



## Some aspects of inorganic fine (PM1, PM2.5) at T1 during MILAGRO study

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*2nd MILAGRO Science Meeting  
Secretaría Relaciones Exteriores, Mexico City  
May 16, 2007*

# Outline

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## 1. Objectives

## 2. Overview measurement

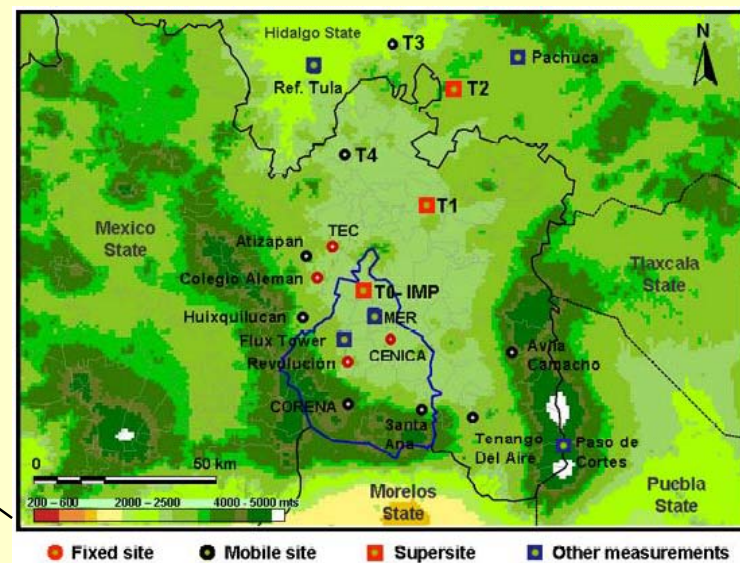
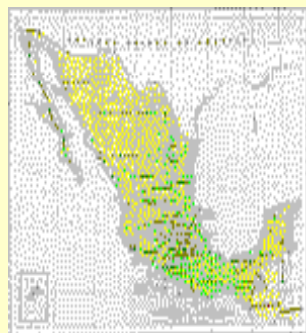
a. sampling systems, b. Data validation

## 3. Summary of Key findings

# Objectives

The sampling of PM (fine) at T1 (MIRAGE site) intends:

- Chemical characterize fine PM
- Evaluate/validate the quality of filter-based measurements in regions with alkaline soil
- Provide data for supporting aerosol modeling downwind the plume of MC



# Measurement overview

- Gravimetric PM

- (3 systems at GIT-trailer)



