

Air Quality issues in Sri Lanka



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Air pollution

What is Air Pollution? - Presence of hazardous unwanted trace gases/substances in the atmosphere

In general , sources of Air pollution can be categorized as natural or anthropogenic -human- related emissions that degrade the atmosphere.



Causes of Air Pollution in Sri Lanka

- *Vehicular Emissions*
- *Open Burning of refuse/solid waste;
Tires*
- *Fossil fuel powered power plants*
- *Resuspension of road side dust*
- *Industrial emissions*
- *Oil Refineries*
- *Agricultural activities*
- *Waste disposal and effluent
treatment*
- *Biomass burning*



Pictures Dr.Ruwan Wijayamuni

Criterion Air Pollutants present in Sri Lankan Cities

- SO_2
- *Particulate matter (PM 10, PM 2.5)*
- NO_x
- CO
- VOC
- *Ozone*
- *Etc*

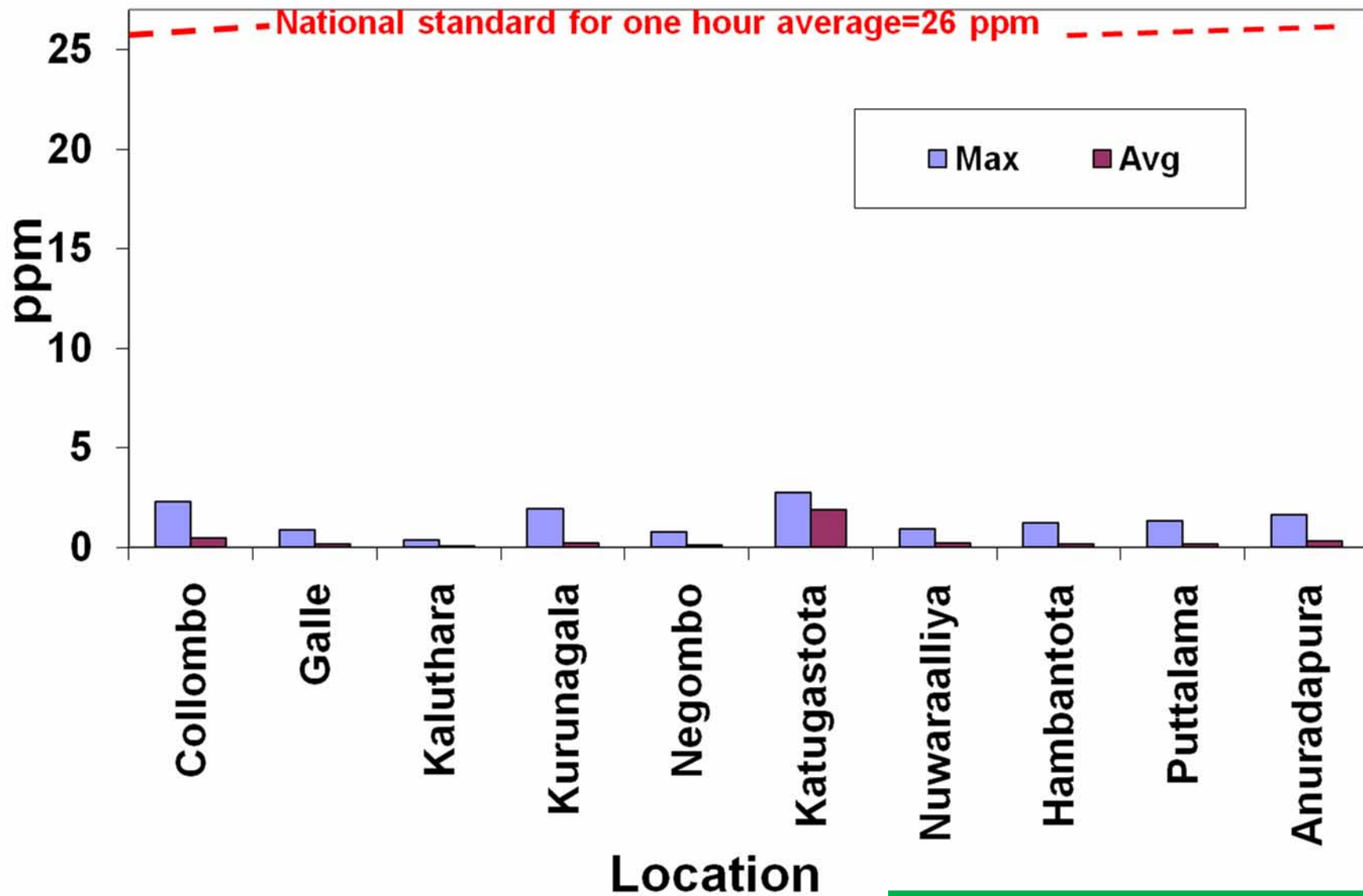


Air Quality Status in Sri Lankan Cities



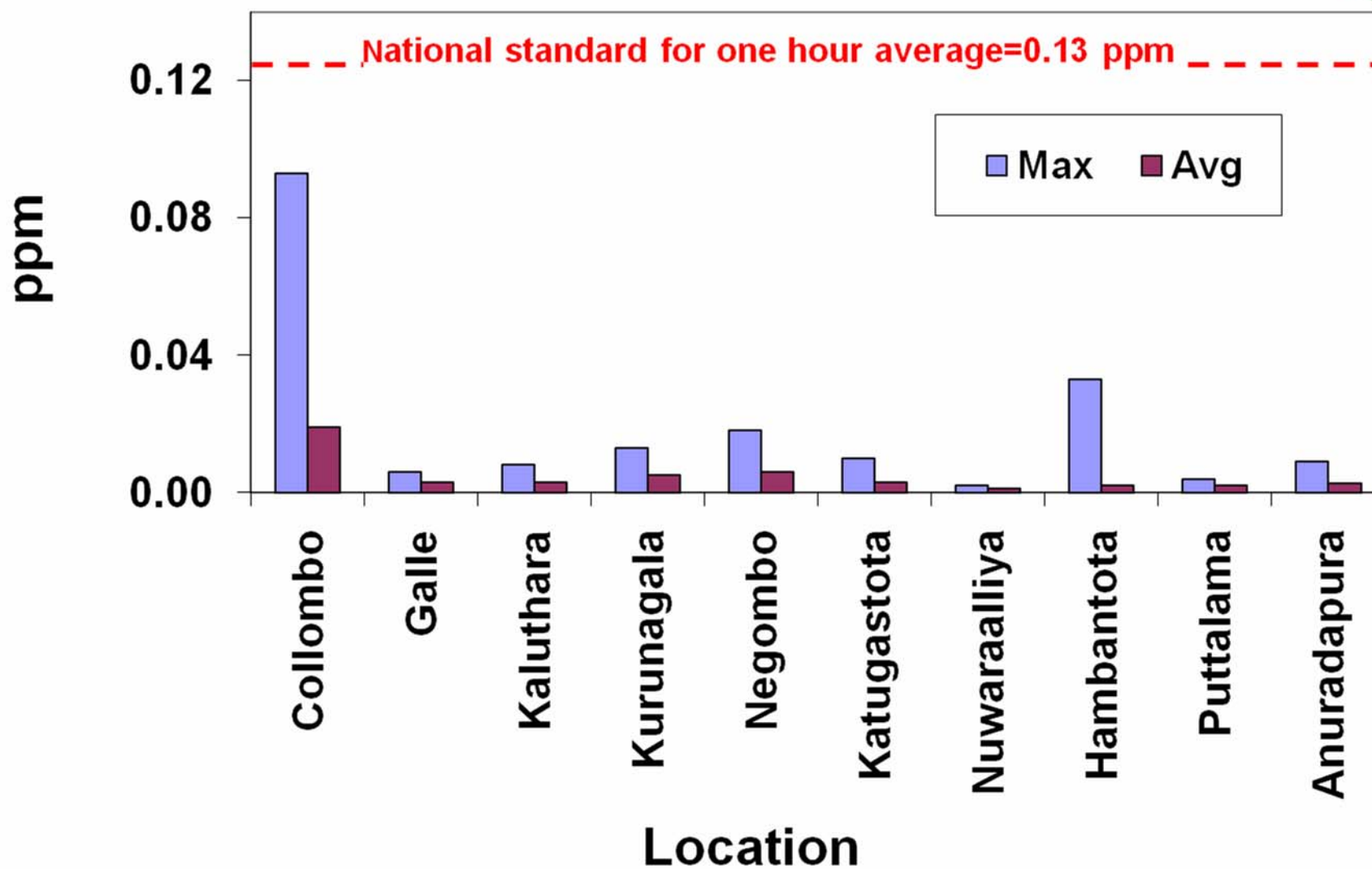
- *Monitoring started in 1996*
- *Following Parameters have being monitoring since 1996*
 - *Carbon monoxide*
 - *Sulfur dioxide*
 - *Nitrogen oxides*
 - *Ozone*
 - *Particulate Matter (PM_{10})*

Variation of One Hour Average Concentrations of Carbon Monoxide(CO) in 1999

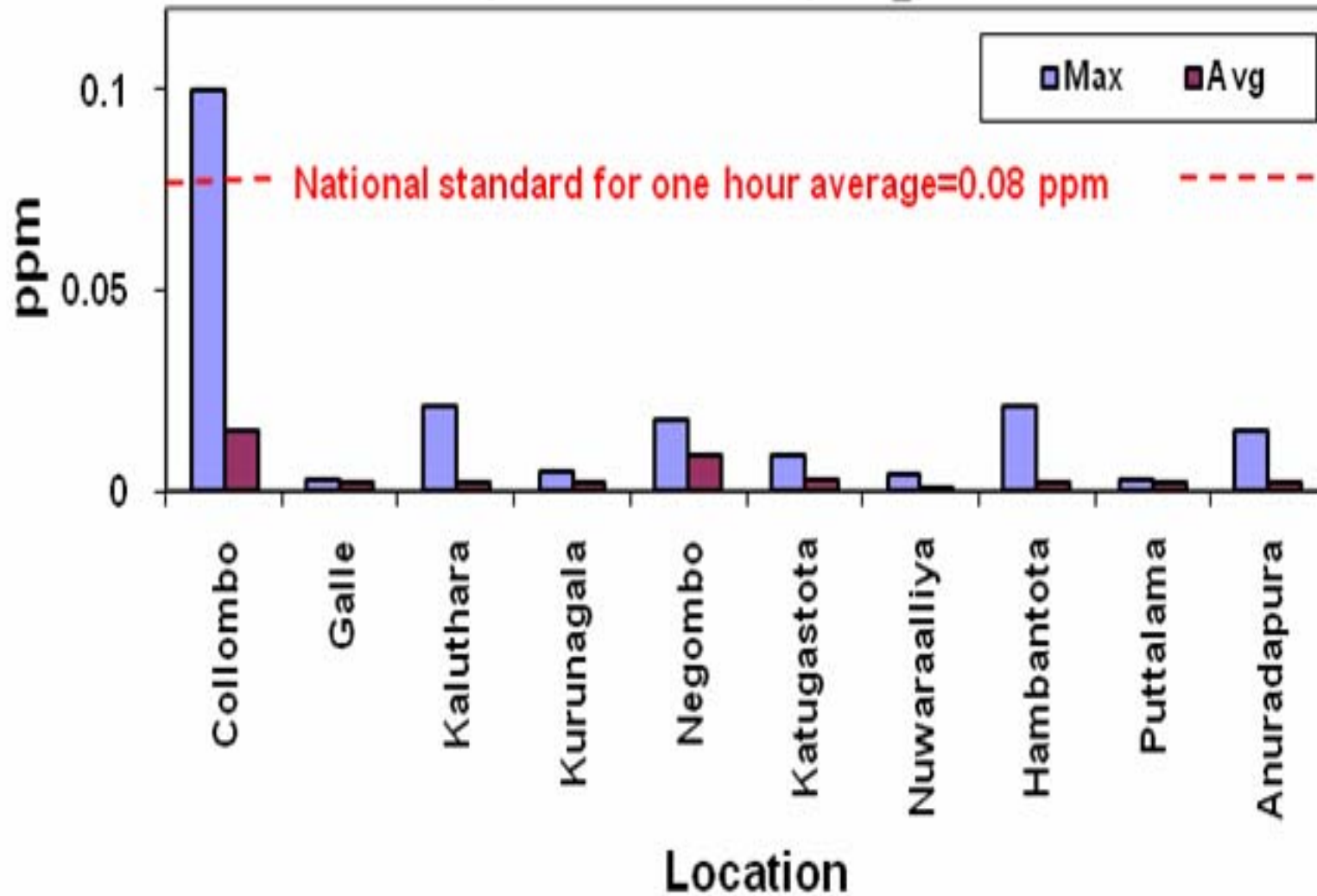




Variation of One Hour Average Concentrations of Nitrogen Dioxide (NO₂) in 1999

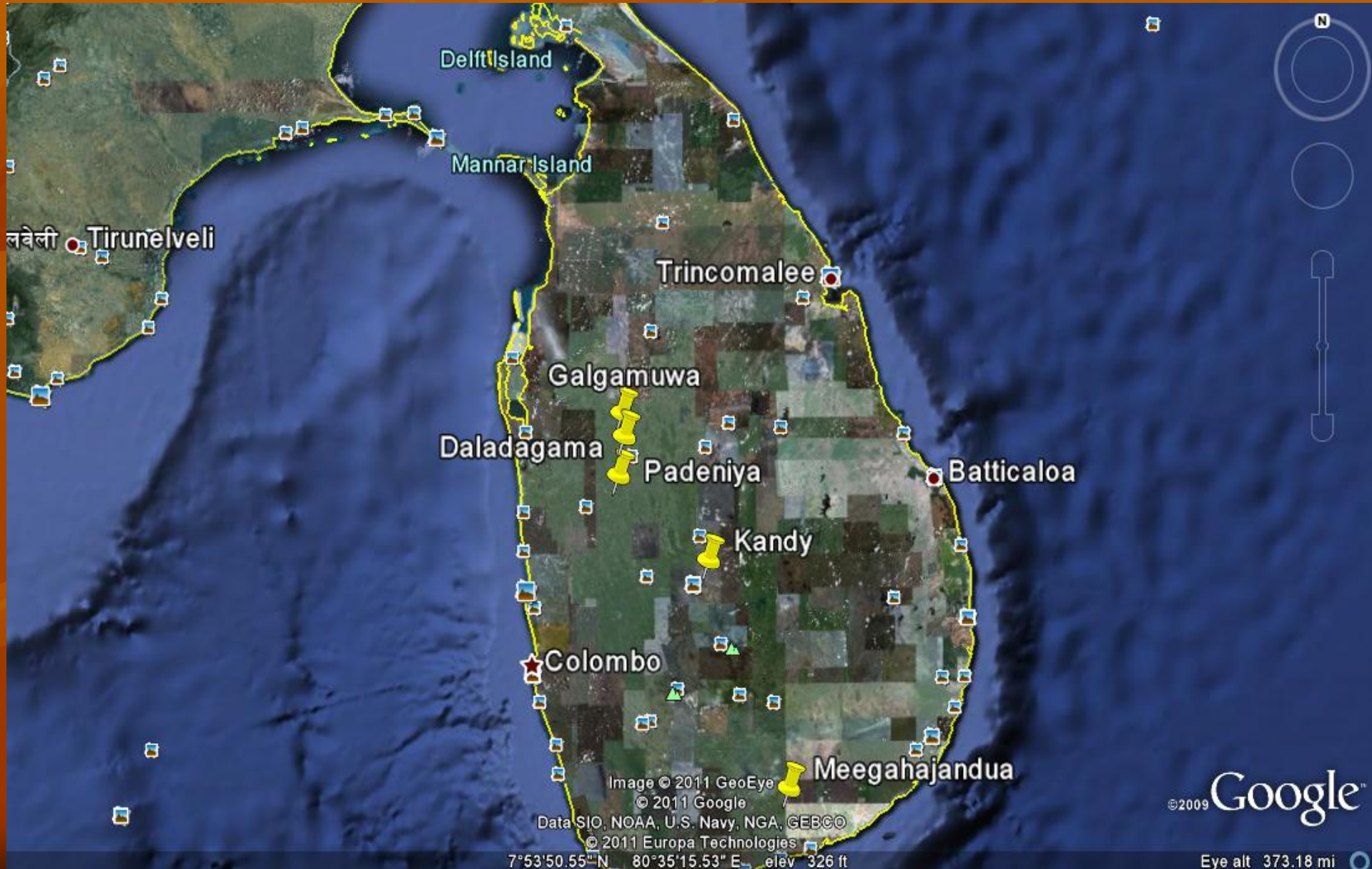


Variation of One Hour Average Concentrations of Sulphur Dioxide(SO₂) in 1999



Recent air quality monitoring

- Recent air quality measurements were done at some of the rural areas as well as urban areas for 24 hour durations and one week durations
- Kandy, Nugegoda (Urban), (One Week)
- Meegahajandura at Hambanthota District (Rural) (One week)
- Kerawalapitiya, Padeniya, Daladagama, Galgamuwa (24 hours)



