



Transport induced Volatile Organic Compound concentration at seven junctions in the city of Colombo

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Background

Sources of VOC's

- VOC emitting trees and plants
- Emissions from road transportation
- Petrol stations (vehicle refueling)
- Offshore & onshore loading of crude oil
- Refineries
- Gas leakage
- Chemical Industry
- Industrial adhesives
- Decorative paint
- Aerosols (cosmetics and toiletries)
- Industrial coatings (metal & plastic)

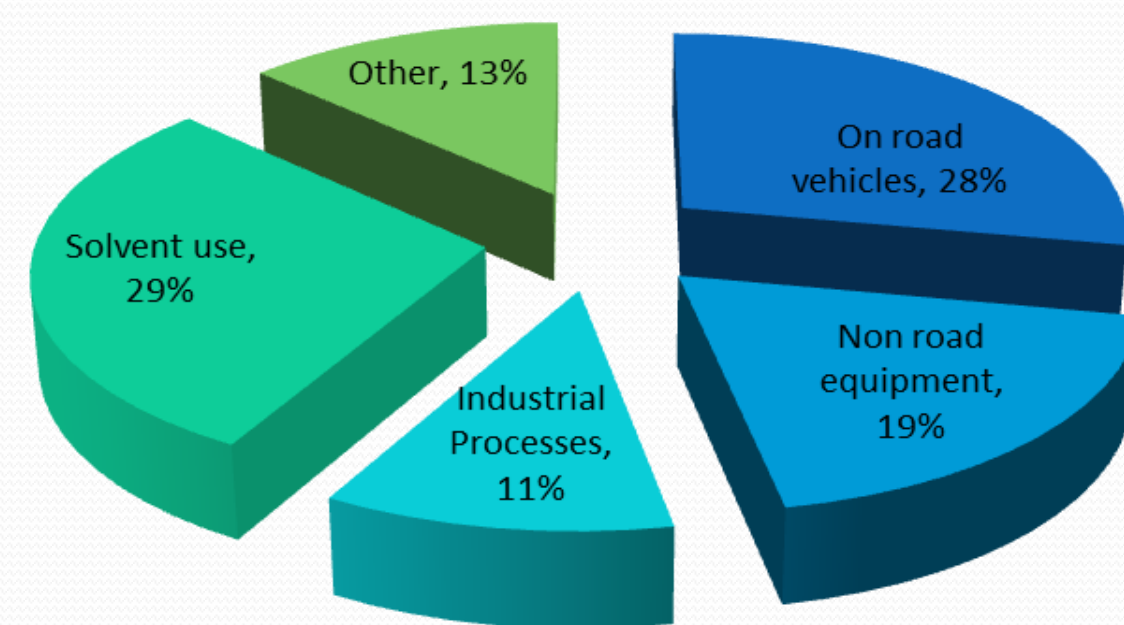


Figure: Sources of VOC's (USEPA,2005)

Adverse Health Effects of VOCs

- Eye, nose and throat irritation
- Headaches
- Loss of coordination
- Nausea
- Damage to liver, Kidney and central nervous system
- Causative agents of Cancer



Source: Respiratory tract diseases, WHO, 2013; Cancer risk associated with Children, WHO, 2013

Methodology

Air quality monitoring, data collection and analysis

Measurements at seven major traffic junctions - Dehiwala - Kollupitiya
- Fort - Narahenpita - Borella - Maradana - Grandpass