Partisol Sampler  
City Government-GDF  
Sampling-UNAM  
-PM2.5



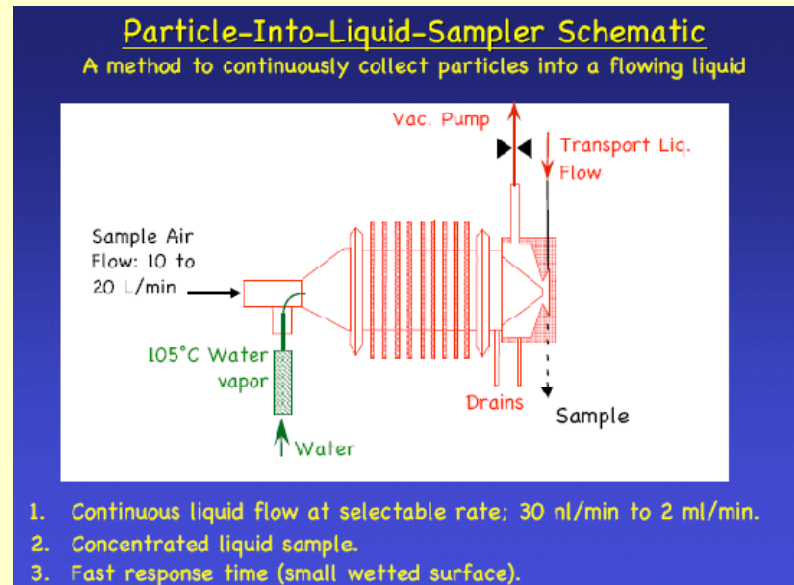
URG cyclone samplers  
PM1, PM2.5



TEOM-GIT  
PM2.5

# Measurement overview

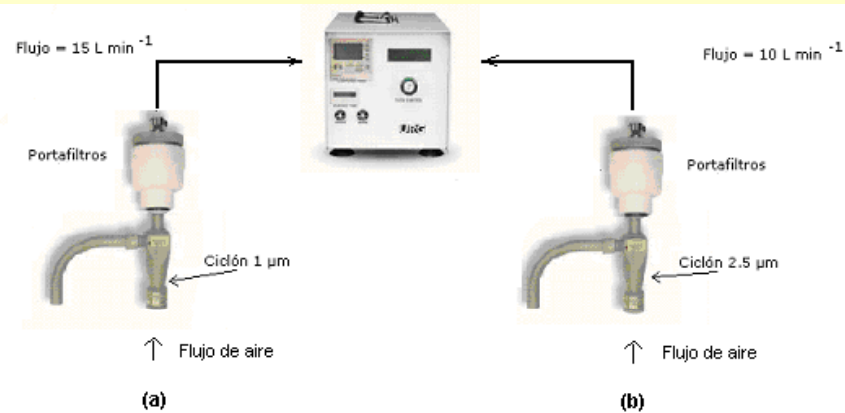
- Speciation PM fine
  - Inorganics
  - Organics



