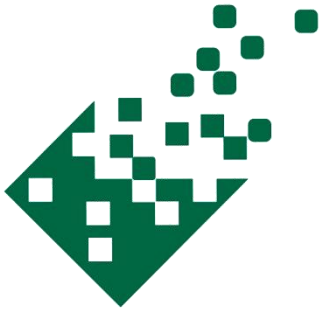
Air Quality Modelling in Tehran

Air Quality Control Company

(AQCC)



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Managing Director

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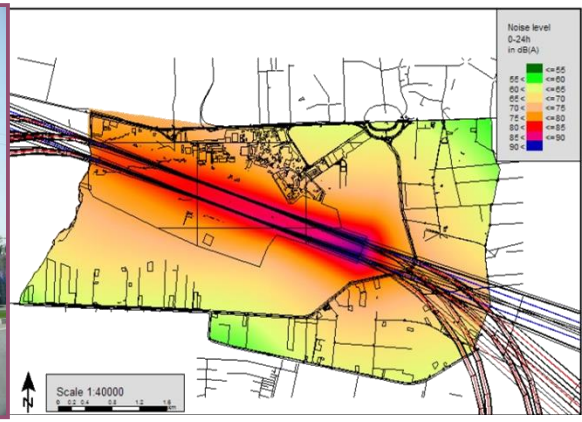
Air Quality Control Company (AQCC)

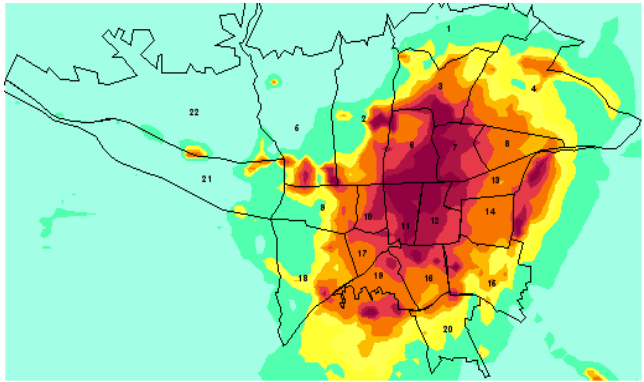
air.Tehran.ir

Air & Noise Pollution

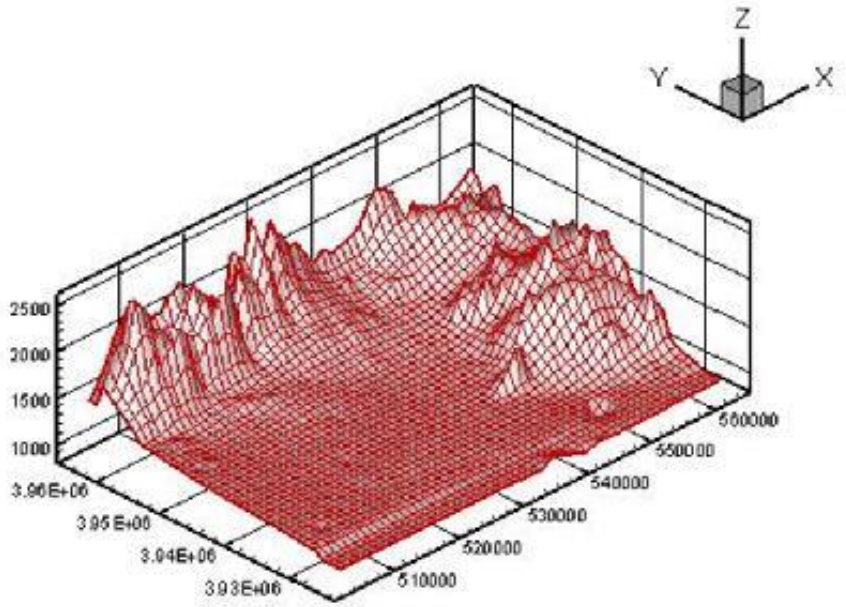
- Measurements
  - Ambient
  - Vehicle
  - Industrial

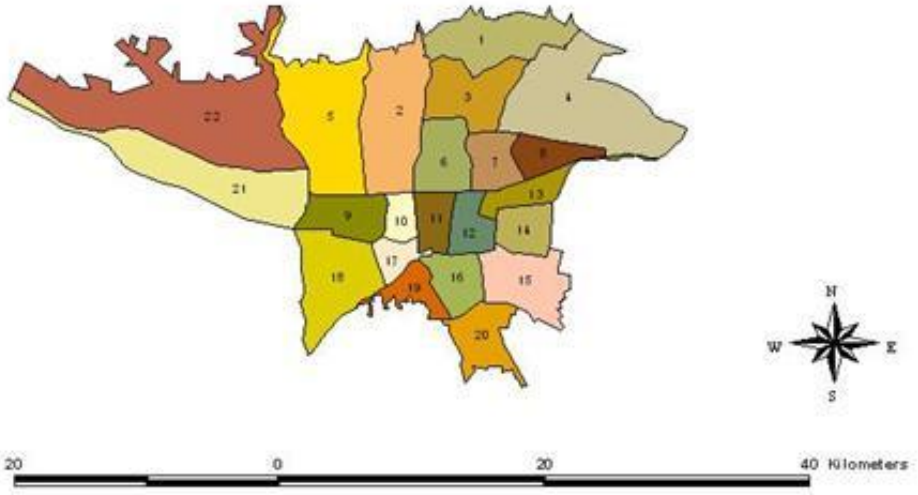


- Mathematical Modeling (Airviro, Predictor, SoundPlan)



