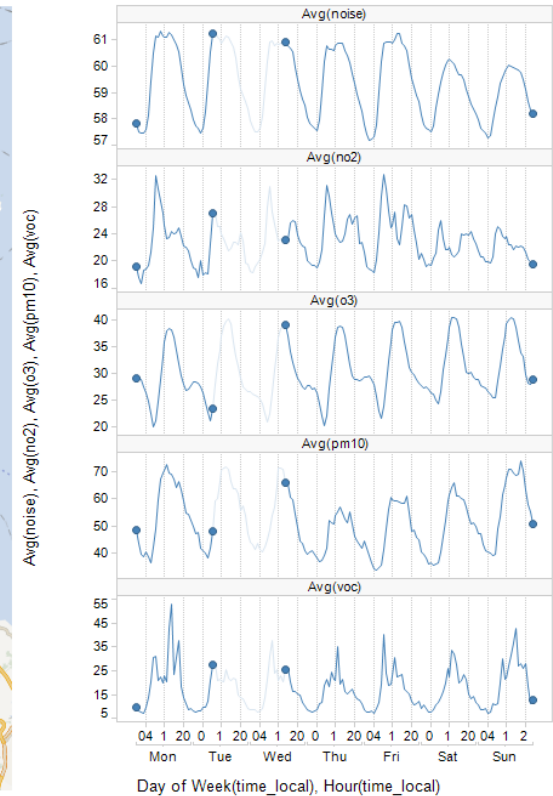
time_local (Day of Month), Hour(time_local)

Selected Sensors will be marked here:



Time Series

30min Averages - All



time_local

Filter Settings

HealthInfoSensors

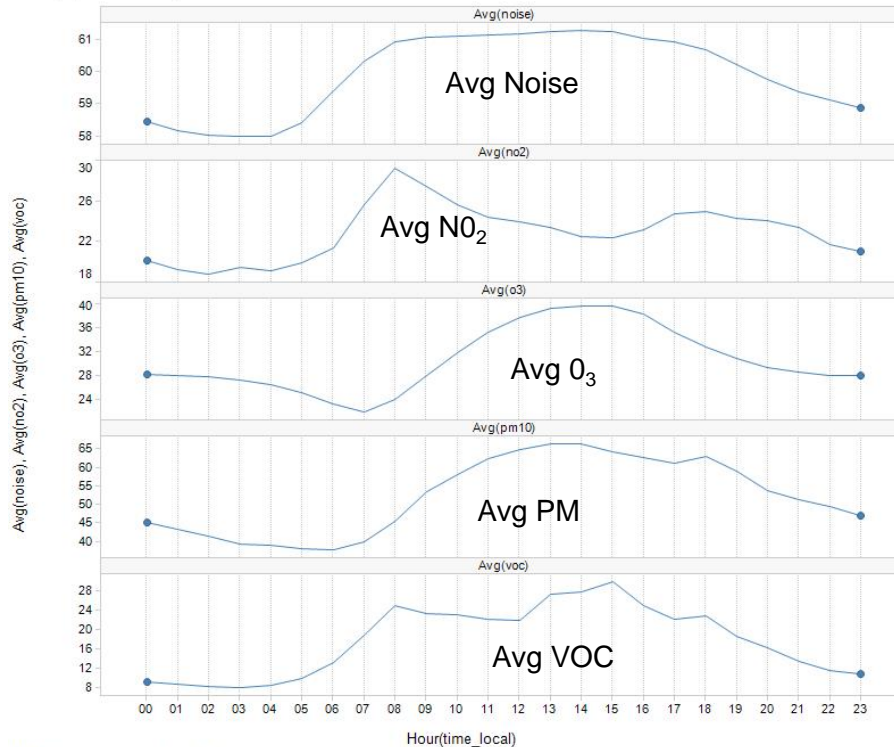
- sensorId: (1302, 1303, 1306, 1307, 1309, 1310, 1311, 1312, 1313, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1336, 1354, 1355, 1356, 1365, 1372, 1403, 1406, 1411, 1430, 1434, 1450, 1455, 1463, 1464)