**PILS-GIT**  
**PM2.5**

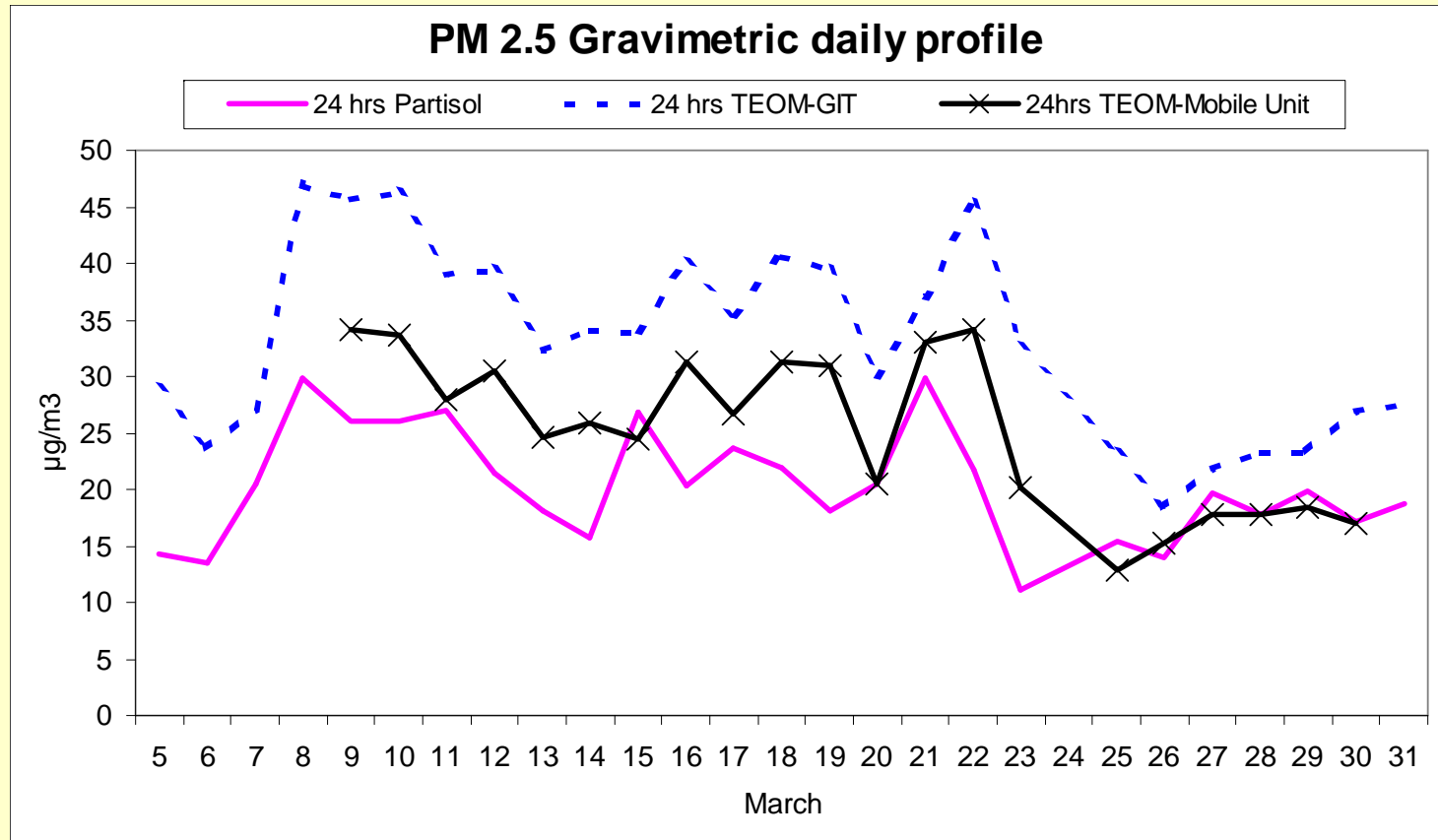


By IC analysis



**URG systems**  
**-UNAM**  
**PM1, 2.5**

# Measurement overview

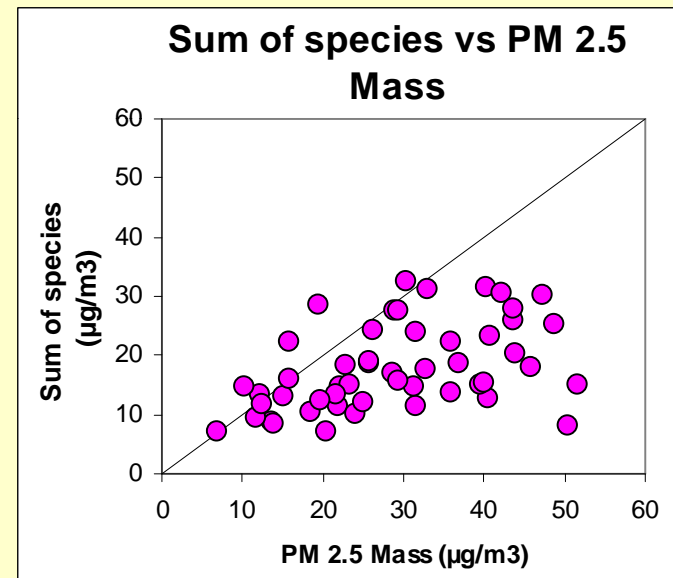
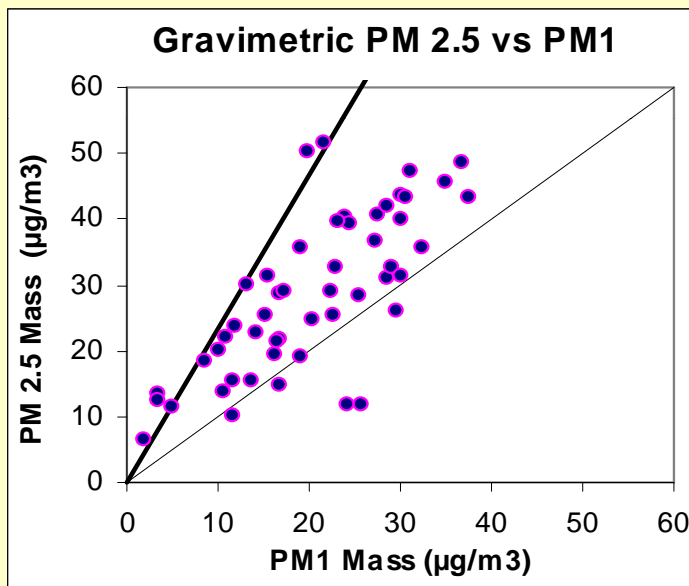


PM<sub>2.5</sub> average mass (March 8-23th): TEOM (GIT): ~38 µg m<sup>-3</sup>,  
TEOM (Gov): 28 µg m<sup>-3</sup> (30% less); PARTISOL: 22 µg m<sup>-3</sup>