Tehran Characteristics



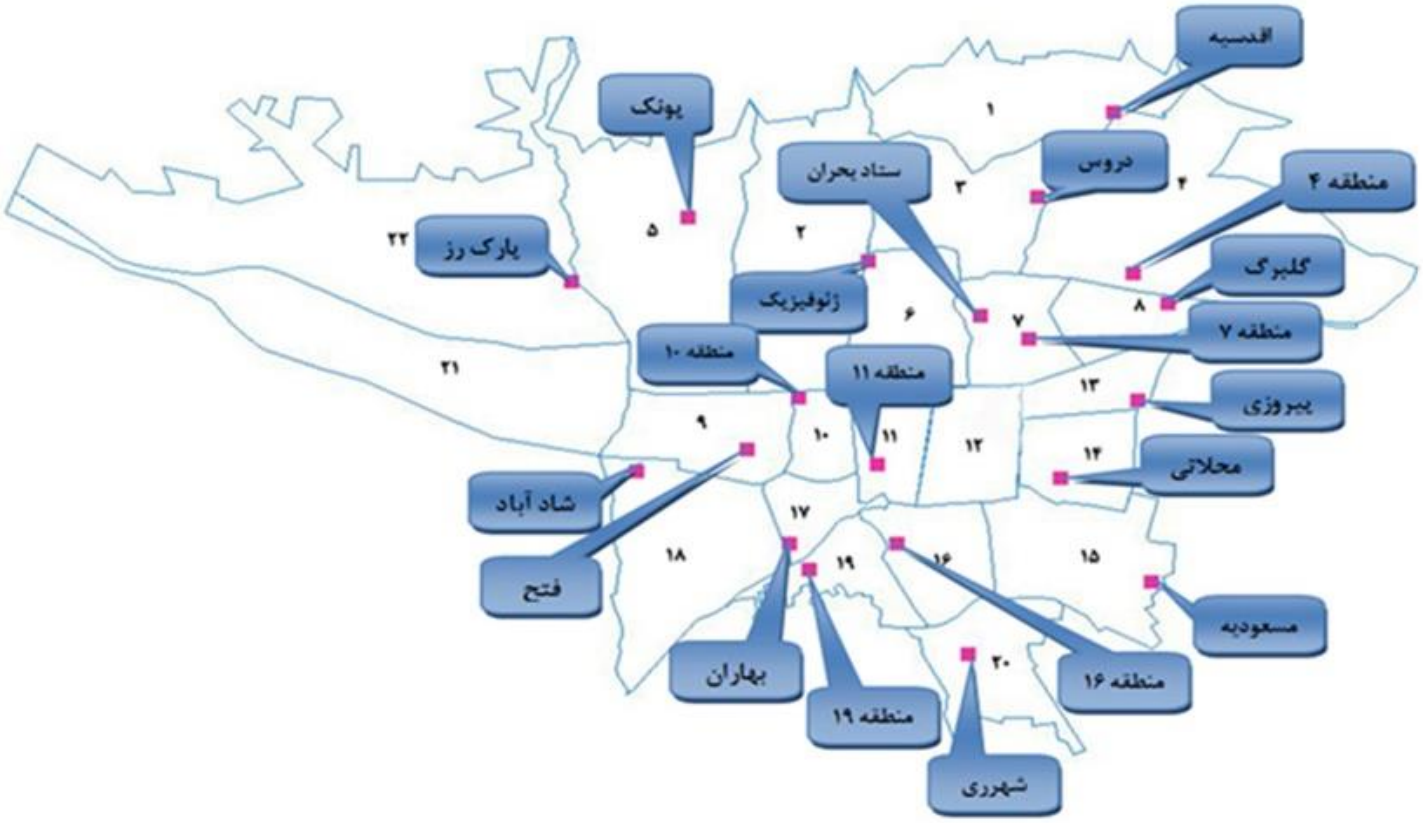


Area : 780 km^2

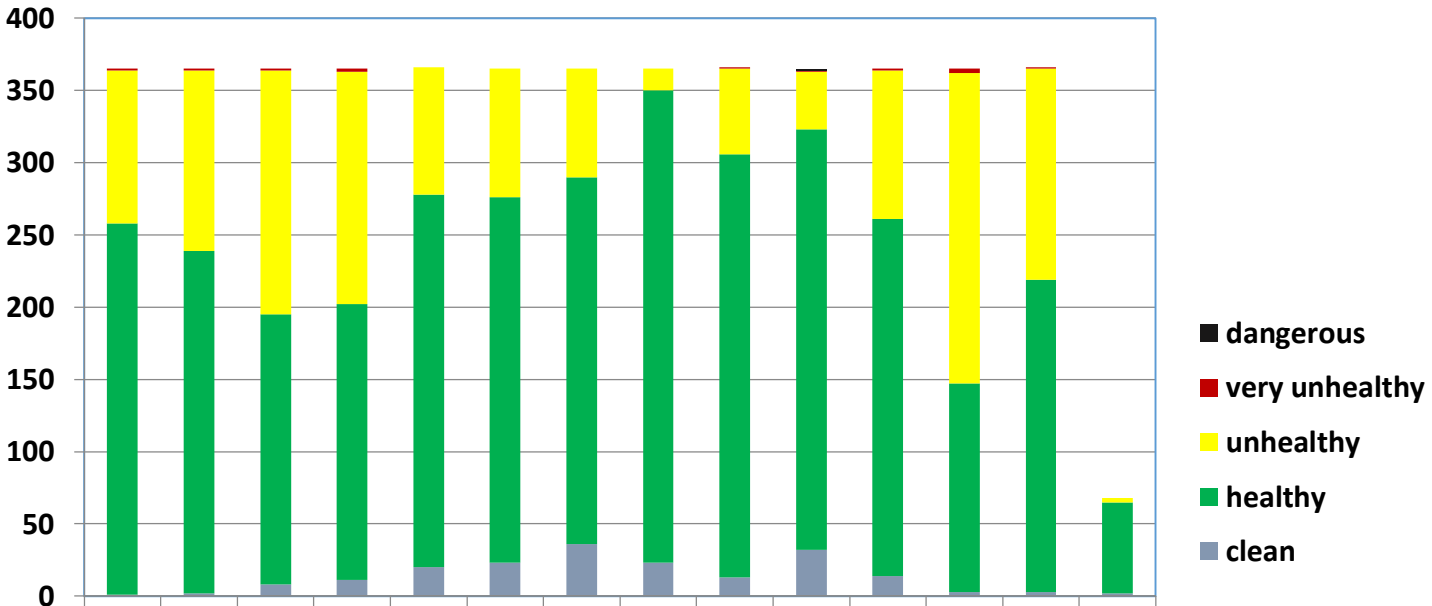
Population: 0.7 million in 1941 to 7,230,000 in 2005

Petrol Consumption: 10 ~ 13 Million liters per day

Air Quality Monitoring (AQCC)