तिरुनेल्वेली Tirunelveli

Delft Island

Mannar Island

Trincomalee

Galgamuwa

Daladagama

Padeniya

Batticaloa

Kandy

Colombo

Meegahajandua

Image © 2011 GeoEye

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO

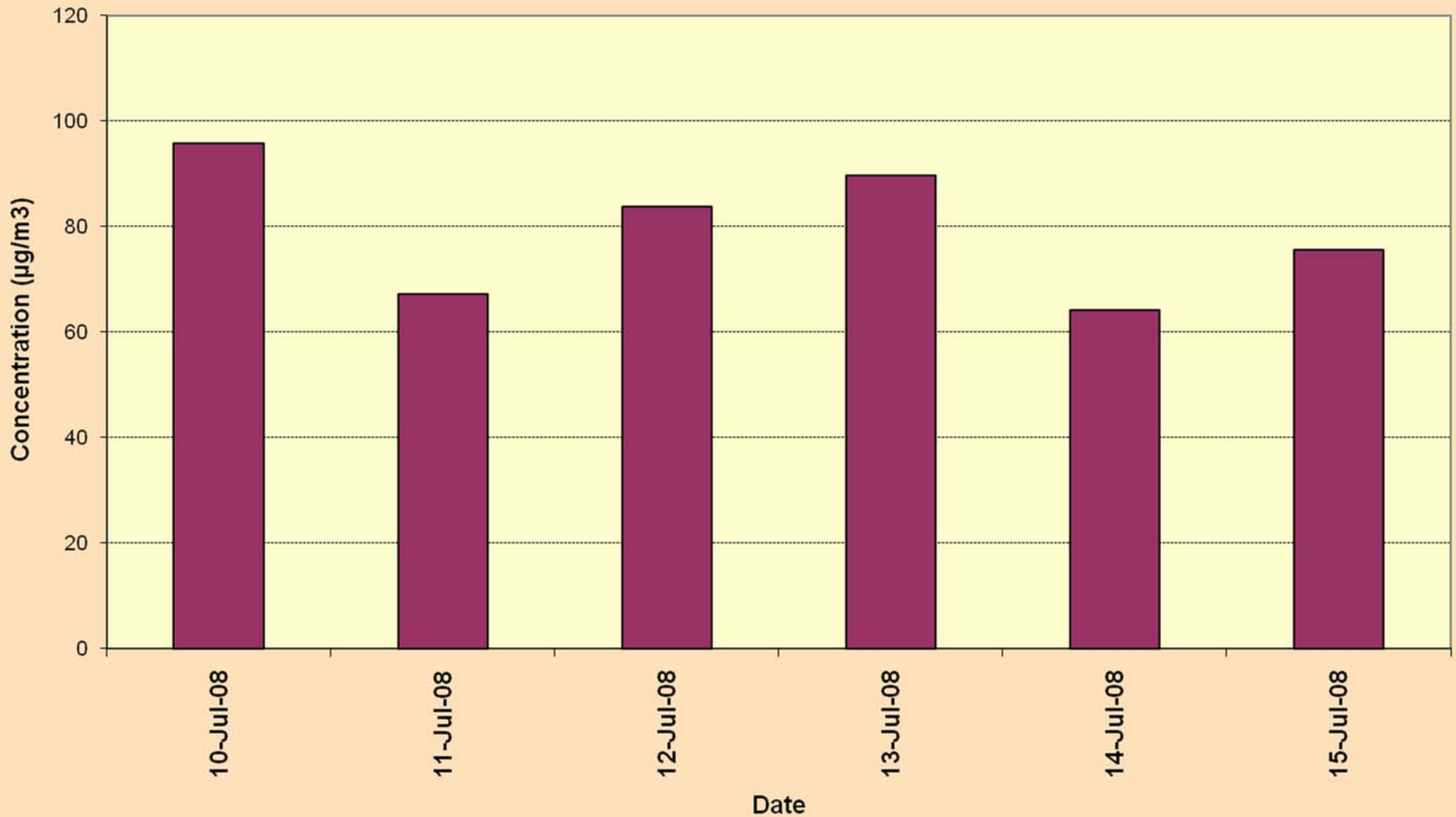
© 2011 Europa Technologies

7°53'50.55" N 80°35'15.53" E elev 326 ft

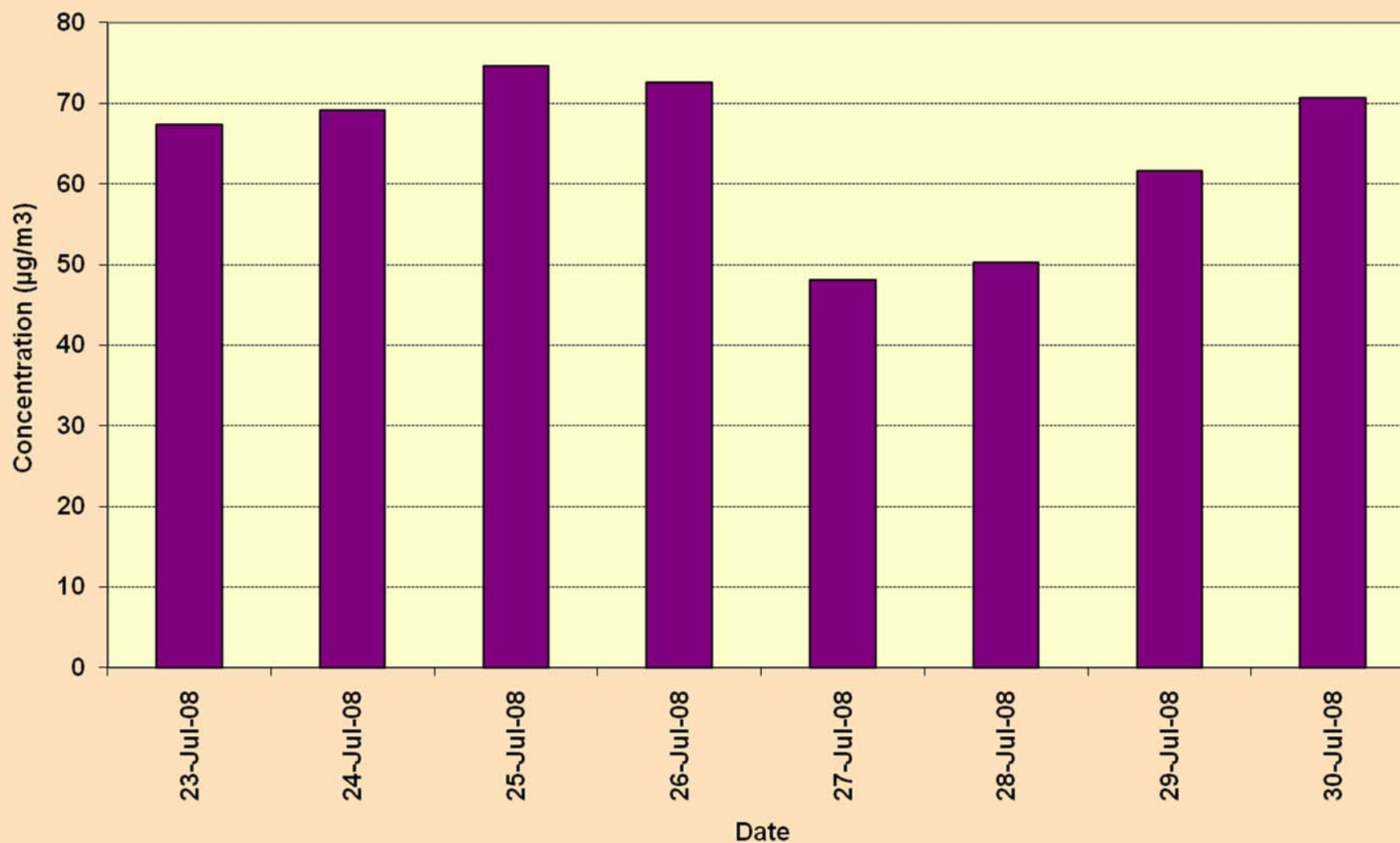
©2009 Google

Eye alt 373.18 mi

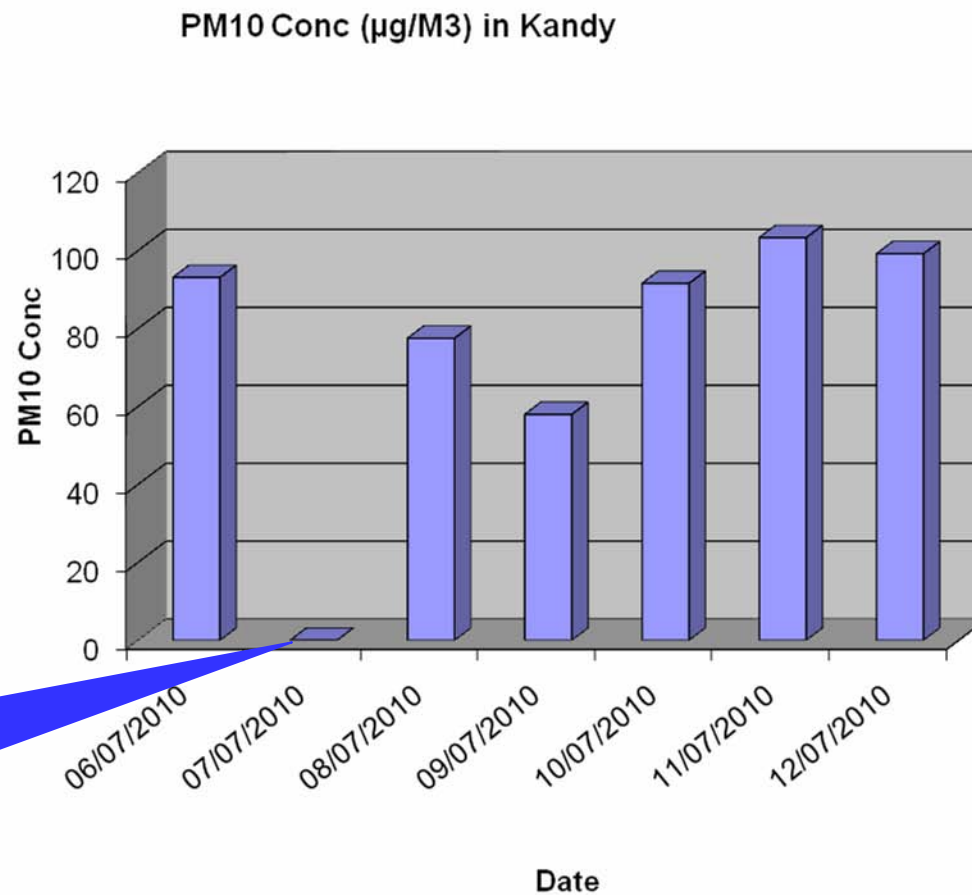
24 hour average concentrations of PM-10 at Nugegoda
(Near Supper Market) 2008



24 hour average concentrations of PM-10 at Kandy City (Torington Garden) 2008



Variation of PM10 24 hour average concentrations in Kandy City 2010 (Torrington Park)