Results_30minAverages

- humidity: (0 <= humidity <= 90) without empty values
- no2: (0 <= no2 <= 2143) and empty values
- pm10: (0 <= pm10 <= 3952) without empty values

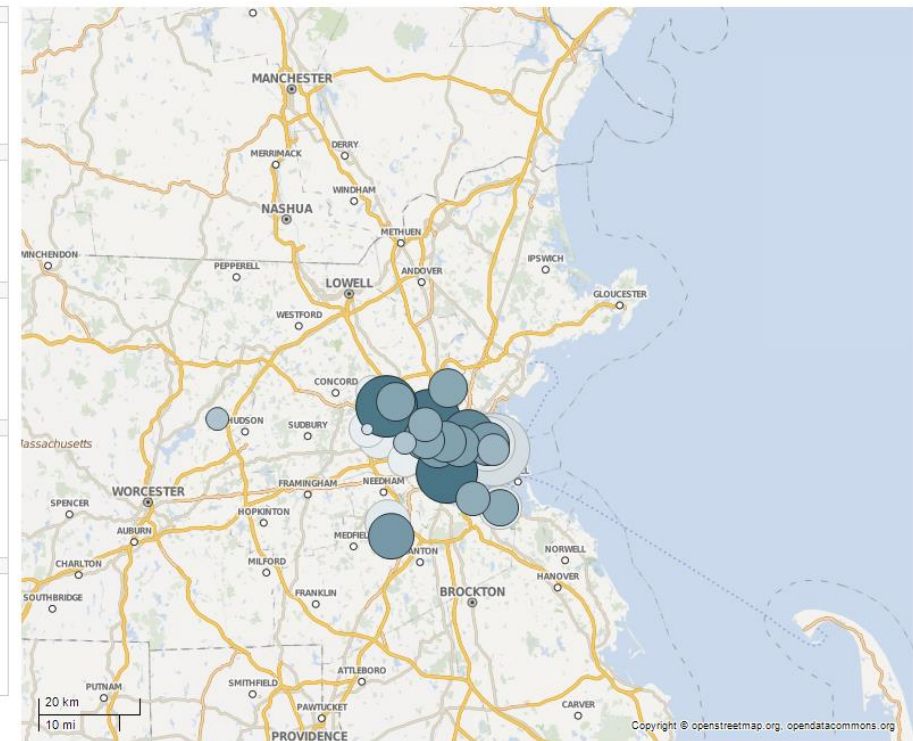
City Total Daily Pattern (Boston)

weekly pattern all city



Weekly pattern each station

Selected Sensors will be marked here:



Day of Week(time_local), Hour(time_local)

Filter Settings

HealthInfoSensors

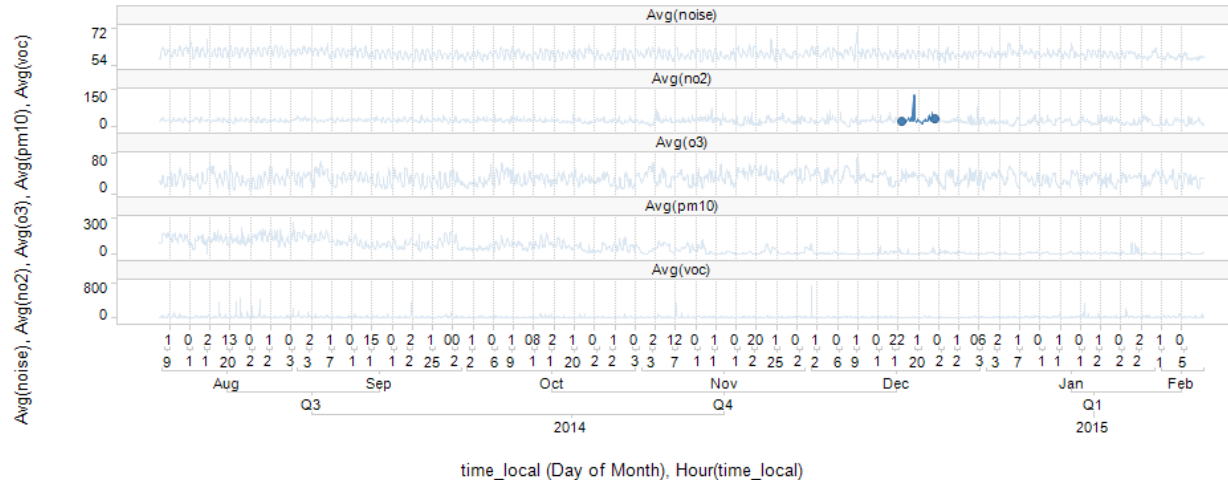
- sensorId: (1302, 1303, 1306, 1307, 1309, 1310, 1311, 1312, 1313, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1336, 1354, 1355, 1356, 1365, 1372, 1403, 1406, 1411, 1430, 1434, 1450, 1455, 1463, 1464)