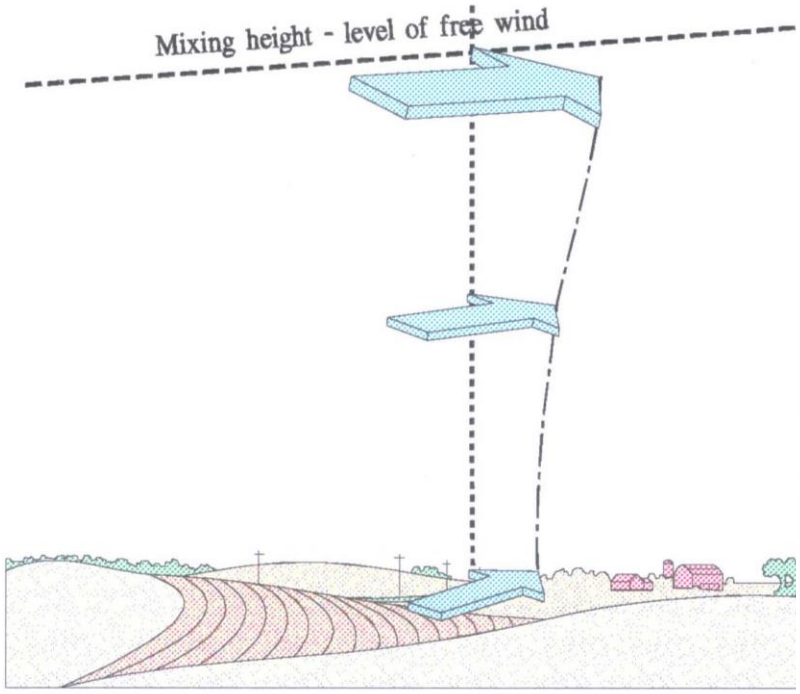


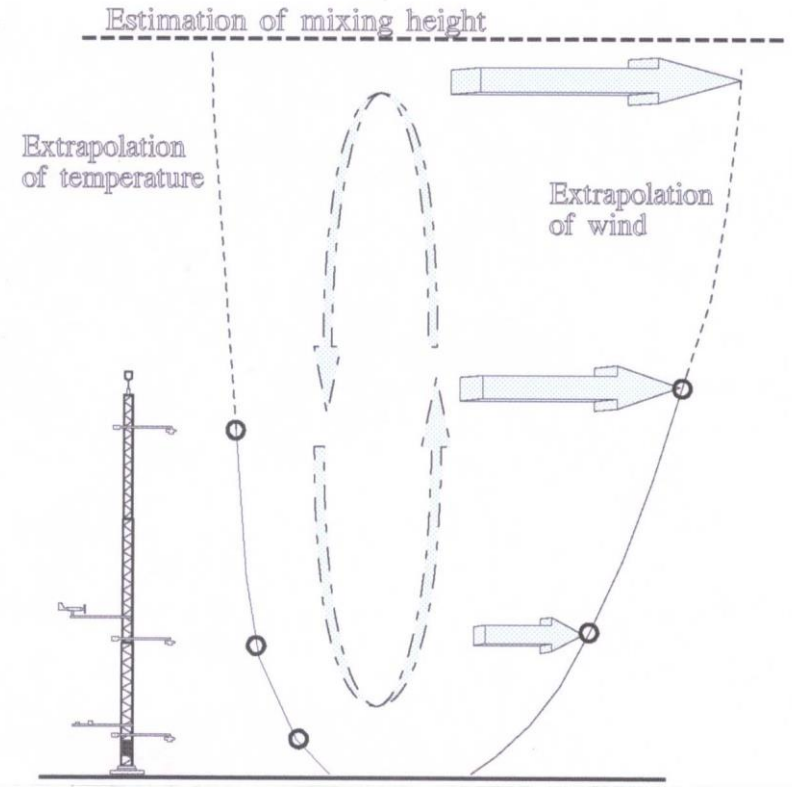
Air Quality Condition in Tehran



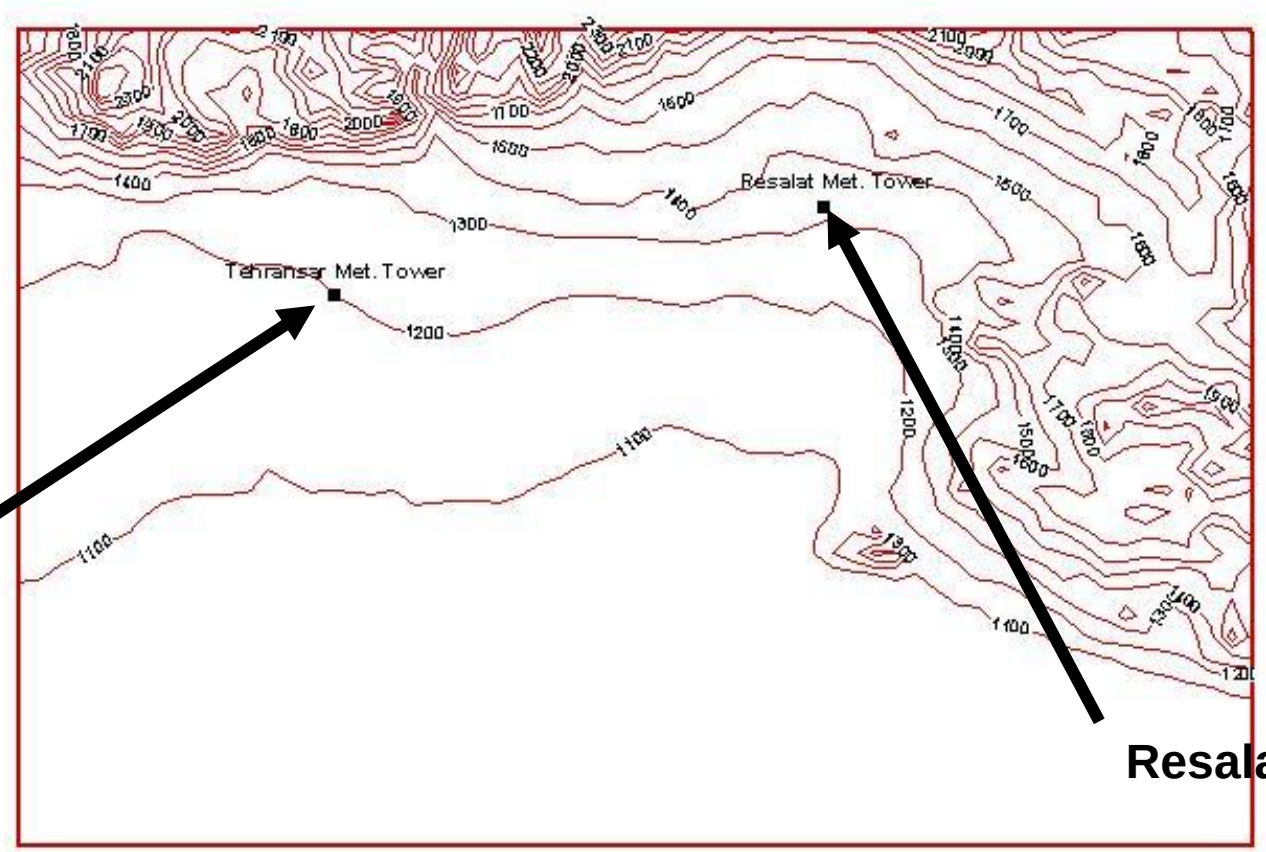
	79	80	81	82	83	84	85	86	87	88	89	90	91	92
dangerous	0	0	0	0	0	0	0	0	0	1	0	0	0	
very unhealthy	1	1	1	2	0	0	0	0	1	1	1	3	1	
unhealthy	106	125	169	161	88	89	75	15	59	40	103	215	146	3
healthy	257	237	187	191	258	253	254	327	293	291	247	144	216	63
clean	1	2	8	11	20	23	36	23	13	32	14	3	3	2