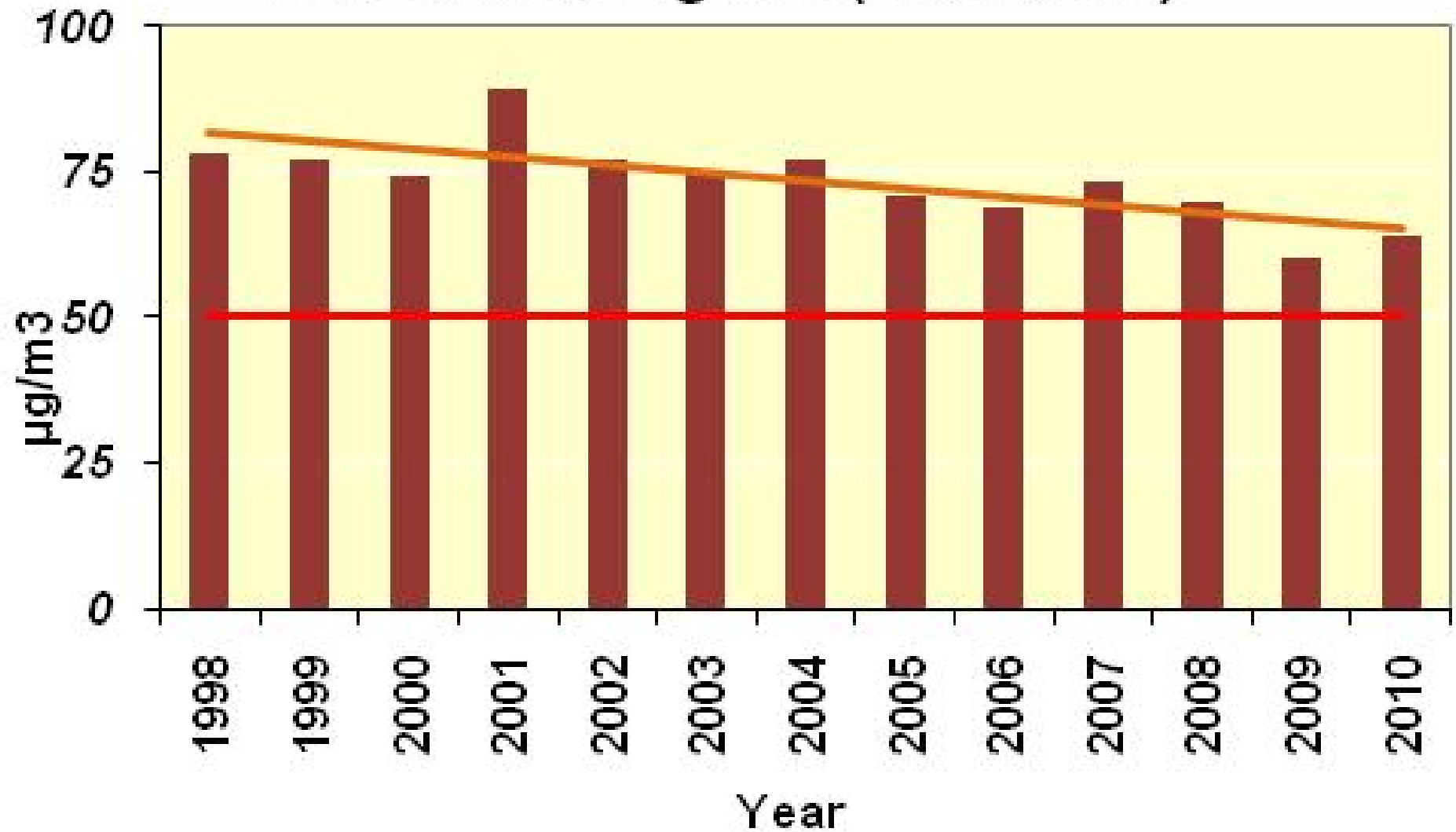


Value rejected

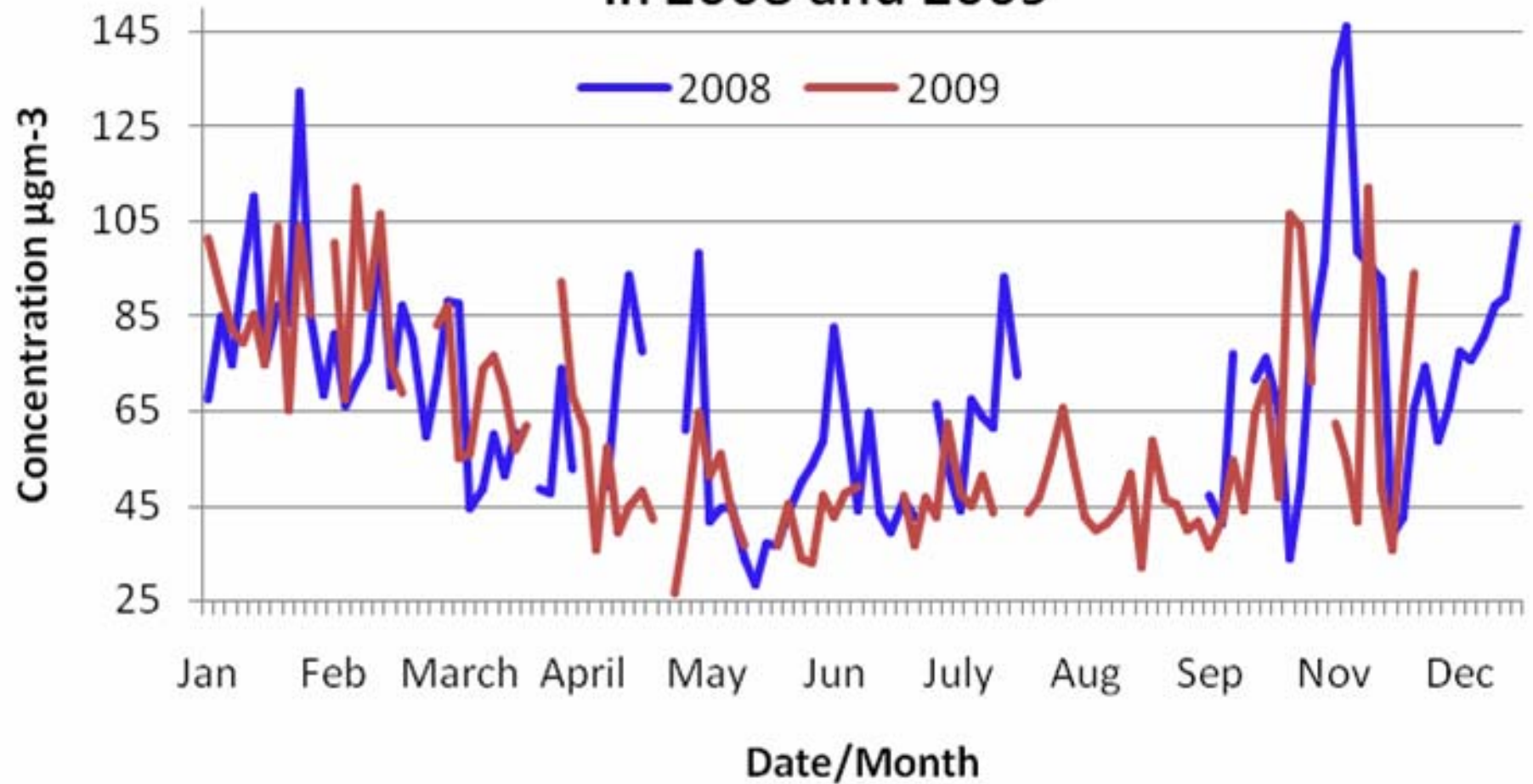
Table 1.

Parameter	Test Site Scores (Maximum during the measurement period) (μgm^{-3})	Sri Lankan Maximum Permissible Level (μgm^{-3})	WHO Recommended maximum permissible level (μgm^{-3})	Comments
Particulate matter (PM-10) 24 Hour Average	39	100	50	Below the National Standards as well as WHO guideline Values
Particulate matter (PM-2.5) 24 Hour Average	15	50	25	
Nitrogen Dioxide (NO_2)	17.7	250	200	
Sulfure Dioxide (SO_2)	19.6 (One Hour Average)	200		
	11.5 (24 hour average)		20	
Ozone (O_3)	49.3 (One Hour Average)	200		
	37.8 (8 Hour Average)		100	
Carbon Monoxide (CO)	1453.9 (One Hour Average)	30000	Not mentioned	

Annual averages of PM-10 at Colombo Fort Monitoring site (1998-2010)

