Ultrafine Particles Concentrations at Different Microenvironments during MILAGRO-MCMA2006

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Introduction

- Microenviromental concentrations of PM2.5, PM1, PM0.5, PM0.25 and PM<0.25 fractions were studied during the MILAGRO-MACM2006 campaign
- To observe their patterns in the different sites.

Methods

- Ultrafine samples were collected:
  - at outdoors and indoors
  - at homes, schools and fixed sites
  - In the three selected sites
  - the sampling period was of 24 hr.
- The Sioutas cascade sampler with 25 and 37 mm Teflon filters and
- The SKC-Leland pump (9 L/m flow rate) were used.
- Per each sampler four 25 mm and one 37 mm Teflon filters were used.
- The filters were analyzed by a gravimetric protocol (CENICA, 2003).

Results.

- **PM 2.5**

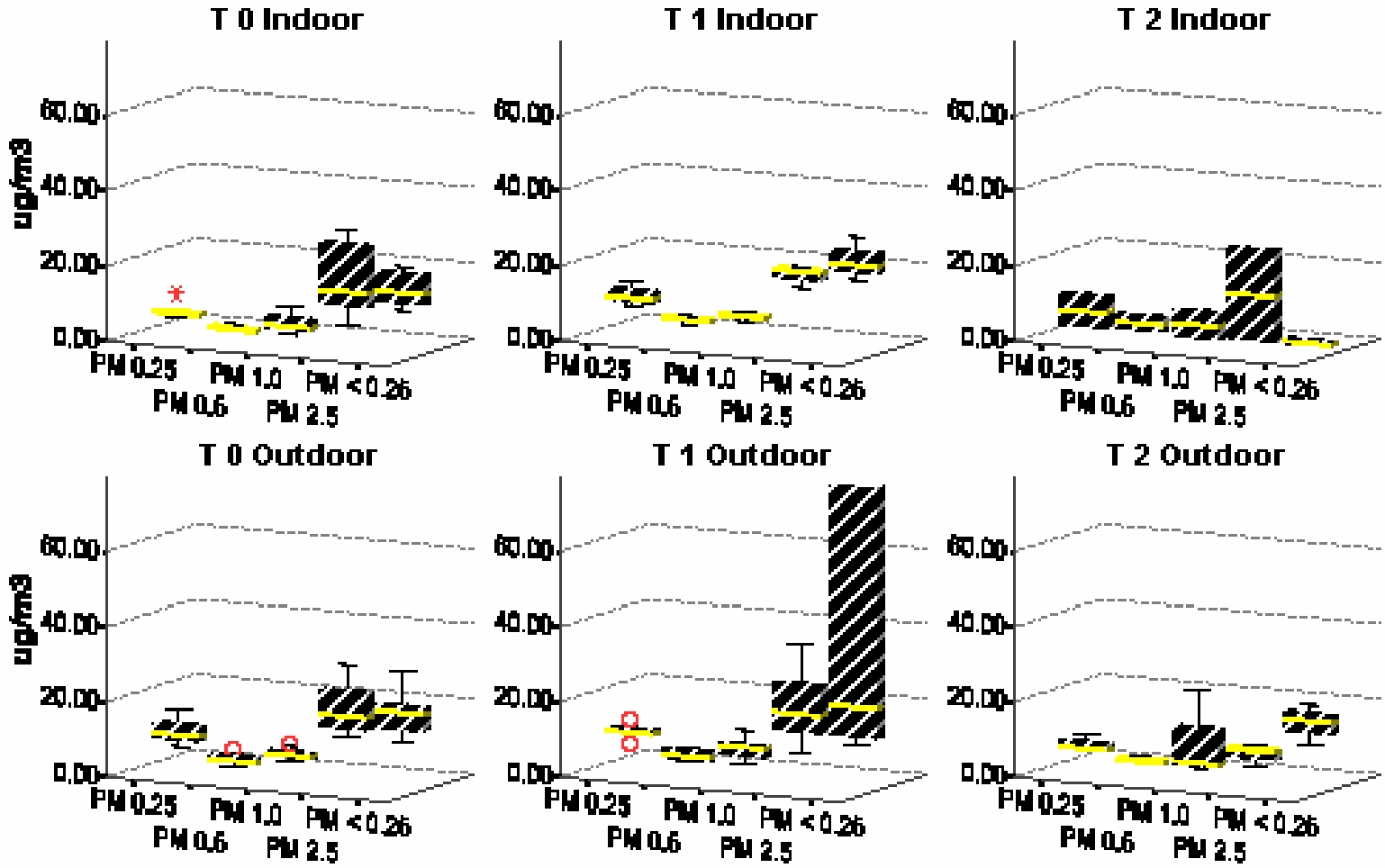
  -Outdoor PM2.5 particles were higher at T0 and T1 than T2 (**19, 20 and 7 ug/m3**, respectively)

  - Indoor concentrations were similar at the three sites (14, 18, 17 ug/m3).