Results_30minAverages

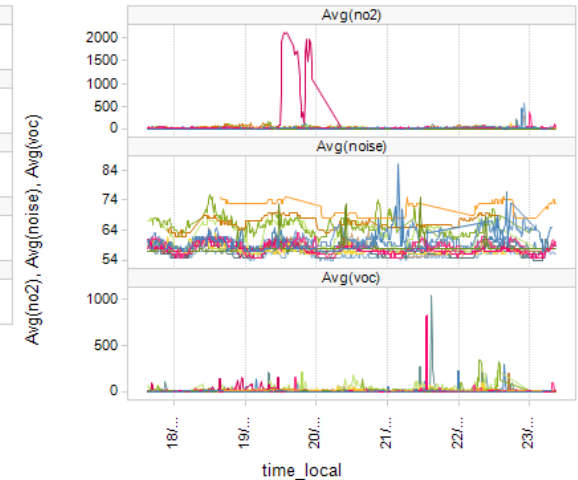
- humidity: (0 <= humidity <= 90) without empty values
 - no2: (0 <= no2 <= 2143) and empty values
- pm10: (0 <= pm10 <= 3952) without empty values

Event Investigation Dashboard (Boston)

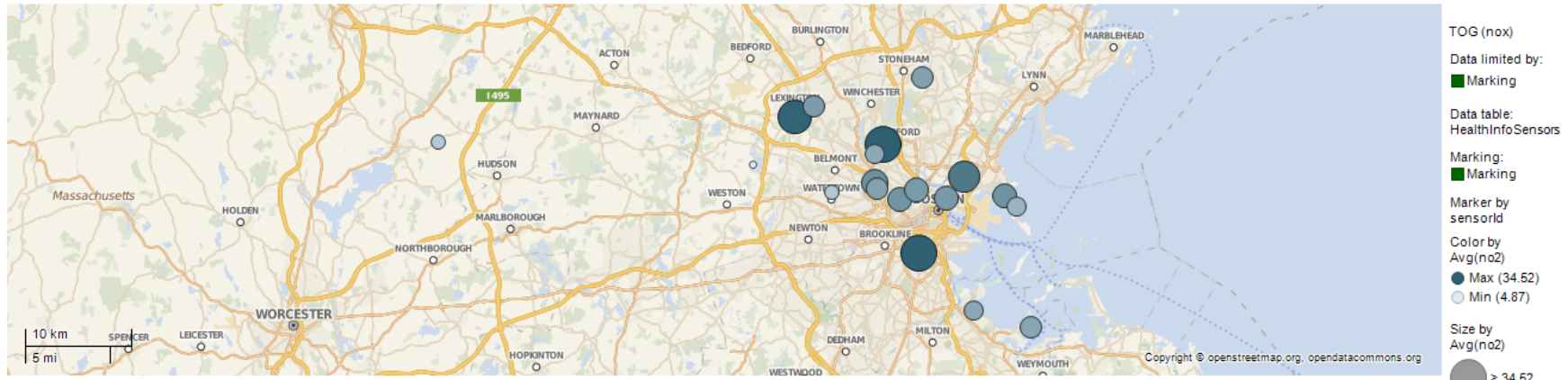
30min Averages - All



Time Series



Selected Sensors will be marked here:



Filter Settings

HealthInfoSensors

- sensorId: (1302, 1303, 1306, 1307, 1309, 1310, 1311, 1312, 1313, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1336, 1354, 1355, 1356, 1365, 1372, 1403, 1406, 1411, 1430, 1434, 1450, 1455, 1463, 1464)

Results_30minAverages

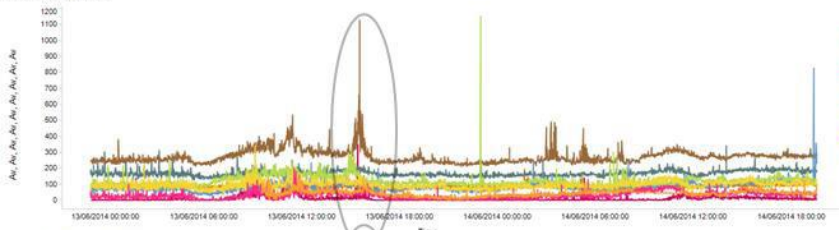
- humidity: (0 <= humidity <= 90) without empty values
 - no2: (0 <= no2 <= 2143) and empty values
- pm10: (0 <= pm10 <= 3952) without empty values

The chart displays the following data series and annotations:

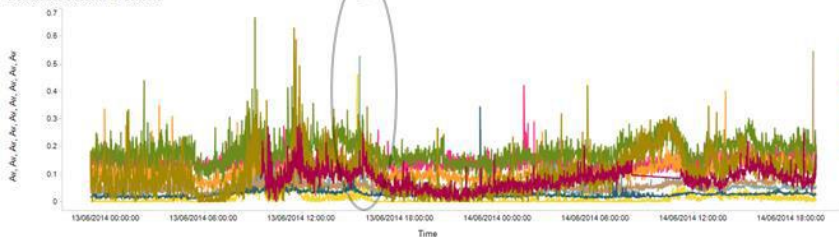
- Y-axis:** Avg(Dust (1302)), Avg(Dust (1315)), Avg(Dust (1325)), Avg(Dust (1327)), Avg(WindDirectionDegrees)
- X-axis:** Time
- Annotations:**
 - A vertical dashed line at 21:30:00 is labeled "Airplane Crash".
 - Other labels include "Data limited by: plane crash 7pm-4am (Page filtering ignored)", "Data table: Sensor1302_31-05-2014_to_01-06-2", "Marking: ■ Marking", and "Series by".
- Legend:**
 - Avg(Dust (1302)) (Pink line)
 - Avg(Dust (1315)) (Yellow line)
 - Avg(Dust (1325)) (Black line)
 - Avg(Dust (1327)) (Blue line)
 - Avg(WindDirectionDegrees) (Brown bars)
- Data Values (Examples):**
 - WindDirectionDegrees: 68.00, 113.00, 140.00, 23.00, 45.00, 0.00, 113.00, 96.00, 84.00, 113.00, 23.00, 0.00, 135.00, 135.00, 135.00, 158.00, 225.00, 270.00, 270.00, 293.00, 315.00, 315.00, 270.00, 284.00, 248.00, 248.00, 293.00, 158.00, 315.00, 315.00, 315.00, 315.00, 315.00, 293.00, 248.00, 225.00, 270.00, 23.00, 0.00.
 - Dust Levels: Various values for the four dust sensors are plotted as lines, with peaks corresponding to the wind direction spikes.

Dust “wave” Propagation (Boston)