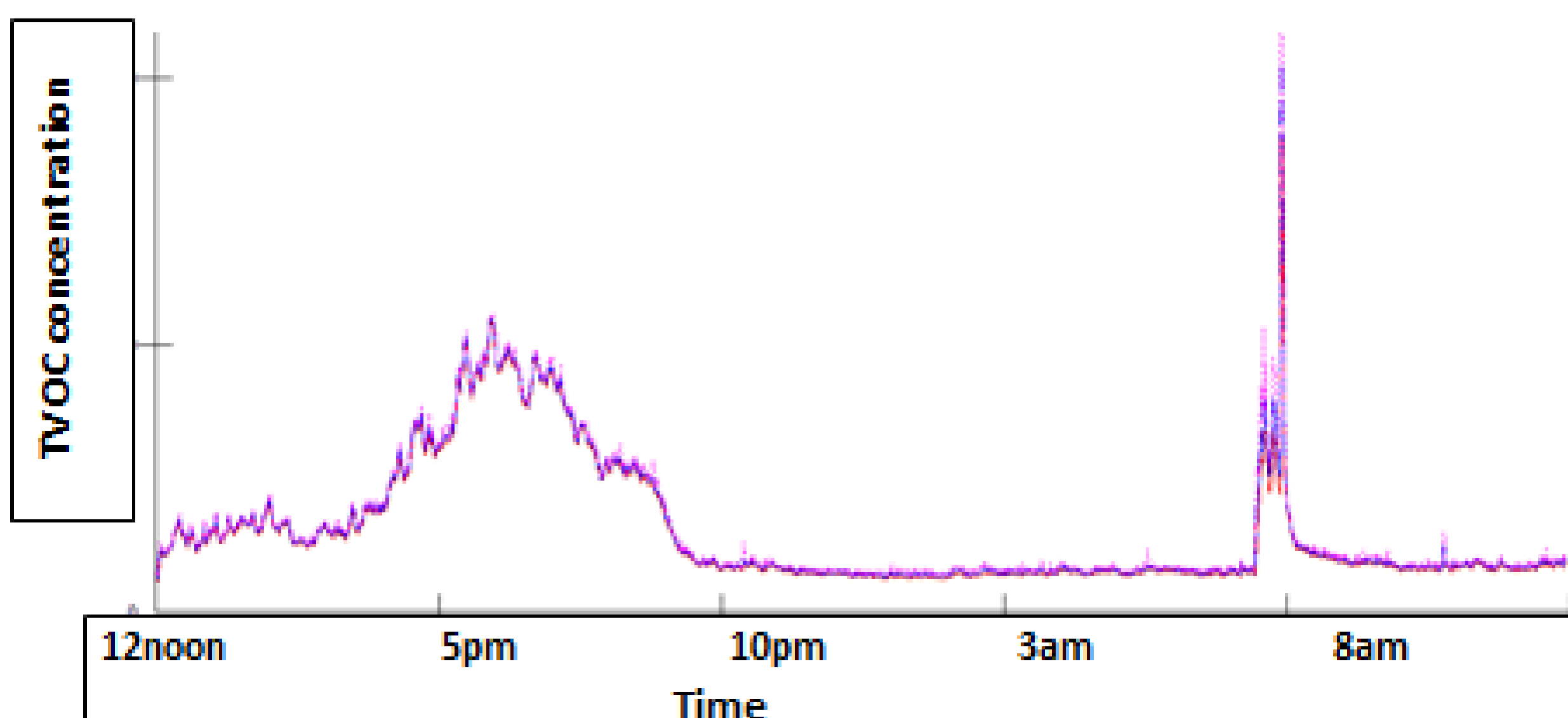
Hourly measurements - beside the road at the above traffic junctions during the medium traffic flow using the MiniRAE Lite TVOC monitor in May 2014.

On-road measurements - TVOC levels were measured on the road when the vehicle was moving in-between junctions.

24 hour outdoor or measurement - measured at the high residential area in Grandpass, 20 meters away from the arterial road.

Results

TVOC 24 hour distribution at the outdoor Grandpass site



Site	Mean \pm SD (ppb)	Median	Minimum	Maximum	Range	IQR
Grandpass	174.35 \pm 127.69	128	63	549	486	180

Results

TVOC Hourly measurements - high traffic junctions

Site	Mean \pm SD (ppb)	Median	Minimum	Maximum	Range	IQR
1. Dehiwala	103.62 \pm 33.54	99.00	59	260	201	25
2. Kollupitiya	266.89 \pm 440.064	72.50	27	1594	1567	105
3. Fort	57.41 \pm 11.94	56	43	102	59	16
4. Maradana	240.20 \pm 177.44	194.50	75	1050	975	177
5. Borella	196.15 \pm 68.12	190	107	601	494	60
6. Narahenpita	104.76 \pm 34.16	91.5	65	191	126	44
7. Grandpass	207.6 \pm 57.17	226.5	108	280	172	107



On road measurements of TVOC levels in Colombo

Site	Mean \pm SD (ppb)	Median	Min.	Max.	Range	IQR
Dehiwala to Kollupitiya (1)	181.71 \pm 12.89	183	153	200	47	17
Kollupitiya to Fort (2)	189.40 \pm 38.19	189	129	311	182	38
Fort to Maradana (3)	202.27 \pm 55.29	195	128	353	225	40
Maradana to Borella (4)	289.69 \pm 75.71	321.5	110	369	259	94
Borella to Narahenpita (5)	215.71 \pm 8.73	216	200	227	27	11
Narahenpita to Grandpass (6)	560.14 \pm 276.68	536	239	1059	820	391



Conclusion

- TVOC concentration is dependent on vehicle density on road with high to low traffic congestions, fuel type of the motor vehicles, metrological parameters and sea breeze.
- Also it has a similar pattern with the other pollutants for 24hour measurement that relate to traffic density.

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