Local Meteorological Data



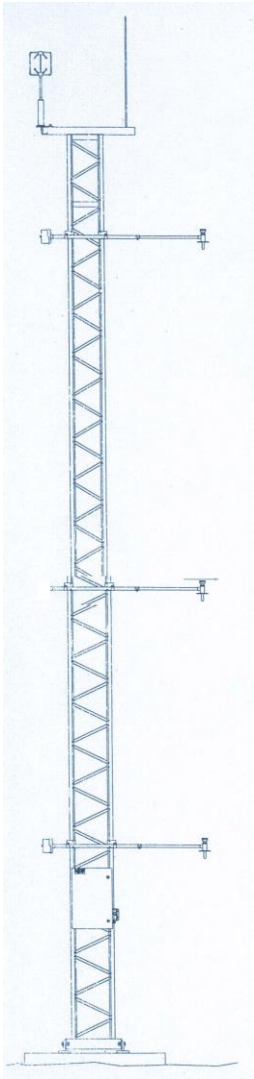


Met Towers Locations in Tehran



Tehransar

Resalat



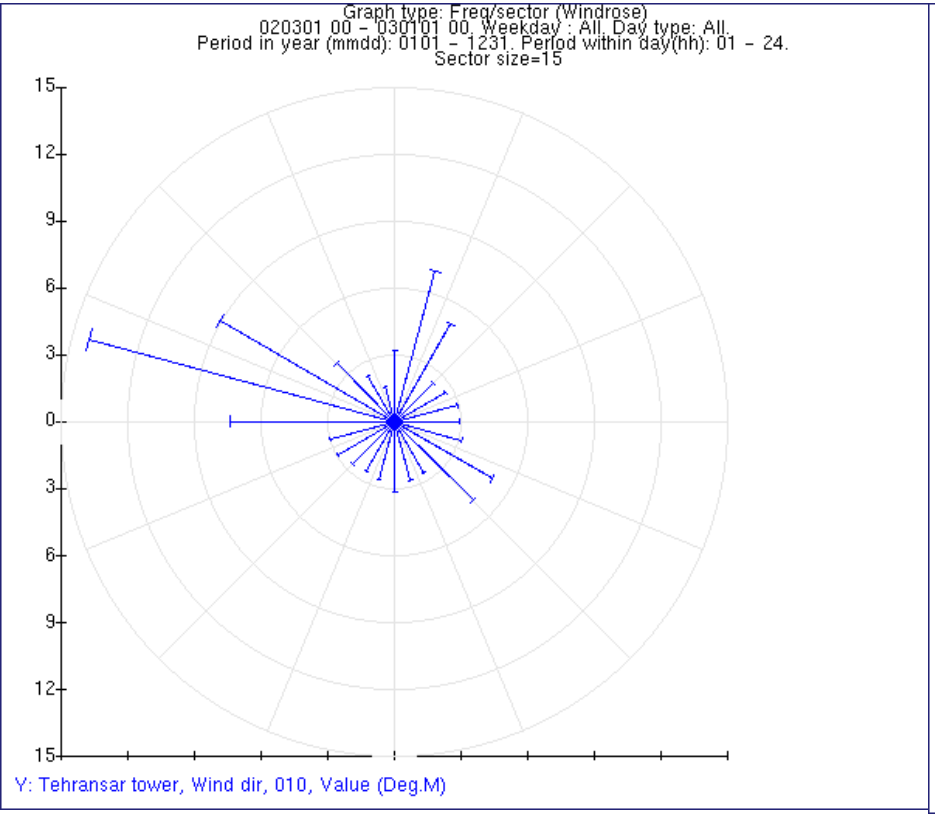
Meteorological Data
Technical description of met. sensors

Parameter	Requirements	Time resolution
Horizontal wind (Speed and direction)	Threshold < 0.25 m/s Accuracy better than 0.3%	15 minute mean value and standard deviation based on sensor output frequency 1 Hz
Vertical wind	Threshold ≈ 0 accuracy better than 3%	15 minute standard deviation based on sensor output frequency 1 Hz
Temperature	Accuracy better than ± 0.1C	Mean value over 15 minutes
Temperature difference	Accuracy better than ±0.03C	Mean value over 15 minutes