- **PM1**

  The PM1 concentrations were higher at outdoors than indoors in all sites, T2 presented the highest concentration (9.48 vs. 4.3 ug/m3).

Ultrafine particles concentrations by site and fraction



Results.

PM 0.5

- PM0.5 concentrations were almost the same at outdoors and indoors,

The highest concentration was observed at T1 (4.31 vs. 4.06 ug/m3).

PM 0.25

PM0.25 outdoor concentrations were 3 times greater than the indoor ones at T0 and T1 (9.5 vs. 3.2 ug/m3).

Results.

PM < 0.25

Outdoor PM<0.25 was the most abundant fraction in all the sites with the highest concentrations at T1 (50.67 vs. 23.74 ug/m3).

Endotoxins

- At indoors the higher concentrations were observed at T2 in the PM<0.25 and PM 0.5 fractions.

- At outdoors the higher concentrations were observed at T2 and T1 PM<0.25 and PM 0.25 fractions.

Endotoxins by fraction

Endotoxins (U/mg) in ultrafine particles, by site and fraction

Sitio		Indoor			Outdoor		
		N	Mean	SD	N	Mean	SD
Iztapalapa-D.F. (T0)	PM< 0.25	6	1.07	2.62	11	6.23	10.18
	PM 0.25	6	22.81	43.07	11	.76	2.51
	PM 0.5	6	17.36	42.53	11	1.78	5.89
	PM 1	6	1.77	4.32	11	1.62	5.38
	PM 2.5	6	3.02	7.40	11	.00	.00
Tecamac-Edo. Mex. (T1)	PM< 0.25	3	3.37	2.99	6	3.83	4.00
	PM 0.25	3	.00	.00	6	.00	.00
	PM 0.5	3	.00	.00	6	28.94	70.88
	PM 1	3	.00	.00	6	3.86	5.98
	PM 2.5	3	.00	.00	6	.00	.00
San Pedro-Zapotlan-Edo. Hgo. (T2)	PM< 0.25	2	511.70	258.45	3	20.51	23.90
	PM 0.25	2	.00	.00	3	5.71	9.89
	PM 0.5	2	173.61	245.52	3	.00	.00
	PM 1	2	.00	.00	3	.00	.00
	PM 2.5	2	.00	.00	3	10.96	18.99

Results

- In a comparison between the total mass collected by the Sioutas sampler and the mass sampled with the SKC single stage PM2.5 sampler
- It was observed a reasonable agreement in T0 and T2, but the difference between them was important at T1.

Comparison between Sioutas Cascade Impactor and SKC PM2.5 Single stage impactor

Place: Total

Sitio		N	Mean	SD
Iztapalapa-D.F. (T0)	SKC-Indoor	34	41.65	20.77
	Sioutas Indoor	6	44.75	15.66
	SKC Outdoor	38	42.00	21.75
	Sioutas Outdoor	11	57.54	15.91
Tecamac-Edo. Mex. (T1)	SKC-Indoor	12	36.00	21.84
	Sioutas Indoor	3	61.90	13.57
	SKC Outdoor	17	31.07	11.99
	Sioutas Outdoor	6	91.93	59.45
San Pedro-Zapotlan-Edo. Hgo. (T2)	SKC-Indoor	13	34.84	16.36
	Sioutas Indoor	2	28.64	32.89
	SKC Outdoor	14	24.10	5.75
	Sioutas Outdoor	3	42.36	6.18
Total	SKC-Indoor	65	37.02	20.45
	Sioutas Indoor	11	46.50	20.11
	SKC Outdoor	77	32.86	19.64
	Sioutas Outdoor	20	65.58	37.54

Conclusions

- The observed ultrafine particles concentrations, mostly the smaller fractions, were higher in the three studied sites
- They showed a different pattern probably related with specific local sources in each of the sites.
- These levels of ultrafine particles present in the MCMA may be associated with some health problems, such as the observed oxidative stress in the studied populations.