# Measurement overview

- **DATA VALIDATION**

- **Physical and chemistry consistency tests (PM1, PM2.5)**



**Gravimetric & Sum of species vs TEOM & other gravimetric sys.**

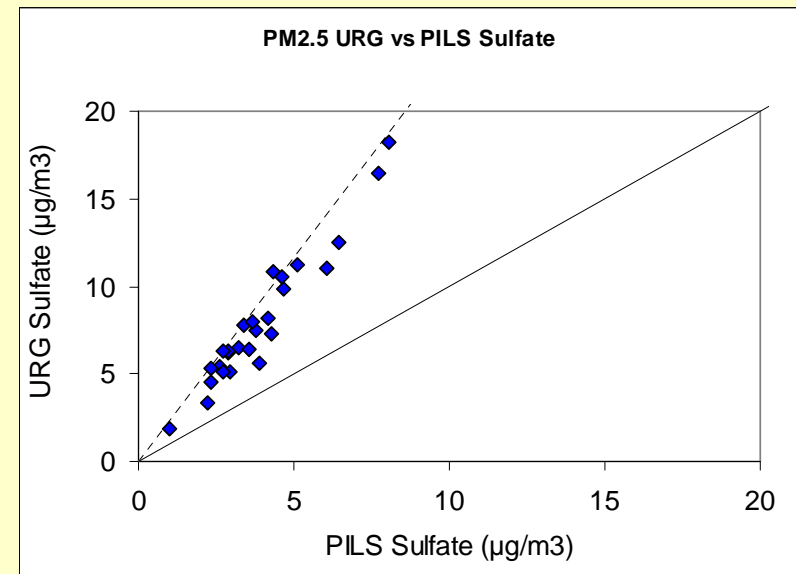
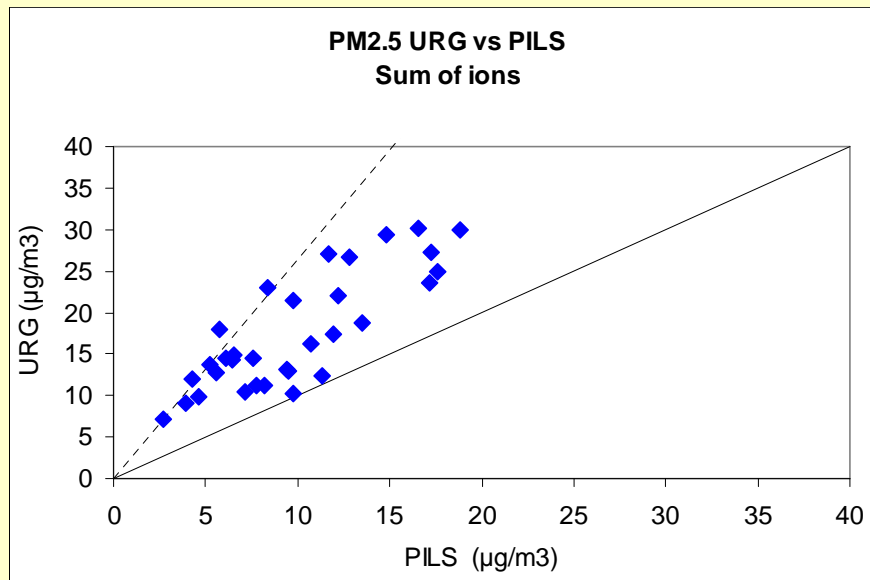
**Results:**