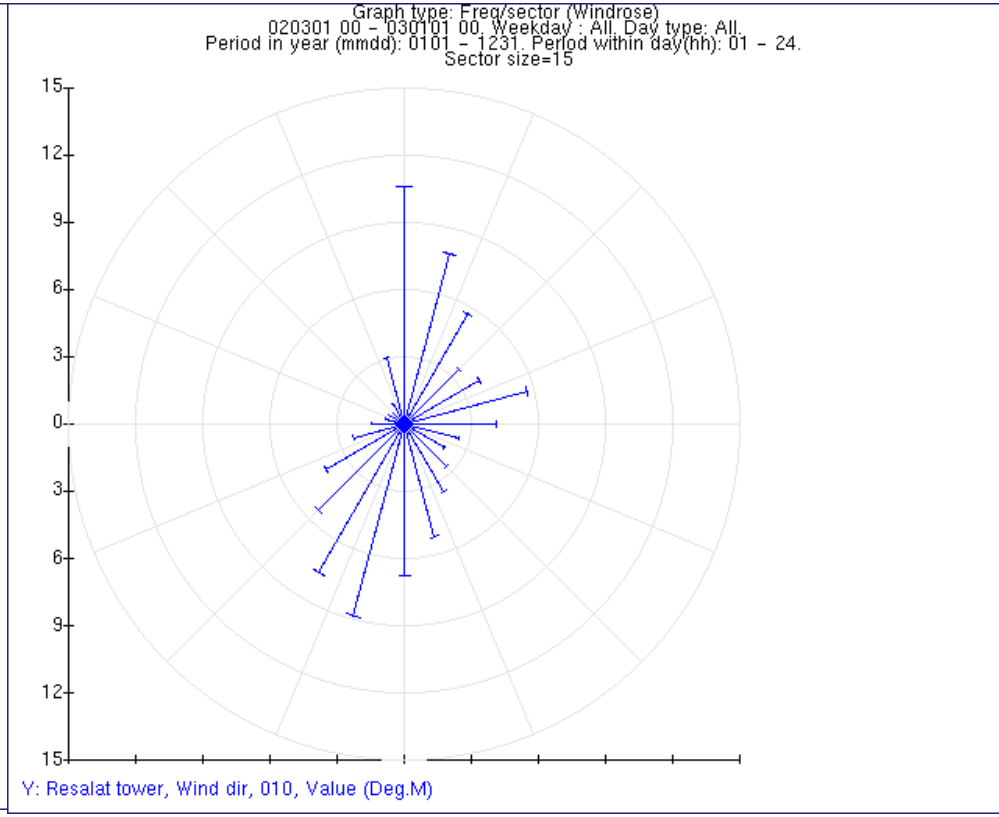
Parameter	Sensor type and configuration
Horizontal wind	A Propeller anemometer of "Air Quality" approved type (according to the US EPA).
Horizontal and vertical wind at the top of the mast	A three axis ultra sonic anemometer.
Temperature	Platinum sensor PT-100 in a traditional radiation shield or fan aspirated radiation shield.
Temperature difference	A bridge configuration of thermo couples for direct measurements of temperature difference. Mounted in fan aspirated radiation shields.
Global radiation	A pyranemometer based on a photo diode with a spectral response similar to the visual light.

Wind sensor: Gill Instrument3-D Ultrasonic anemometer (at top of tower)
Horizontal wind sensor: Young Wind Monitor AQ (on boom at 10 meters)
Temperature sensor: PT-100
Temperature difference: Thermocouples (between 8-2 and 22-8)
Radiation shield: young (fan ventilated)
Logger: Campbell CR-10X