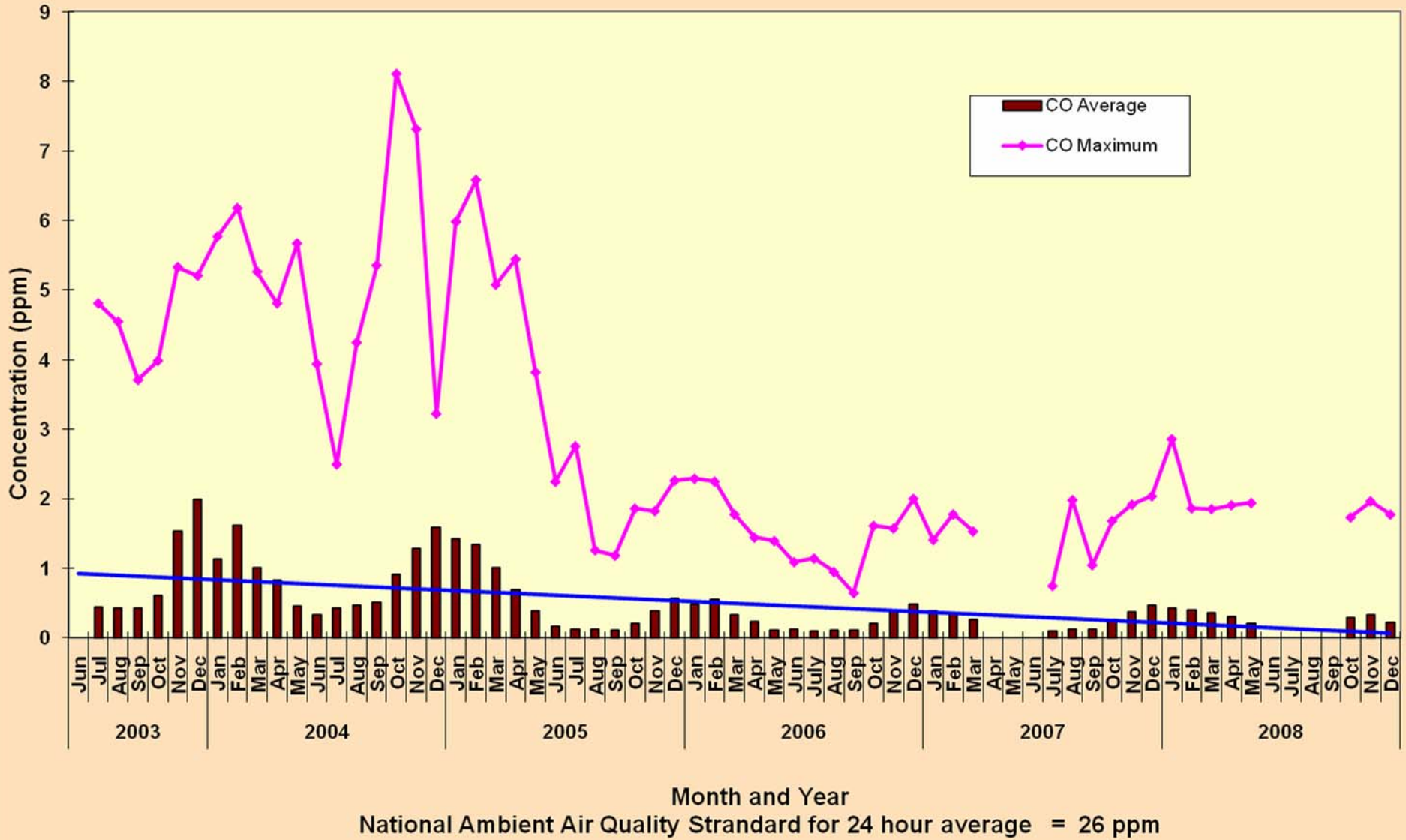


Variation of PM-10 Concentrations in 2008 and 2009

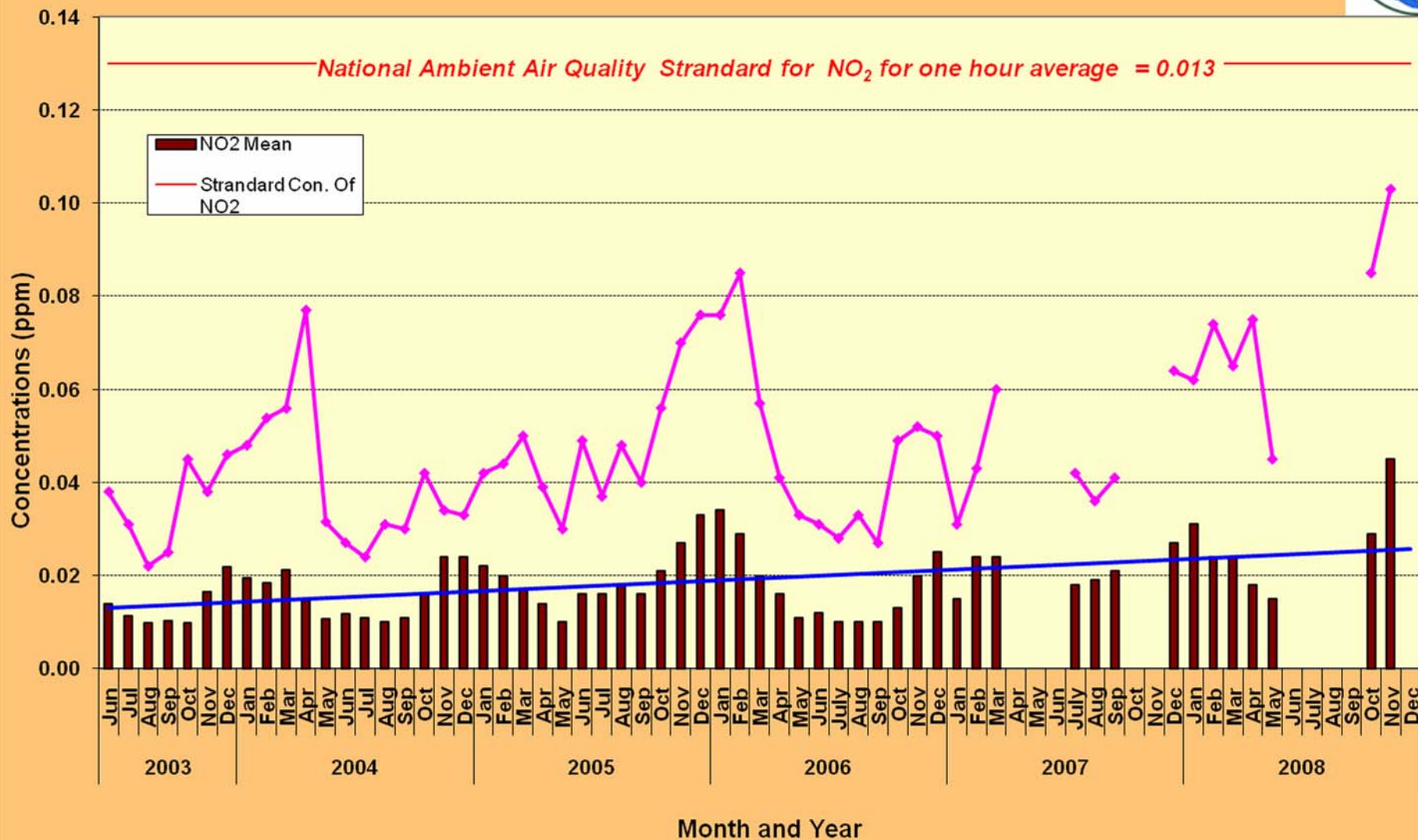




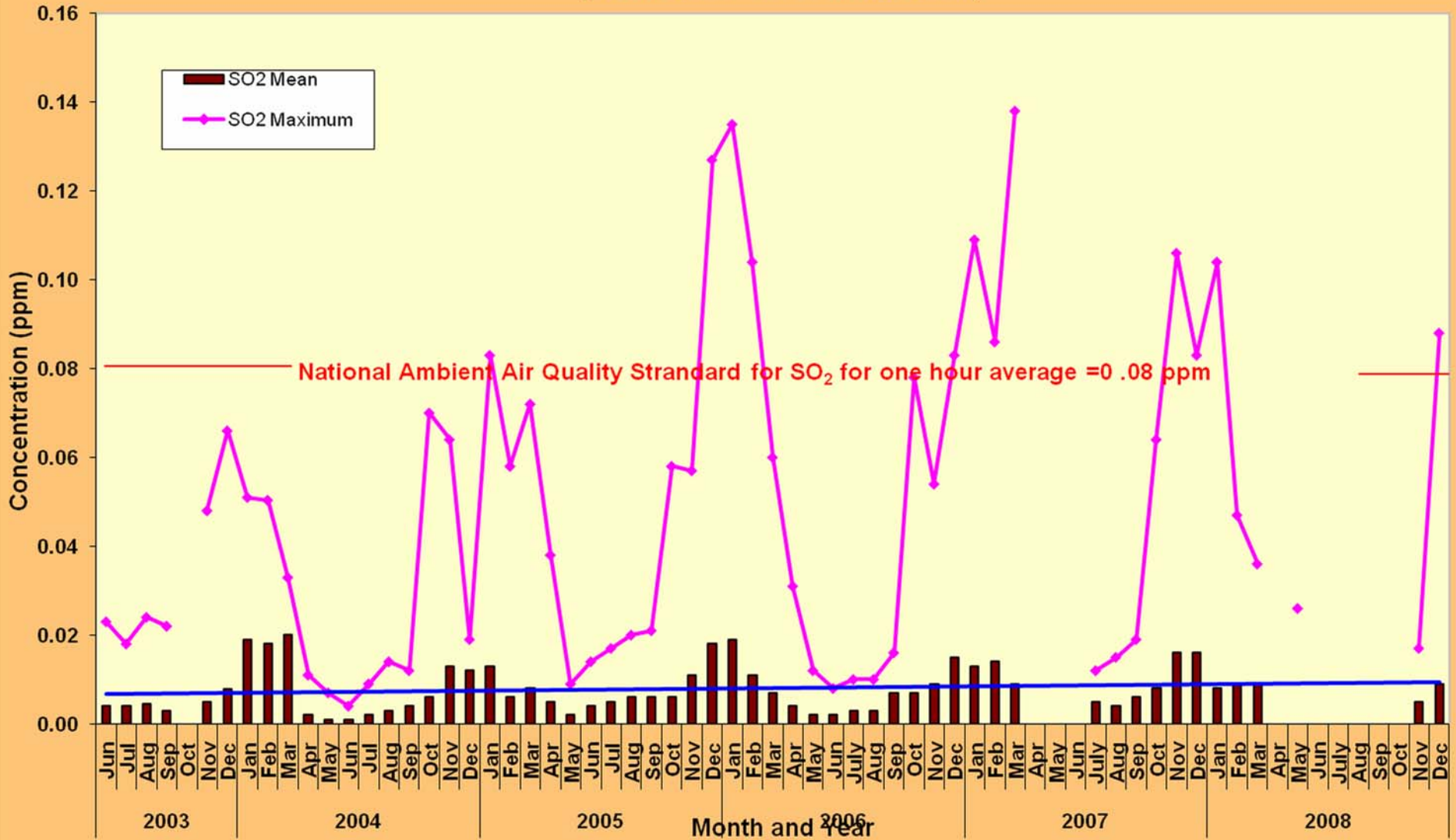
Carbon Monoxide Concentration Monthly Mean and Maximum of one hour averages at Colombo Fort (June 2003 - December 2008)



Nitrogen Dioxide Concentration Monthly Mean and Maximum of one hour averages at Colombo Fort (June 2003 - December 2008)



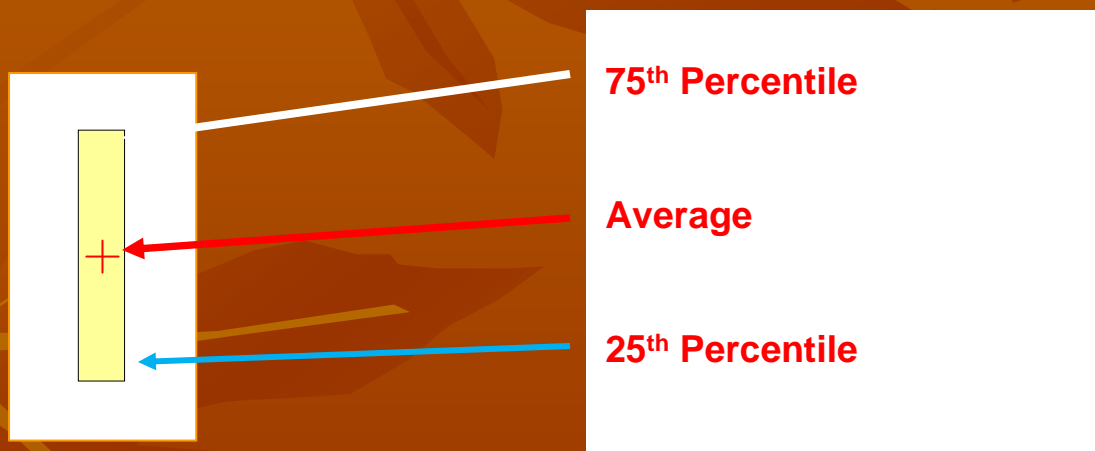
Sulphur Dioxide Concentration Monthly Mean and Maximum of one hour averages at Colombo Fort (June 2003 - December 2008)





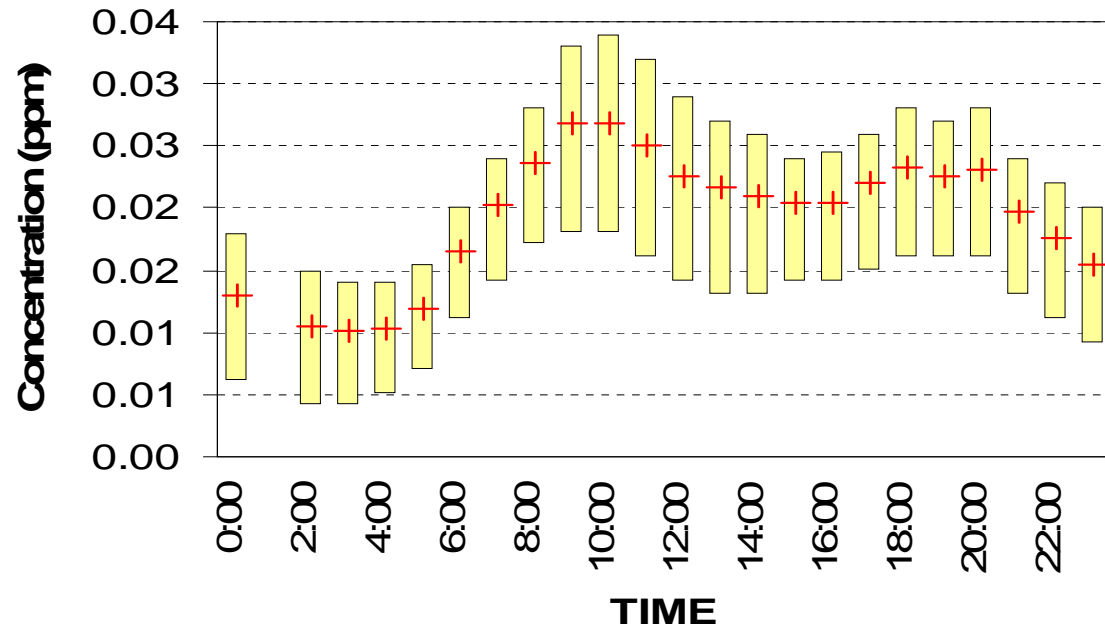
Variation of air pollutant concentrations with time and date

- ❖ The statistical parameters calculated with respect to the time and date were presented in graphical form to study the variation patterns during the day and the week.
- ❖ The statistical parameters of air pollutants are represented in these graphs in following format.

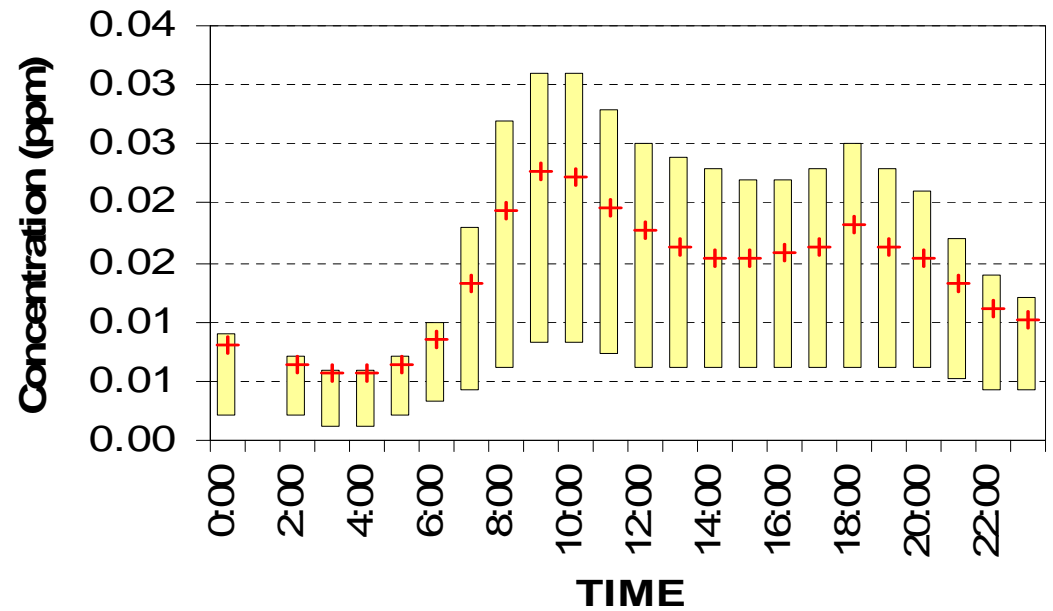


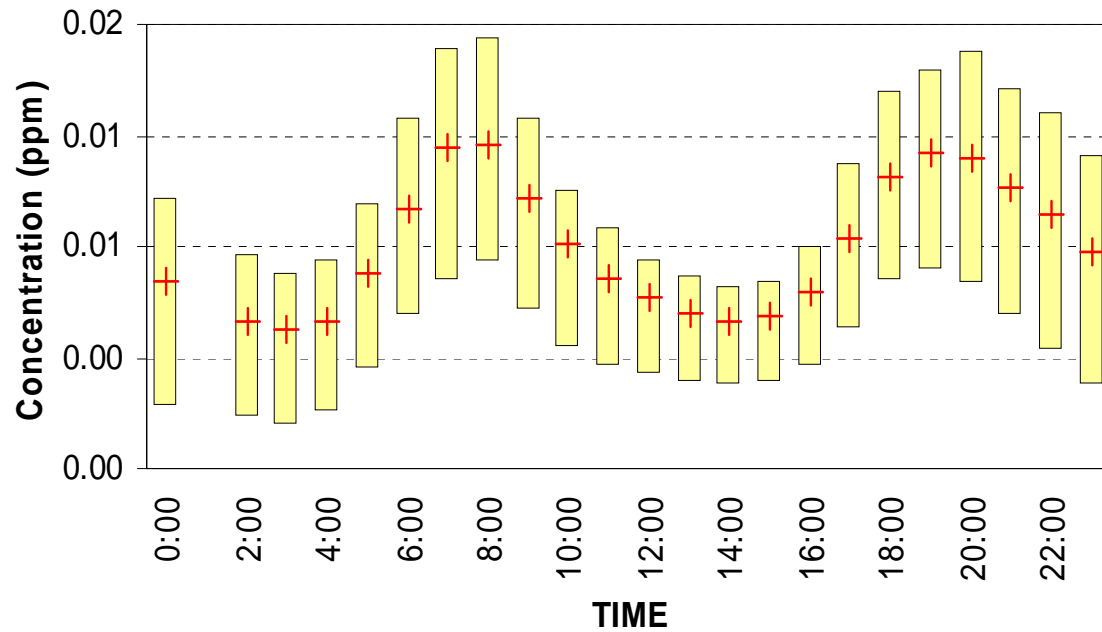


Variation of one hour averages of NO_2 concentrations with time at Colombo Fort monitoring station



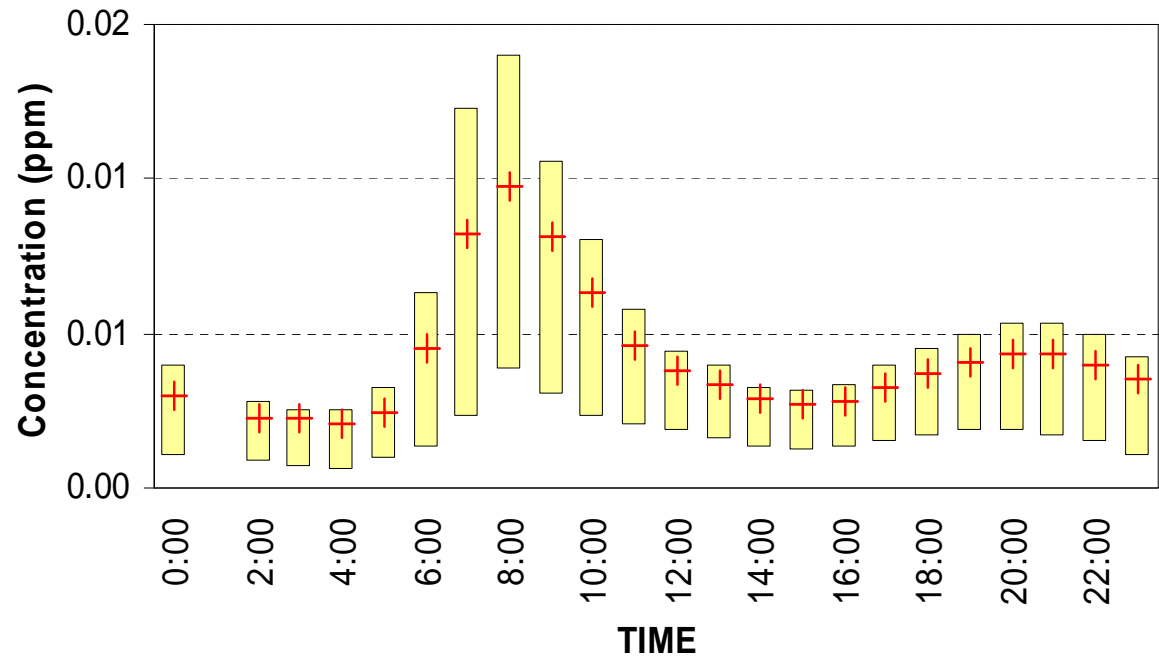
Variation of one hour averages of SO_2 concentrations with time at Colombo Fort monitoring station