**84% PM2.5, 82% PM1 data are consistent**

# Measurement overview

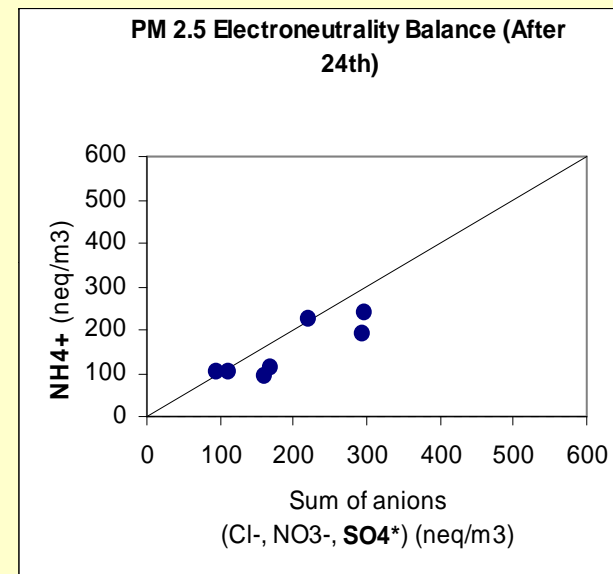
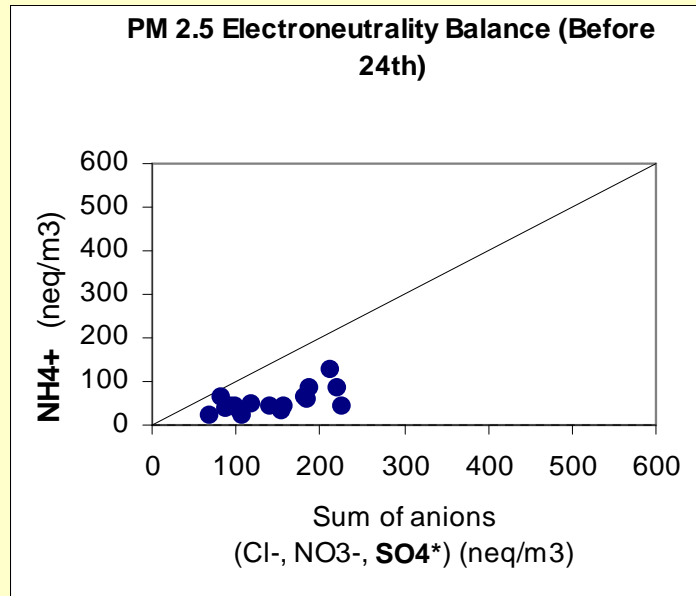
- **DATA VALIDATION (level III, intercomparison, vs PILS-Weber)**

- a) The sum of species =  $1.6(\text{OC}) + \text{EC} + \text{sum (ions)}$  vs TEOM
- b) Equivalent ratios (for dusty & no dusty period)



**Consistent  $\text{SO}_4^{2-}$  artifact on filter-based measurements ---interaction  $\text{SO}_2(\text{g})/\text{basic}$  particles**

# Measurement overview



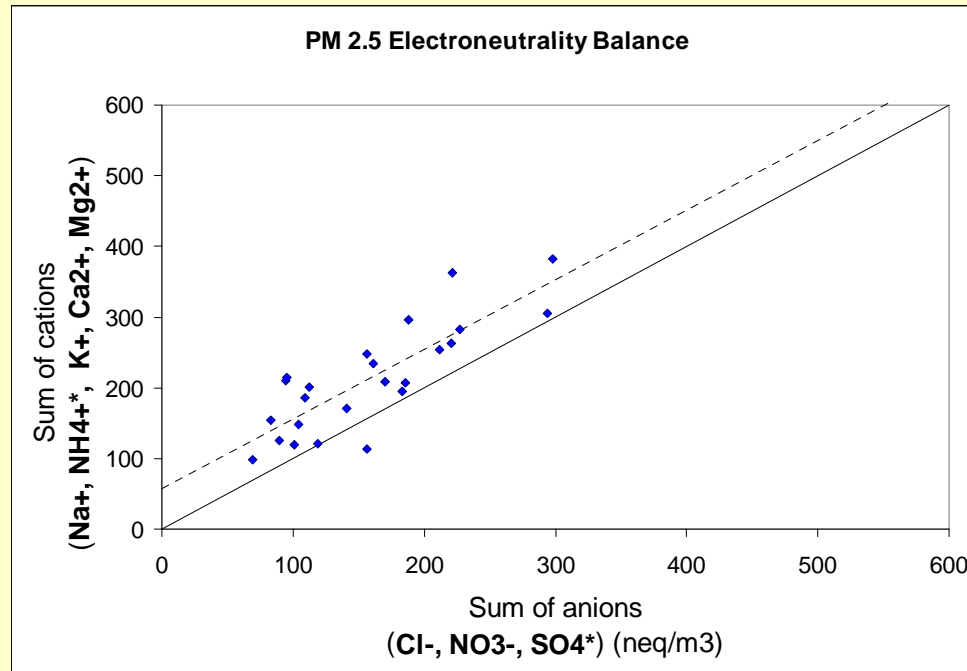
- Before 24th March:

Equiv. Ratio  $\text{NH}_4 / (\text{SO}_4 + \text{NO}_3 + \text{Cl}) \sim 0.39$ ----dusty period