Meteorological Data
Wind Rose



Tehransar

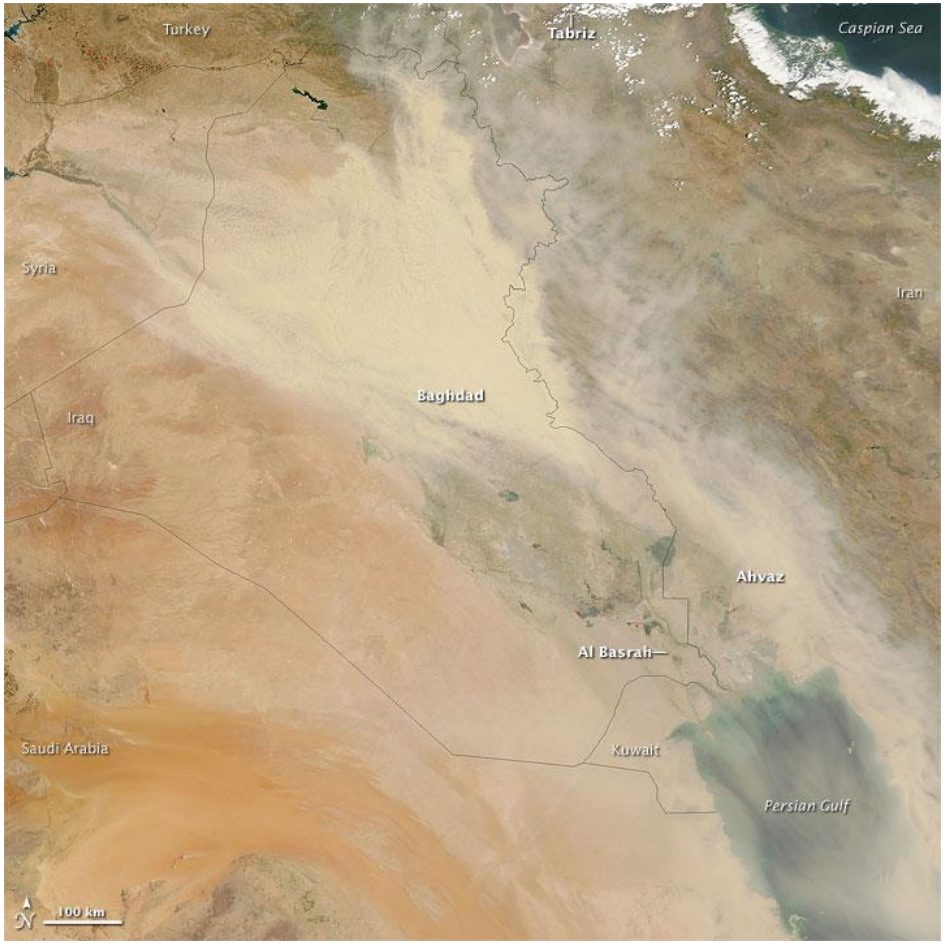


Resalat

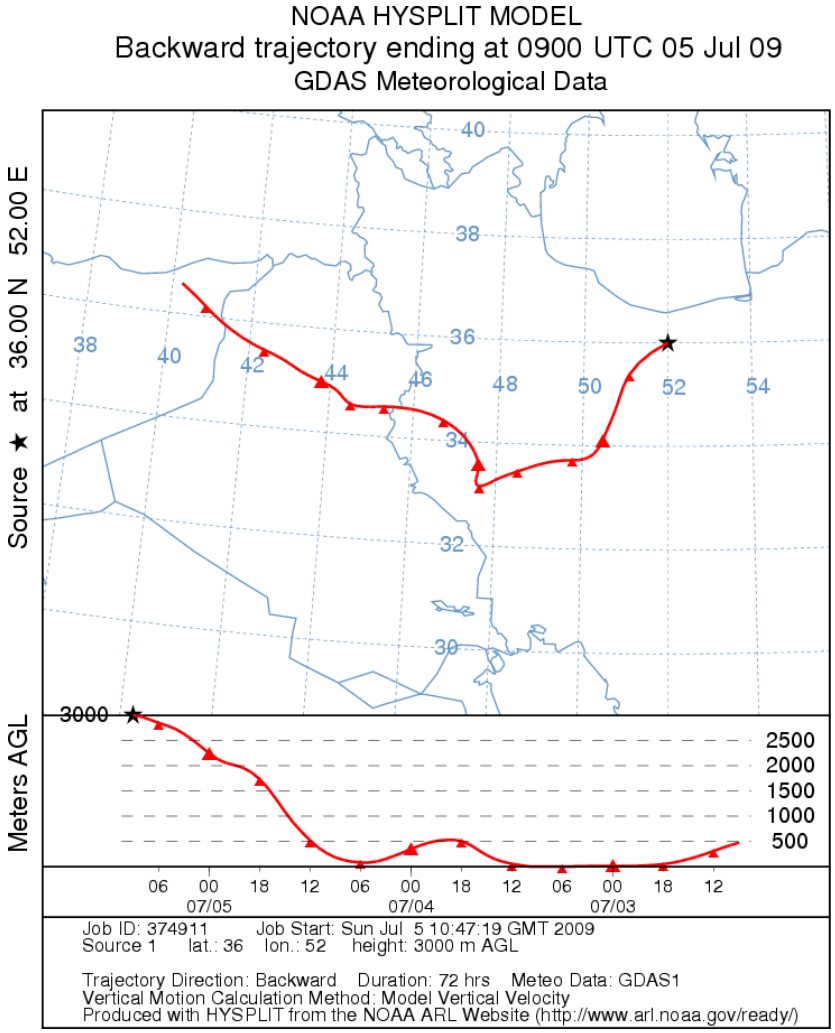
Implementation of Air Quality Modelling in Tehran

- Tehran Transport Emission Reduction Project (1997, GEF, Swedish joint venture and AQCC)
- An Integrated Master Plan in Air pollution Control in GTA (1997, JICA, JWA , UNICO and AQCC)

Trajectory of Particulates over Iran



NASA Picture July 4



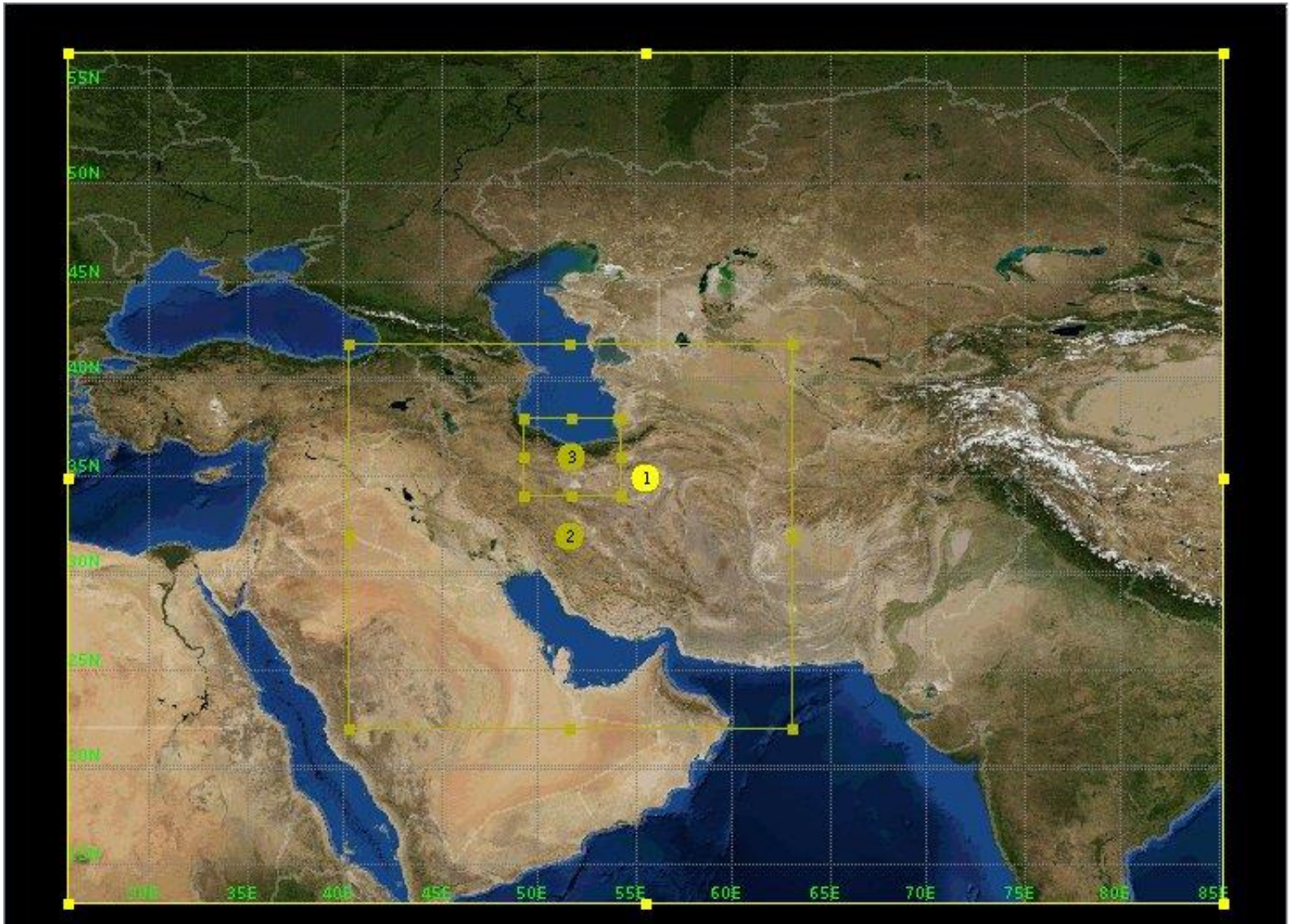
Transboundary Air Pollution Episode in Tehran (2009)