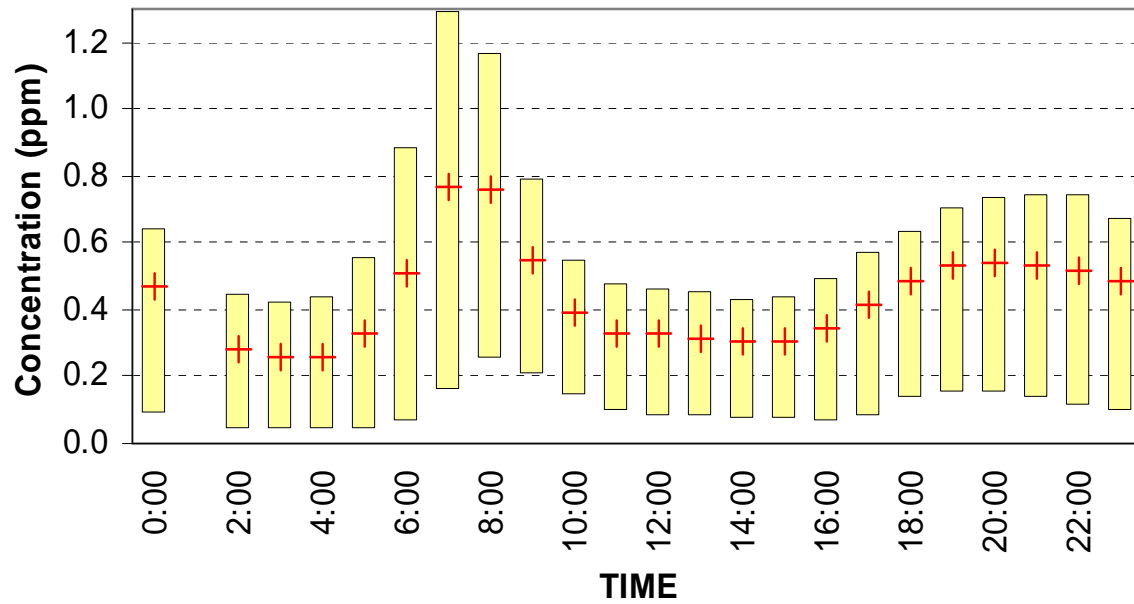




Variation of one hour averages of NO_2 concentrations with time at Colombo Meteorological Department monitoring station

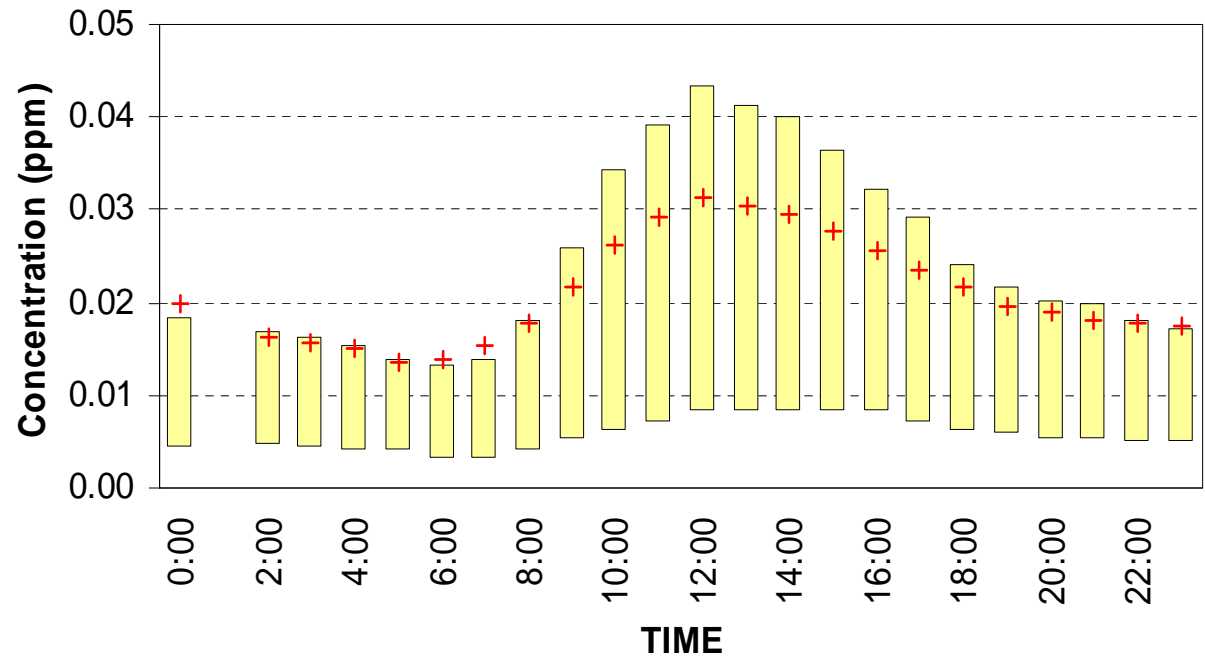
Variation of one hour averages of SO_2 concentrations with time at Colombo Meteorological Department monitoring station



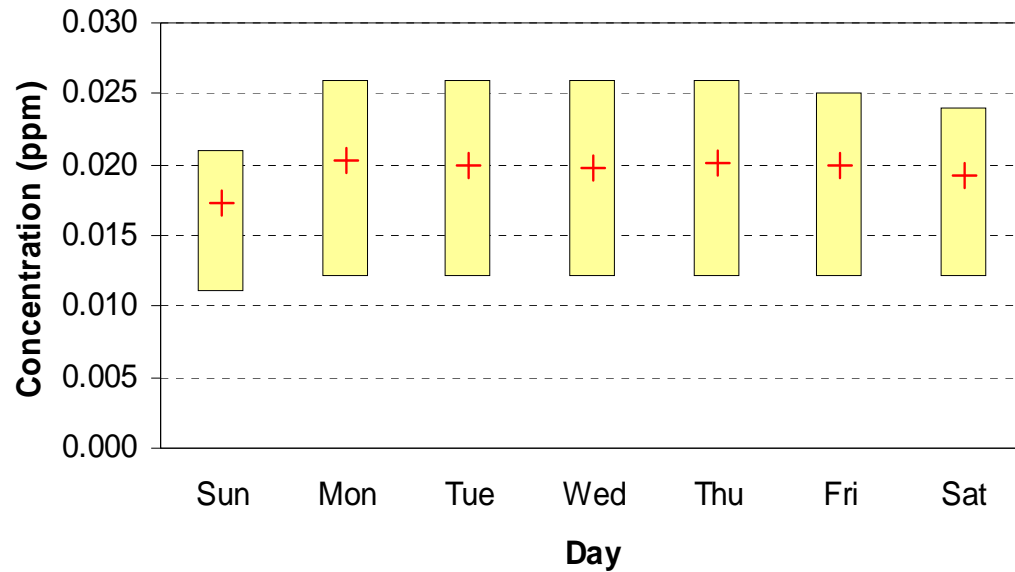


Variation of one hour averages of CO concentrations with time at Colombo Meteorological Department monitoring station

Variation of one hour averages of O₃ concentrations with time at Colombo Meteorological Department monitoring station

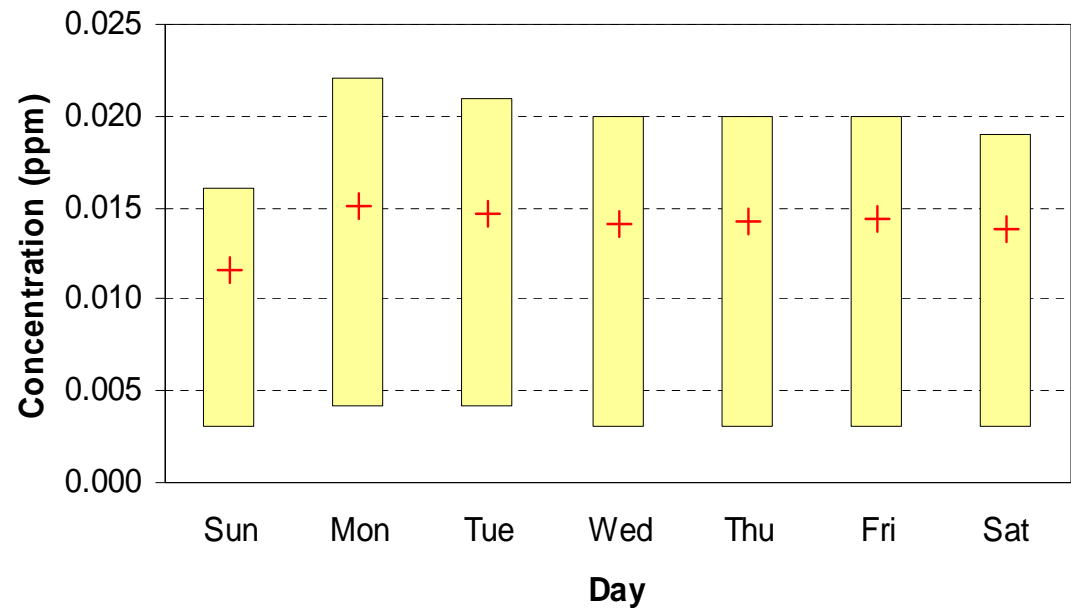


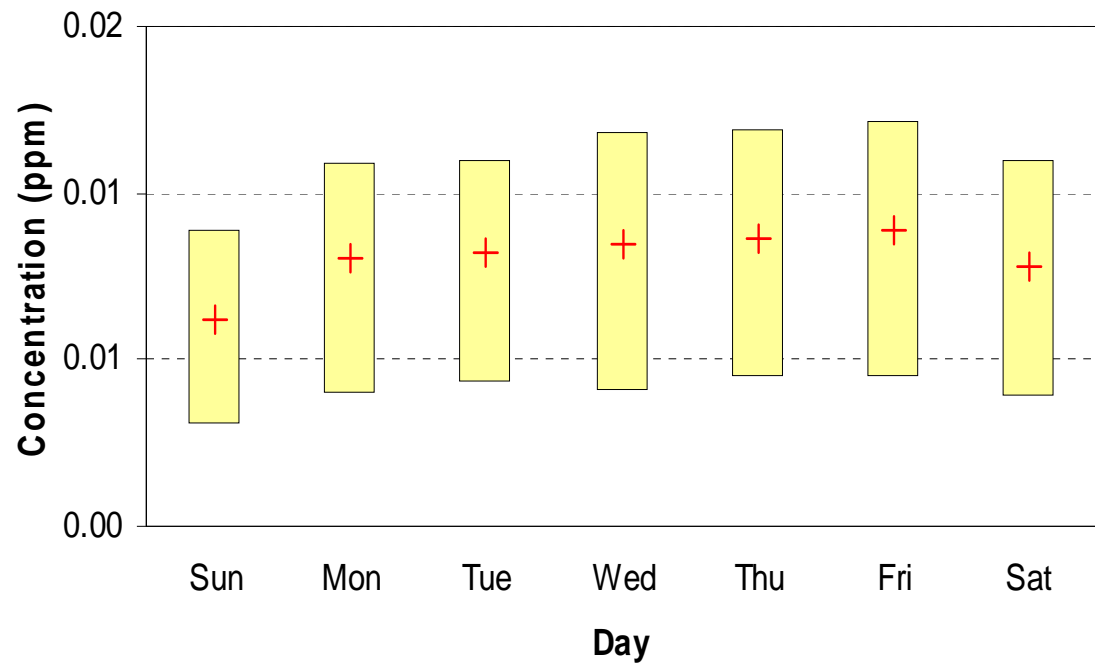
Variation of air pollutant concentrations with date



Variation of one hour averages of NO₂ concentrations with day at Colombo Fort monitoring station

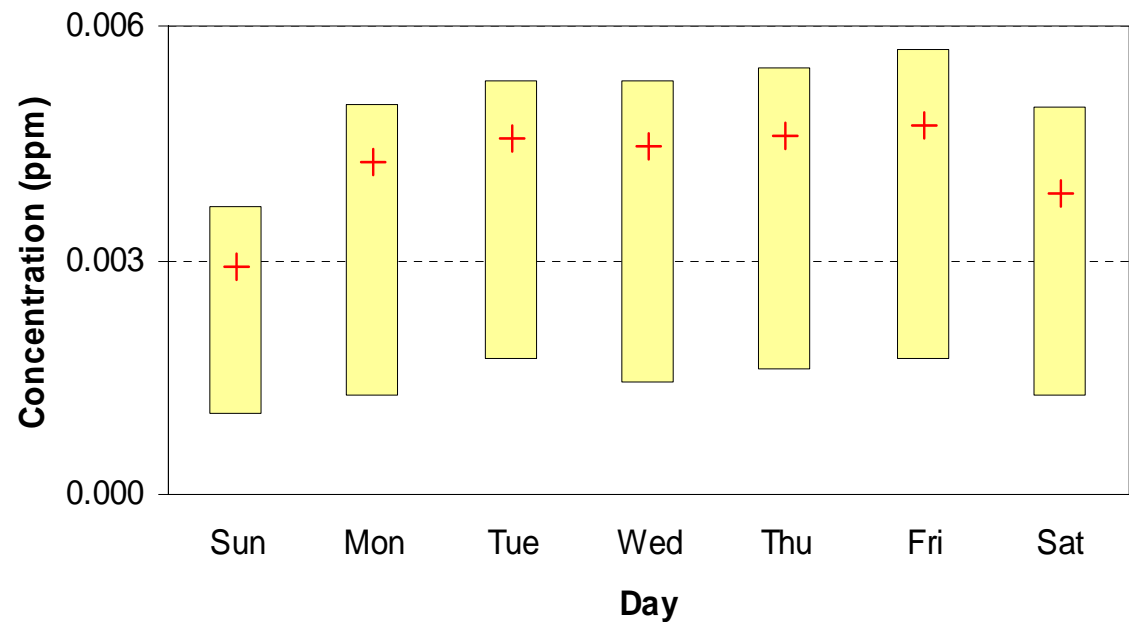
Variation of one hour averages of SO₂ concentrations with day at Colombo Fort monitoring station

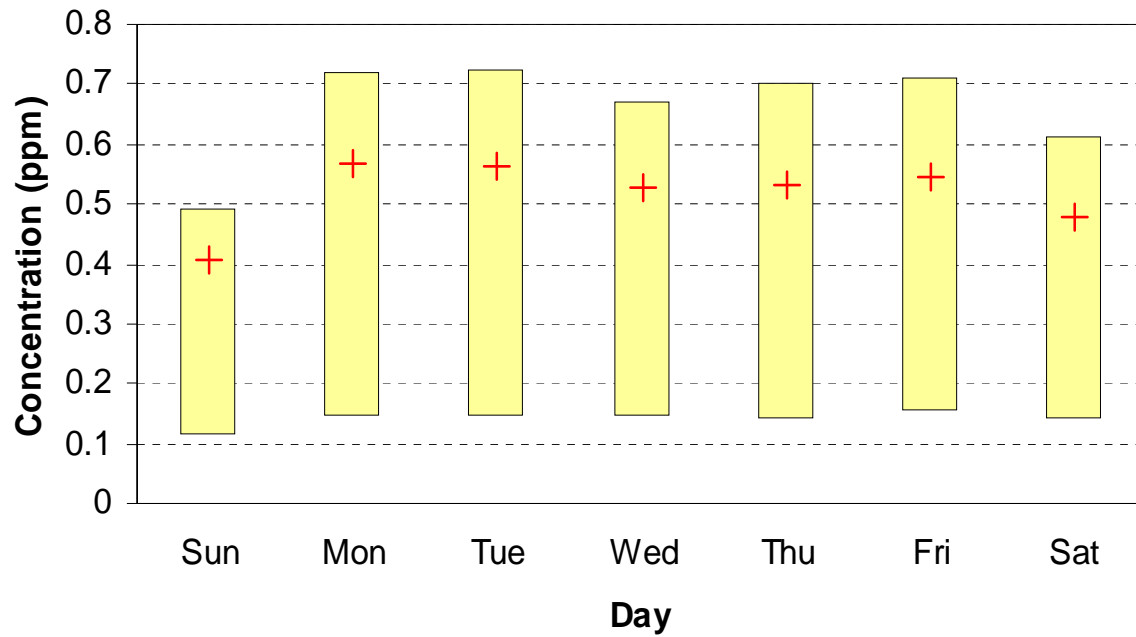




Variation of one hour averages of NO₂ concentrations with day at Colombo Meteorological Department monitoring station