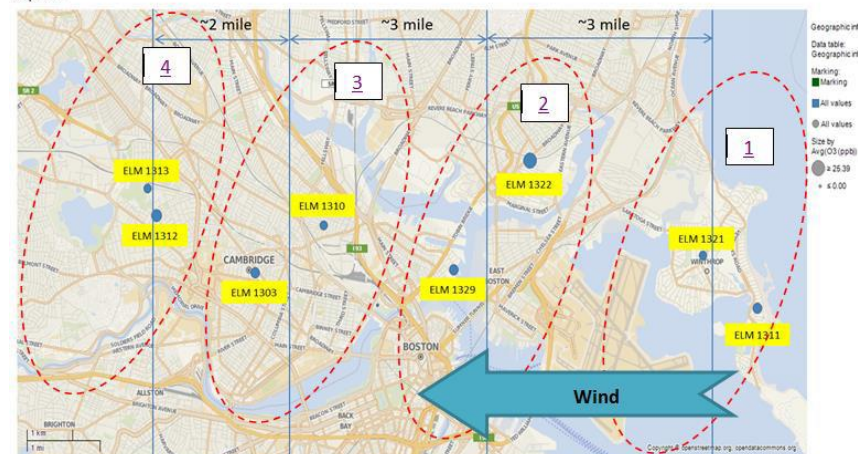
Dust For all sensors



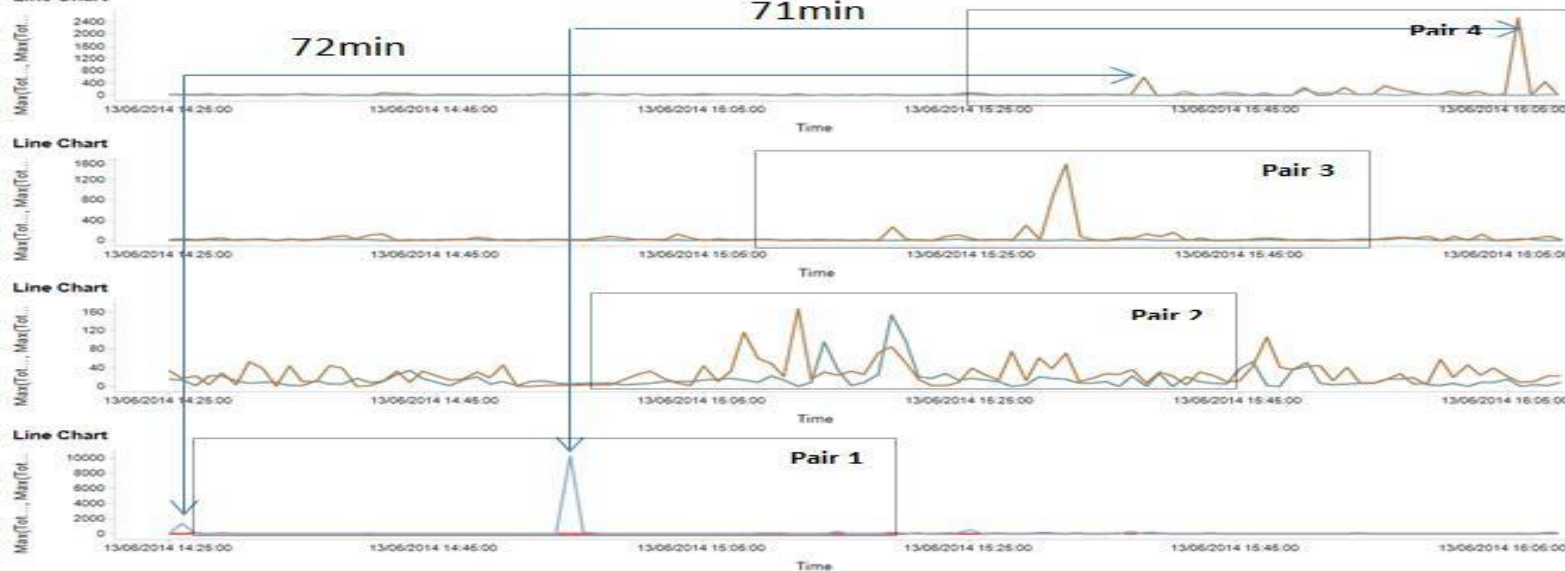
Normalized Dust For all sensors



Map Chart



Line Chart



Bringing clarity to air and health



Elm transforms how air quality is understood.



High density
sensor
networks



Data for citizens;
real time, online,
mobile



Exposures
explained for
everyone



Few lab
stations per
state



Air data
for regulators



Pollutant
levels not
explained

OUR MISSION

**IMPROVING THE HEALTH AND SAFETY OF
PEOPLE AND THE ENVIRONMENT**

Merci pour votre attention

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