Current Air Pollution Modelling in Tehran

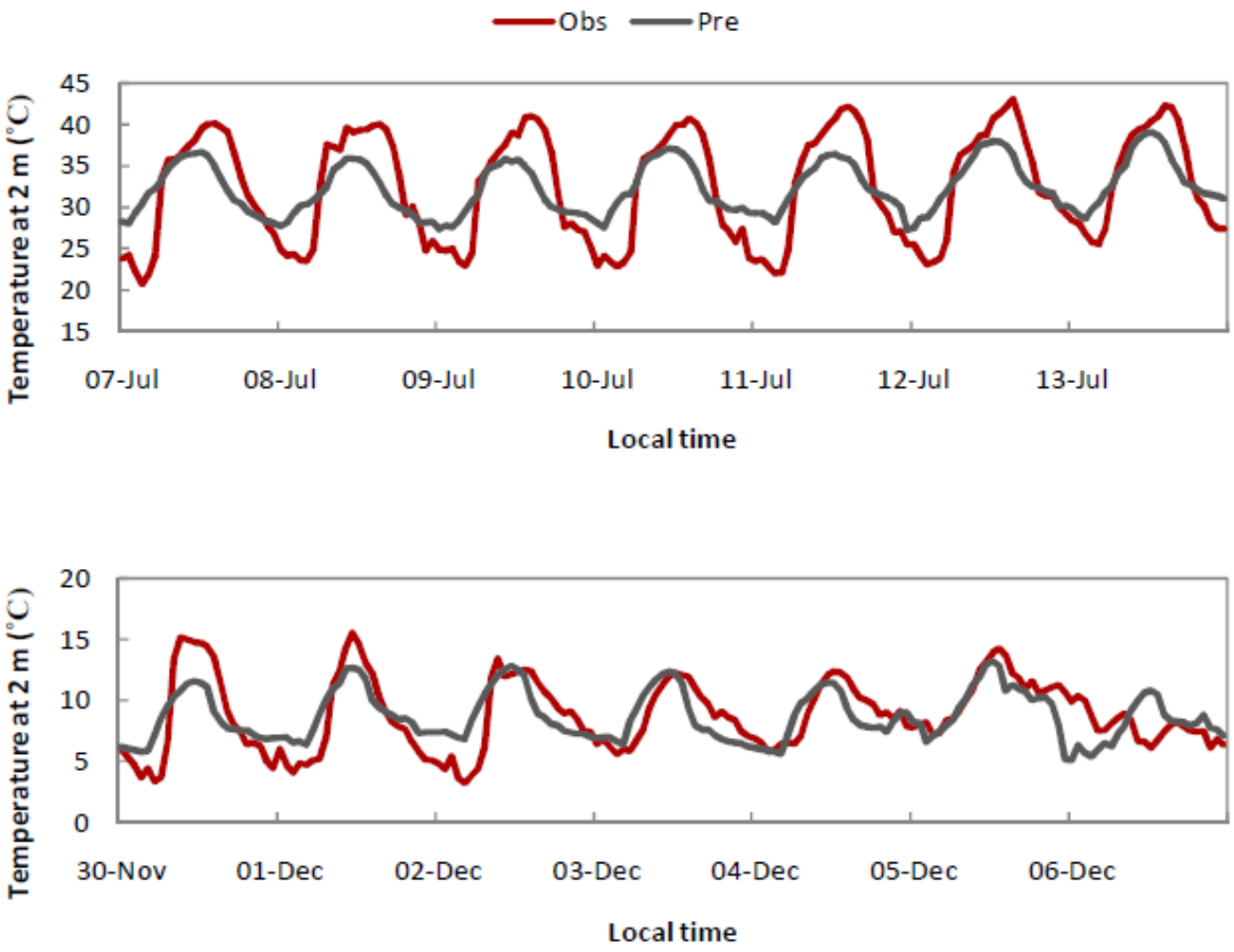
- Source Oriented Approach:
  - Combination of WRF and CAMx

- Receptor Oriented Approach
  - Chemical Mass Balance (CMB)