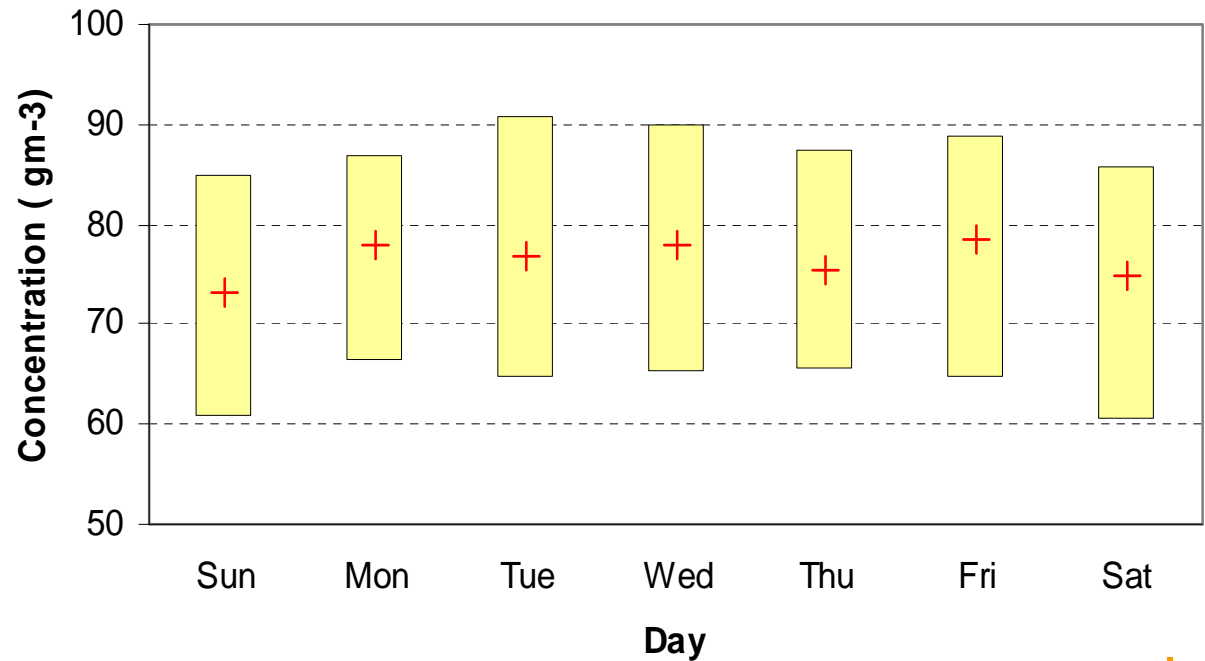
Variation of one hour averages of SO₂ concentrations with day at Colombo Meteorological Department monitoring station





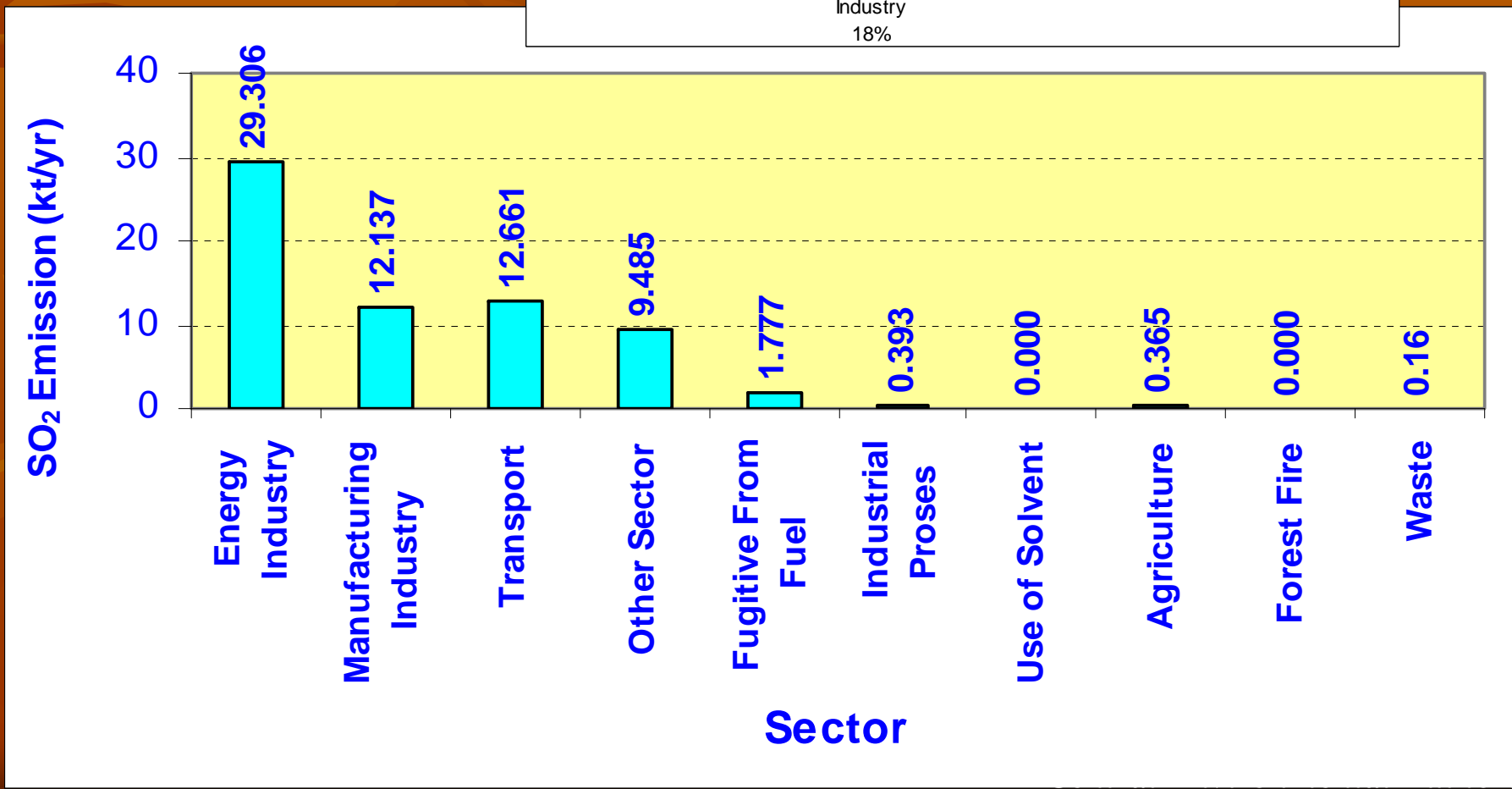
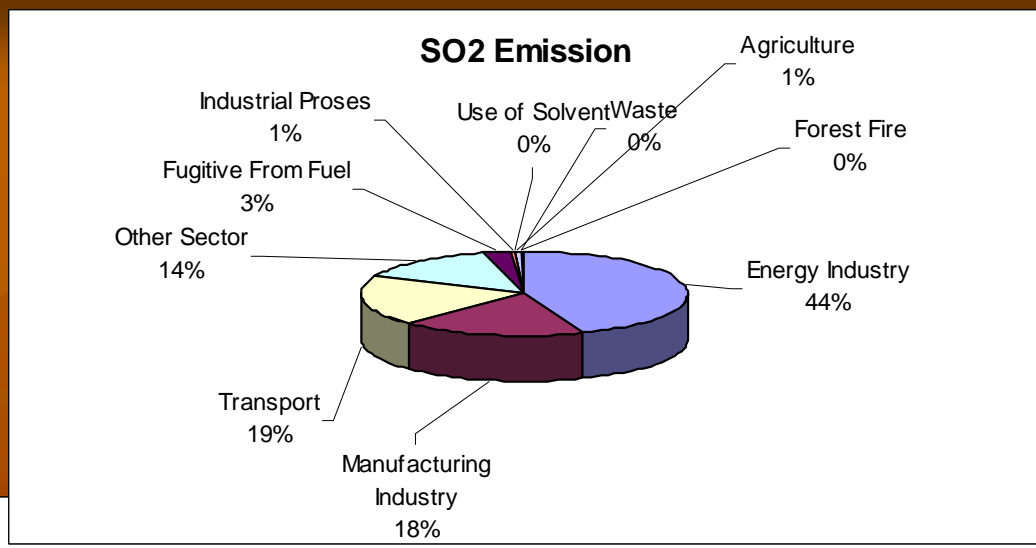
Variation of one hour averages of CO concentrations with day at Colombo Fort monitoring station

Variation of 24 hour averages of PM₁₀ concentrations with day at Colombo Fort monitoring station



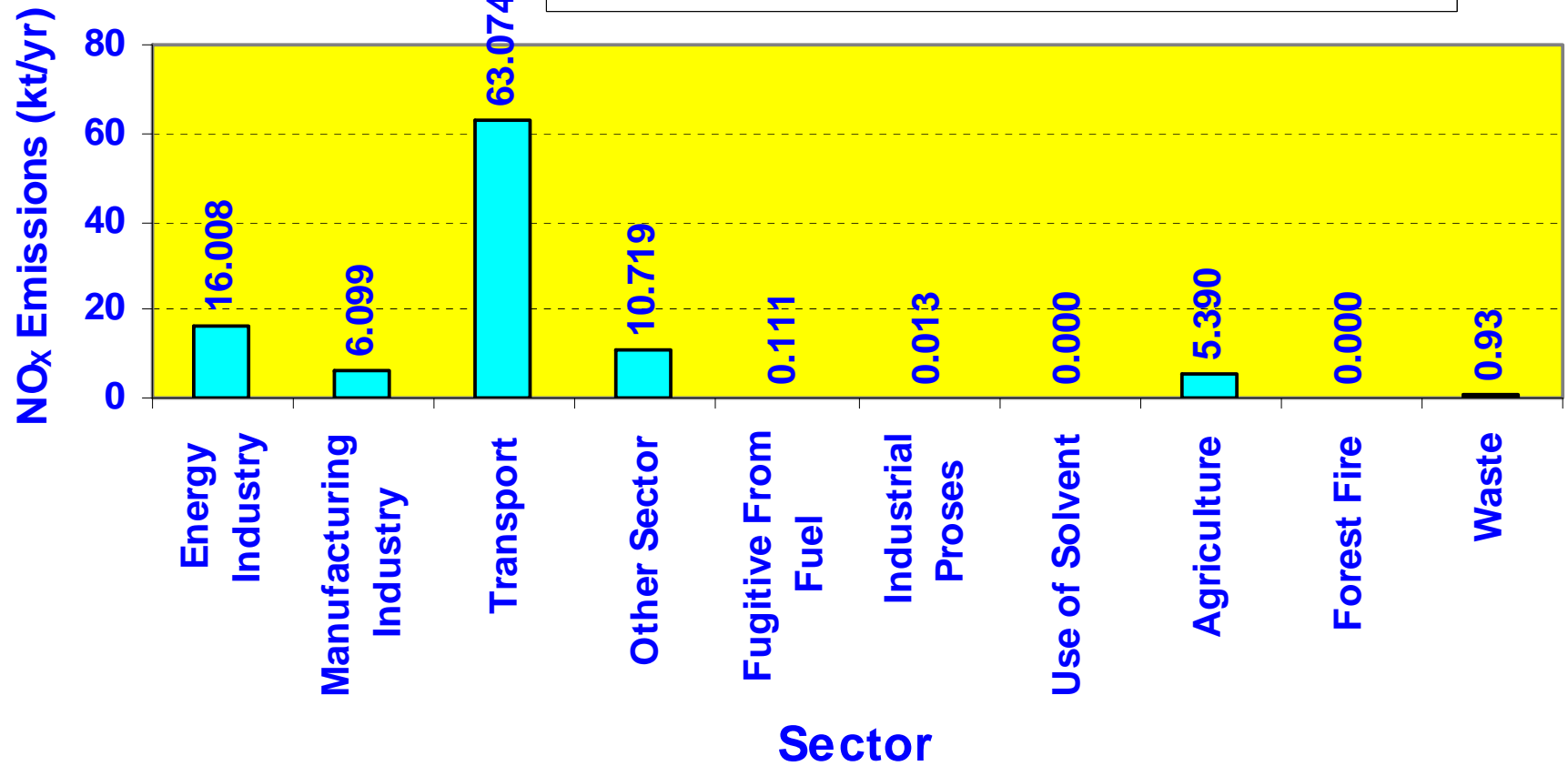
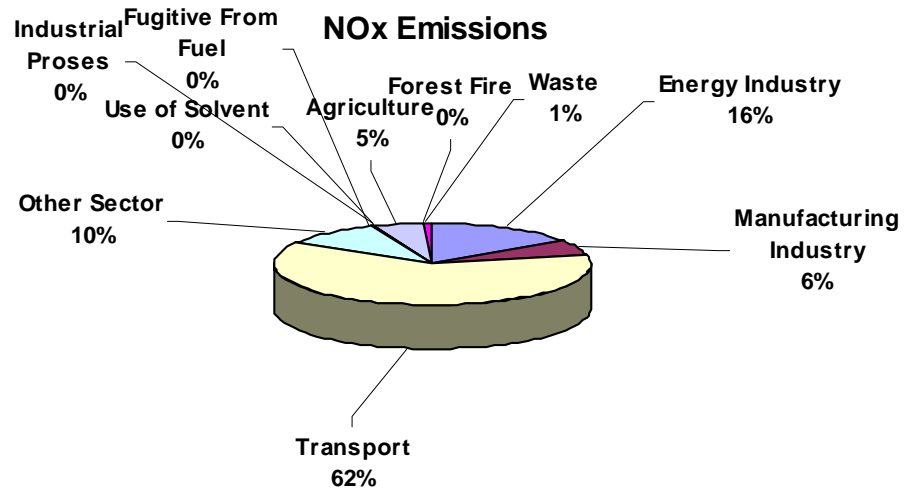


SO₂ Emission



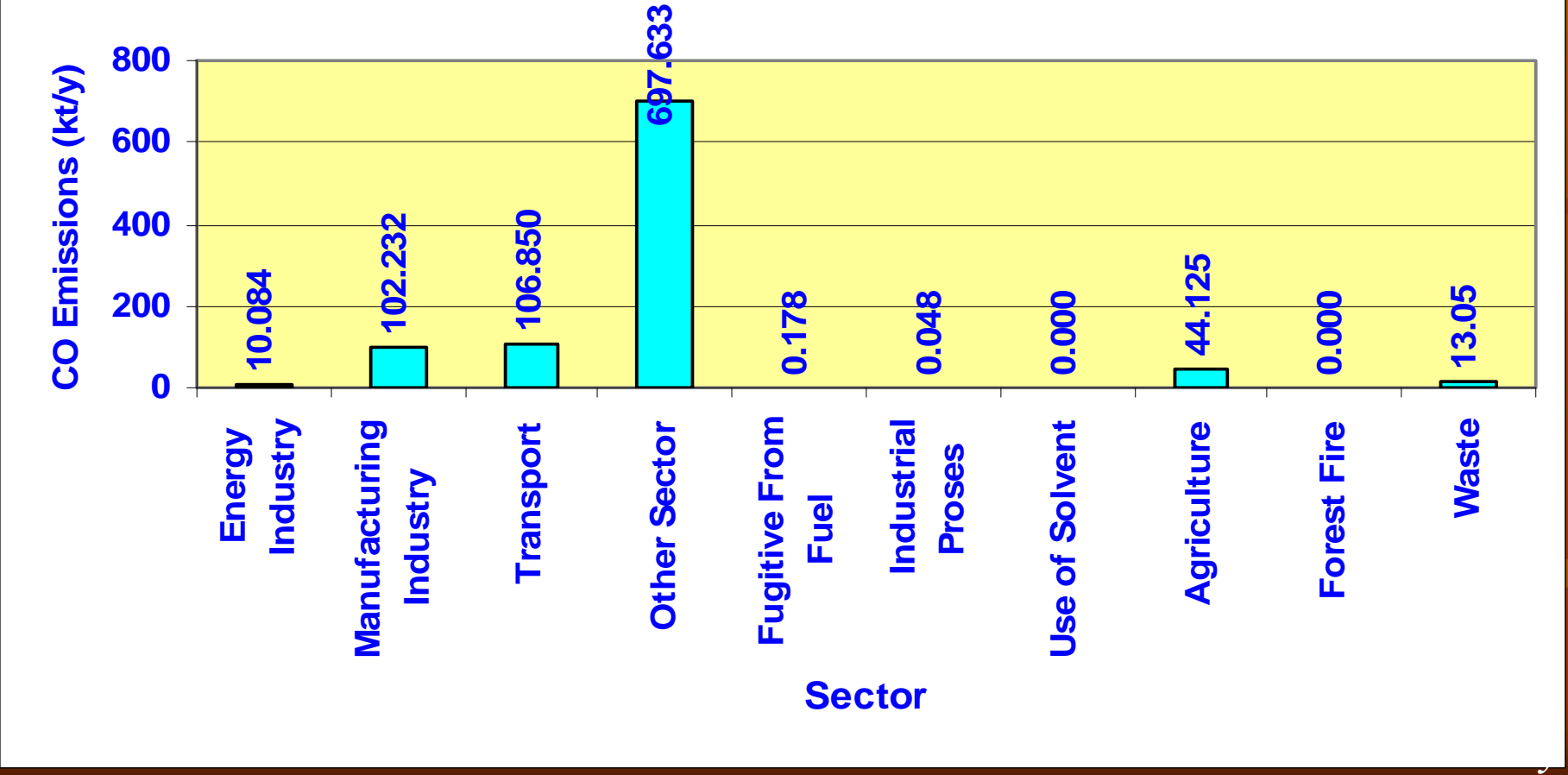
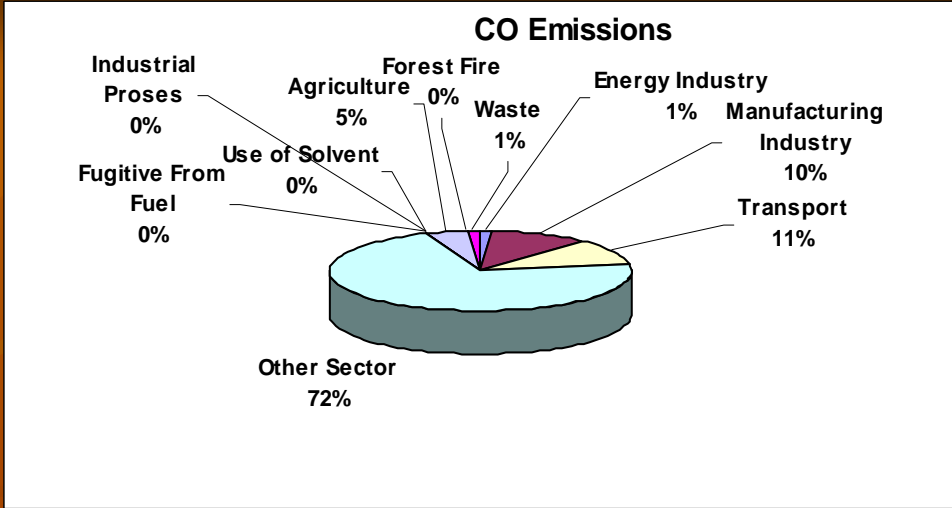


NO_x Emission

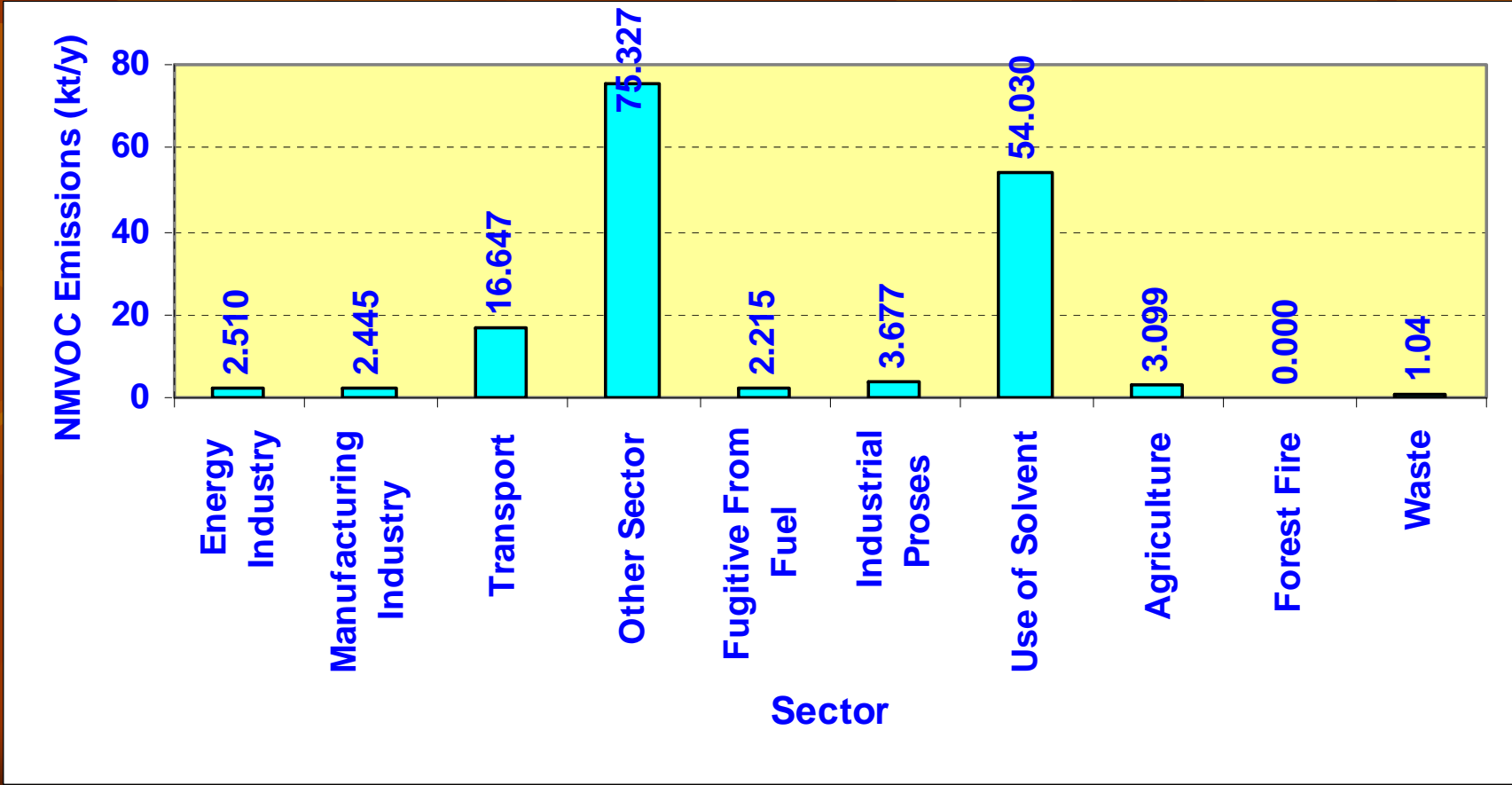
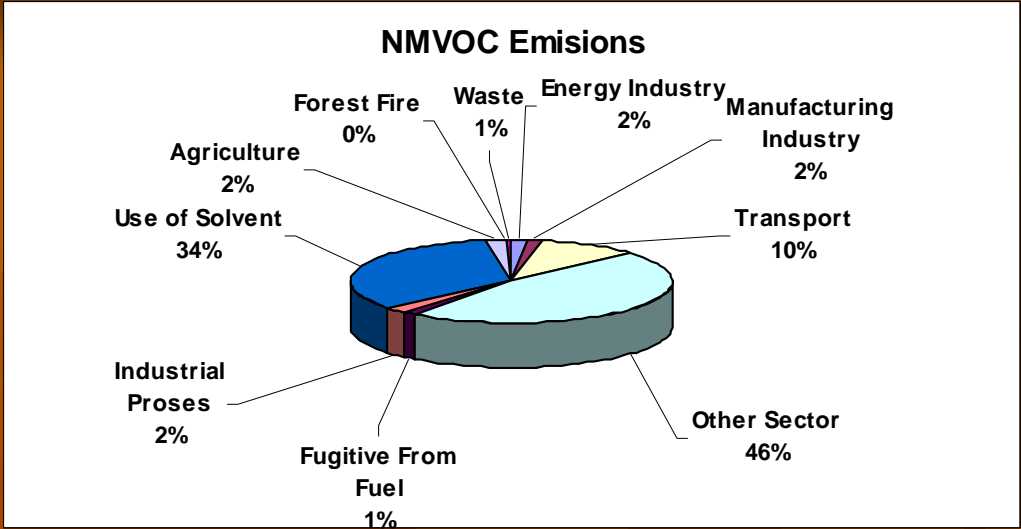