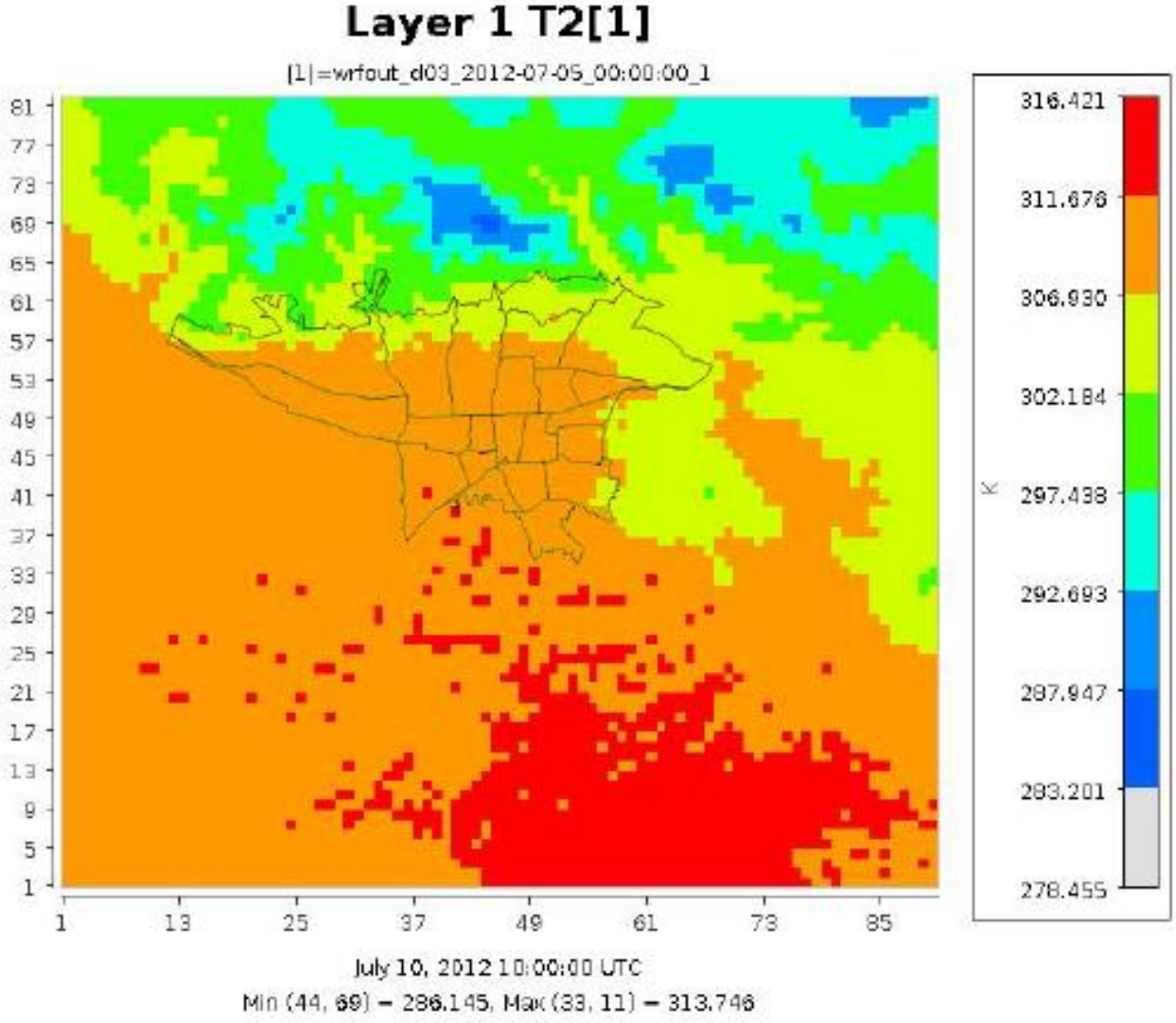
Current Air Pollution Modelling in Tehran



WRF Results


Obs
Pre
Temperature at 2 m (°C)
45
40
35
30
25
20
15
07-Jul
08-Jul
09-Jul
10-Jul
11-Jul
12-Jul
13-Jul
Local time
Temperature at 2 m (°C)
20
15
10
5
0
30-Nov
01-Dec
02-Dec
03-Dec
04-Dec
05-Dec
06-Dec
Local time

WRF Results


Layer 1 T2[1]
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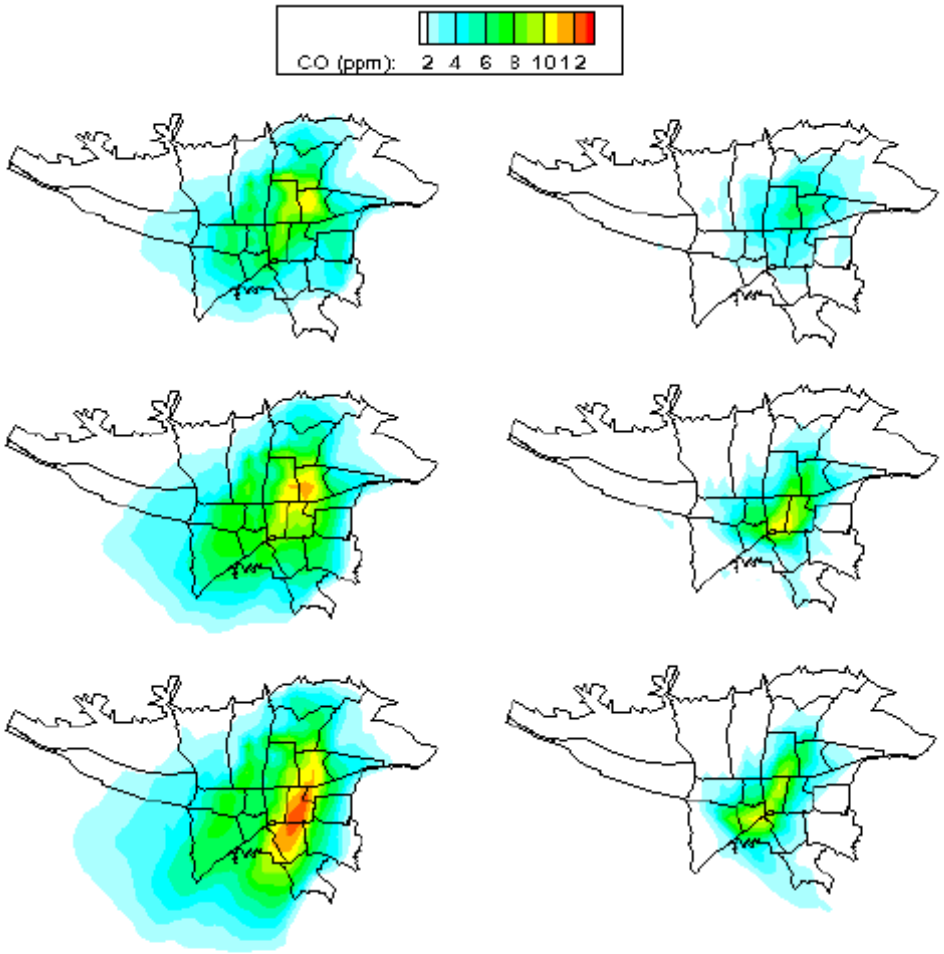
77
73
69
65
61
57
53
49
45
41
37
33
29
25
21
17
13
9
5
1
1
13
25
37
49
61
73
85
316.421
311.676
306.930
302.184
297.438
292.693
287.947
283.201
278.455
K
July 10, 2012 10:00:00 UTC
Min (44, 69) = 286.145, Max (33, 11) = 313.746

CAMx Results



ب الف

نحوه پراکنش مونوکسیدکربن CO مدل‌سازی شده بوسیله مدل CAMx در سطح شهر تهران در ساعت‌های ۹، ۱۰ و ۱۱، الف) ۱۰ ژوئیه و ب) ۳ دسامبر، ۲۰۱۲

Air Quality Modelling Development Plans

- Prepare an accurate emission inventory in Tehran area
- Implementation of WRF-Chem in order to estimate tranboundary airborne particulates
- Implementation of advanced trajectory models (FLEXPART, FLEXTRA) for large scale purposes