CO Emission

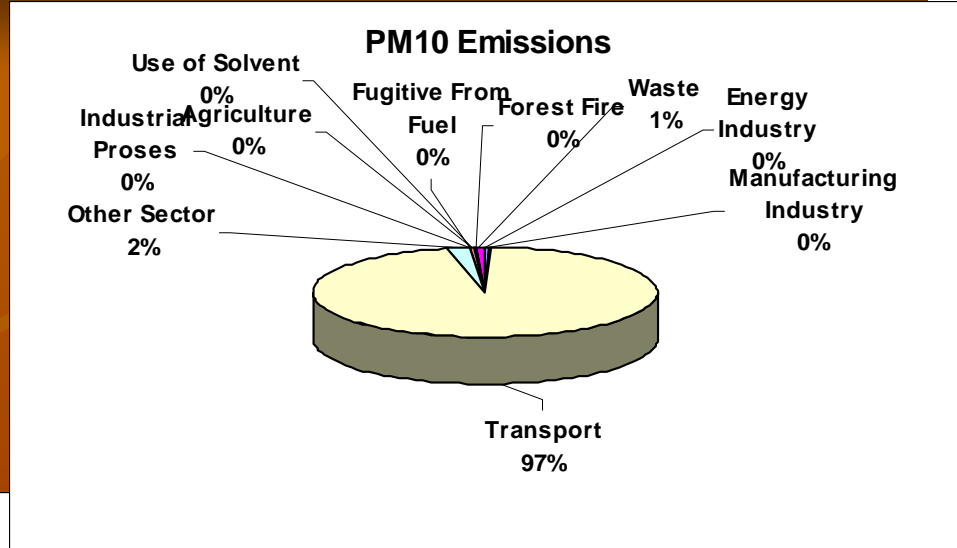


NMVOCEmission

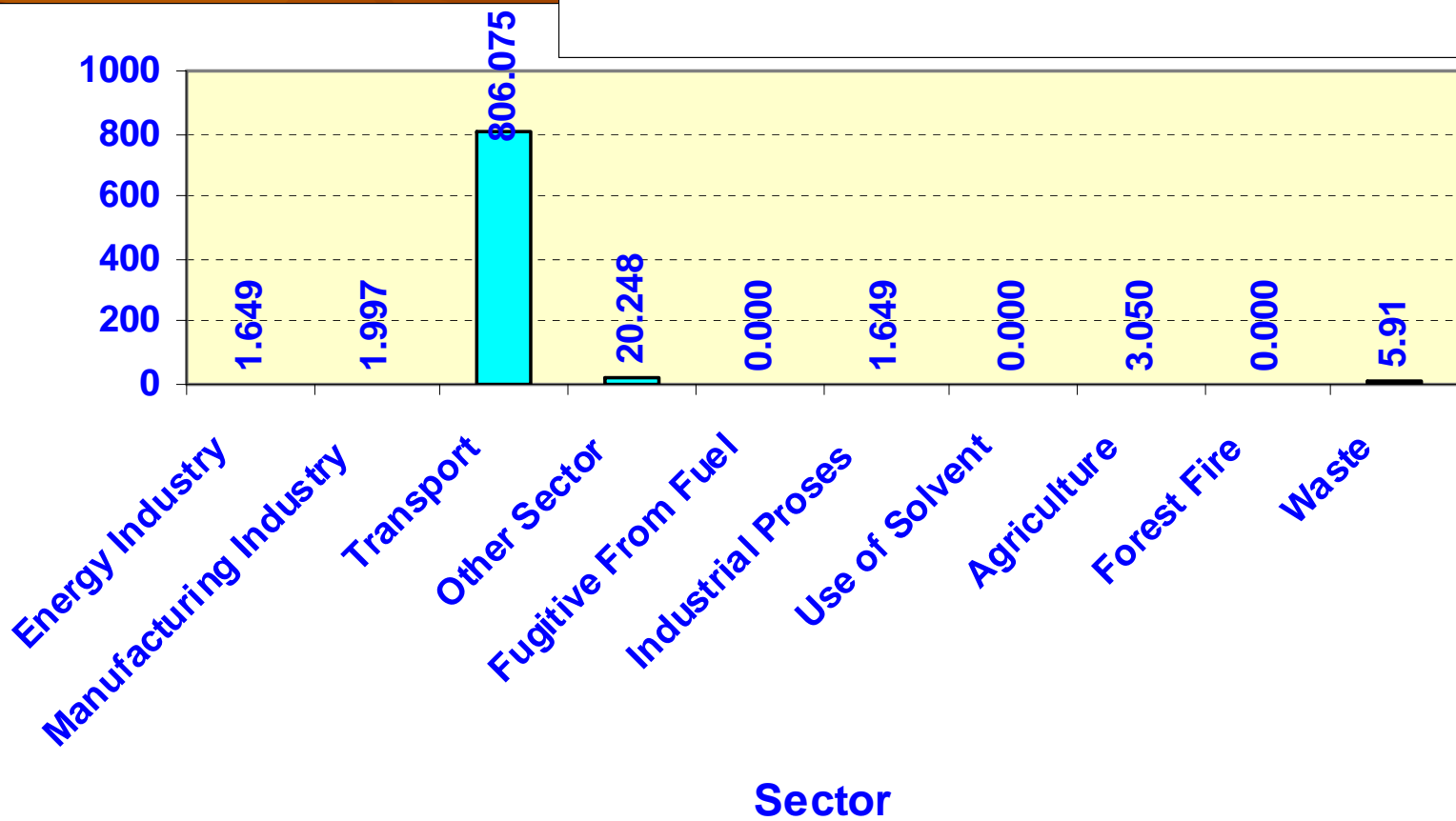




PM-10 Emission

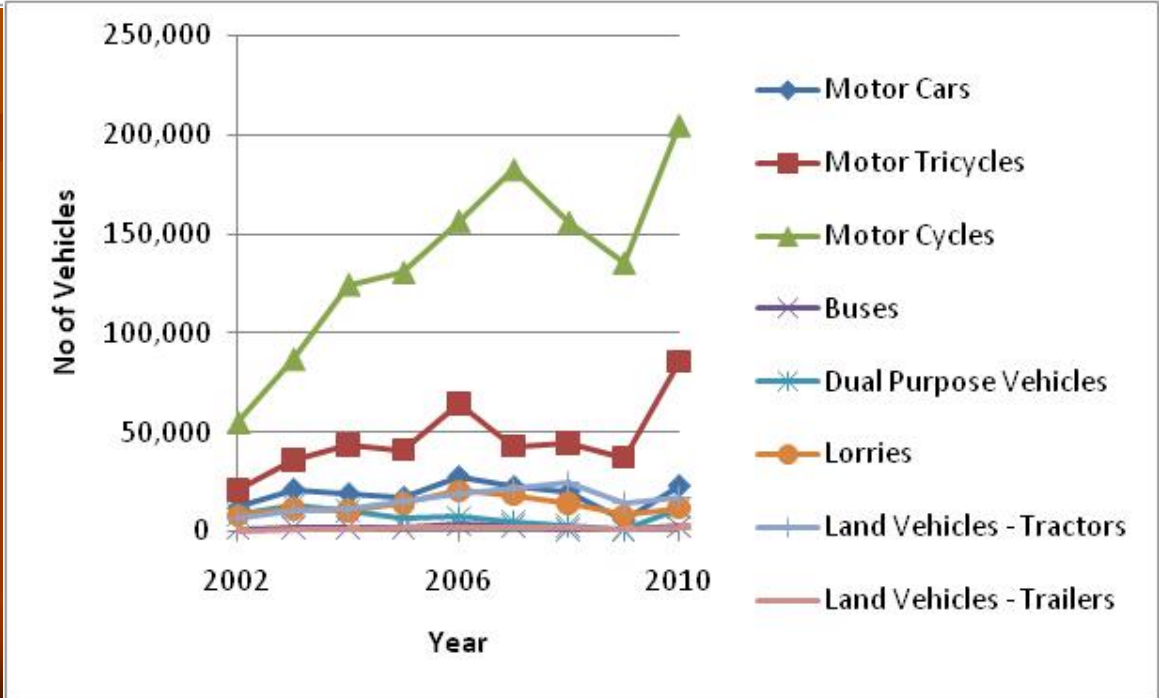
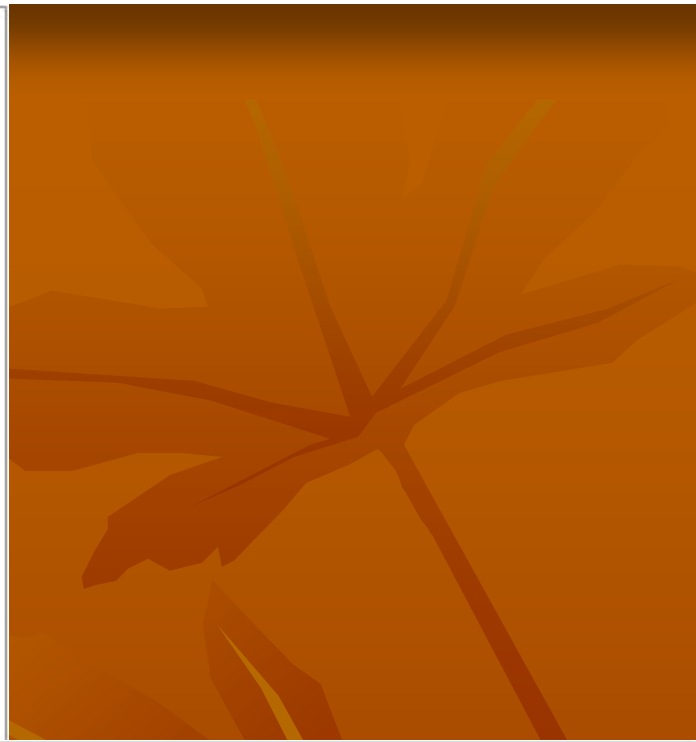
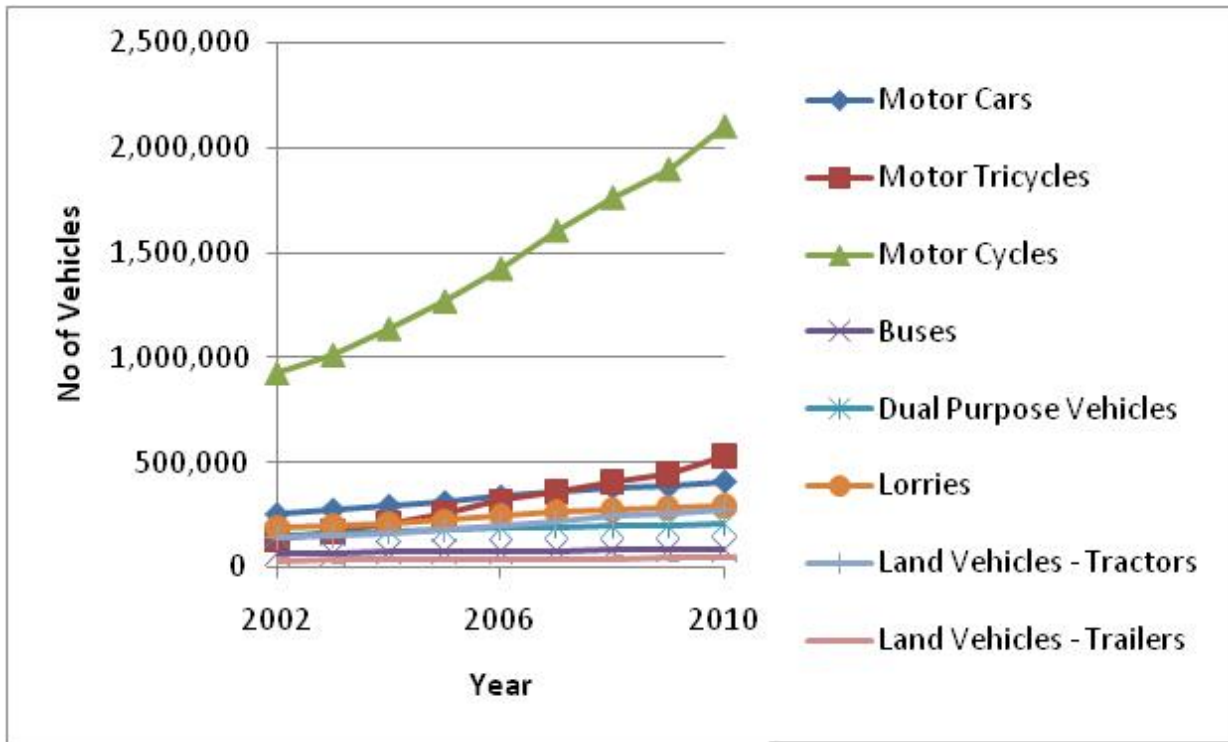


PM 10 Emissions (kt/y)



Issues

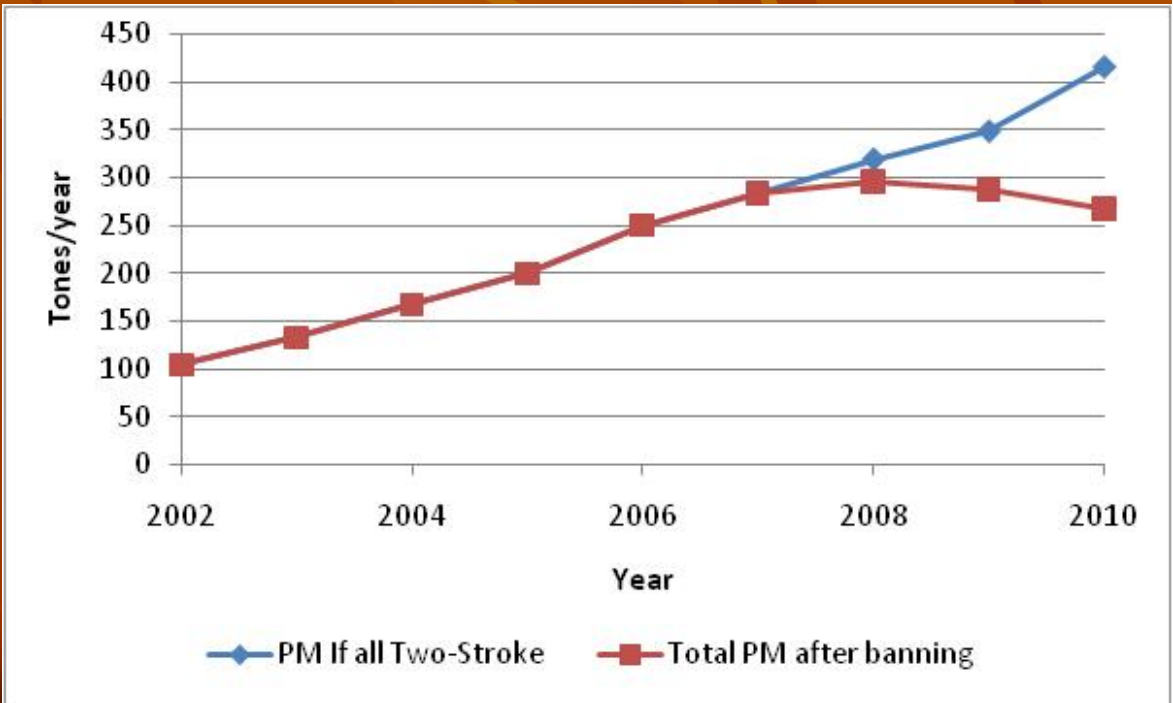
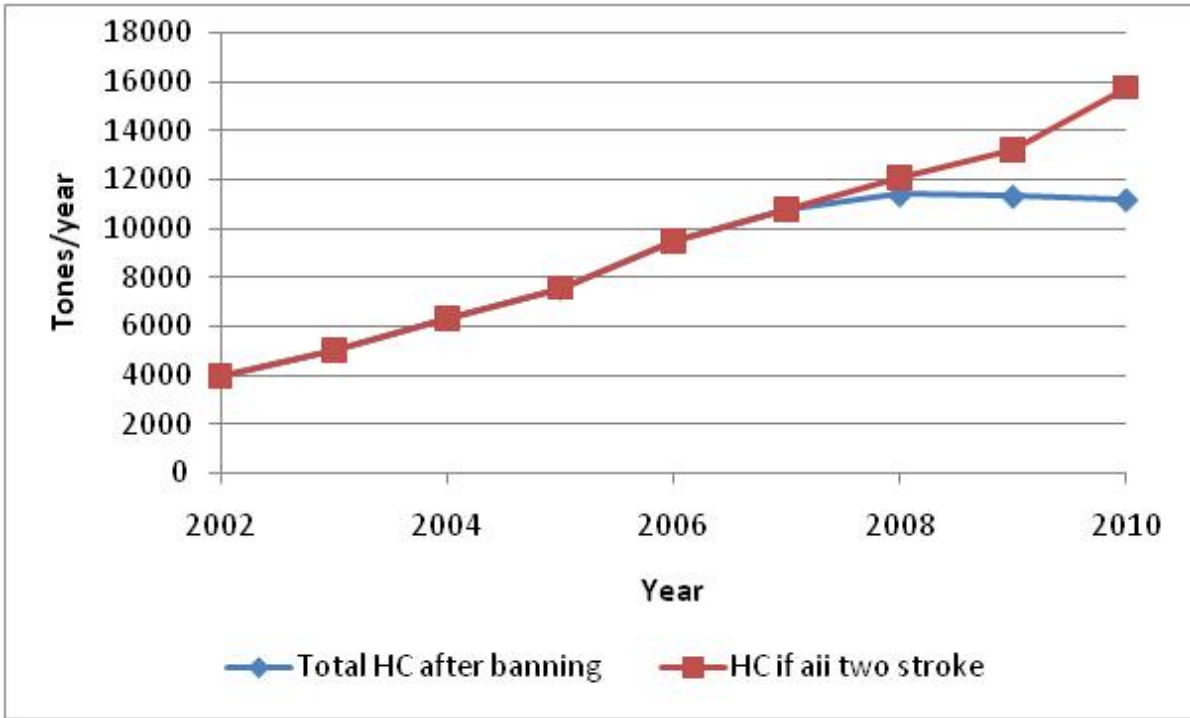
- **Vehicular Emissions are the major contributor to Urban Air Pollution**
 - Increasing Traffic volume
 - Increasing traffic congestion
 - **Poor Inspection and Maintenance of vehicle**
 - **Poor quality of roads**
- **are added burden**
- Non availability of comprehensive set of islandwide air quality monitoring Data



One Example

Due to three wheelers

- Current Situation
 - Estimated HC around 8900 MT/Y
 - Estimated PM around 259 MT/Y
- If not control rapid growth of Three Wheelers at year 2020
 - Estimated HC around 16000 MT/Y
 - Estimated PM around 3000 MT/Y



THANK YOU