- After 24th March

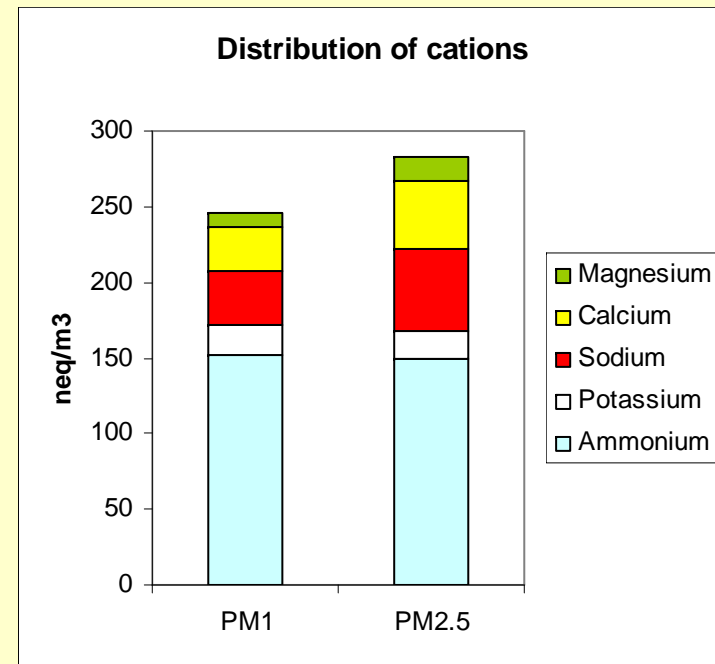
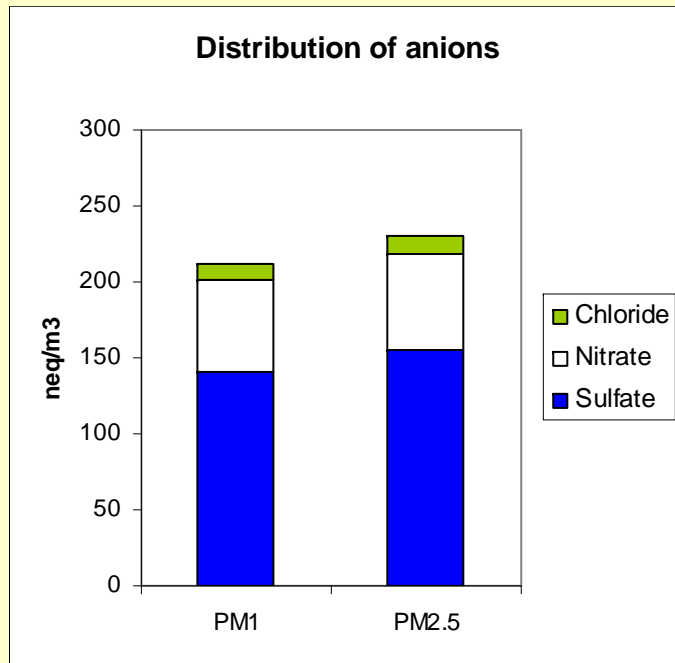
Equiv. Ratio  $\text{NH}_4 / (\text{SO}_4 + \text{NO}_3 + \text{Cl}) \sim 0.9-1.0$ ---- No dusty period

# Measurement overview



- Before 24th March:  
Equiv. Ratio ( $\text{NH}_4^+$   $\text{Na}^+$  + Crustals) / ( $\text{SO}_4 + \text{NO}_3 + \text{Cl}$ )  $\sim 0.85$

# Measurement overview



- PM2.5- sulfate ~ PM1 sulfate
- Na & crustals (Ca, Mg) are important in the PM2.5-1 fraction

# Measurement overview

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- Levels of concentration of ions at T1 are in intermediate level (100-300  $\mu\text{eq m}^3$ ) vs (500-1000  $\mu\text{eq m}^3$ , downtown)
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- K/Na weight mass:
- PM1 : ~ 1
- PM2.5 : ~0.7

VS

K/Na (downtown MC) : 5-6  
High anthropogenic influence  
(Moya et al., 2007)

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## Levels PM<sub>2.5</sub> average mass:

T1

~40  $\mu\text{g m}^{-3}$  (TEOM-GIT)

~30  $\mu\text{g m}^{-3}$  (TEOM-Mobile Unit)

Downtown MC

- ~30  $\mu\text{g m}^{-3}$  (TEOM-RAMA)

## Summary of Key Findings (1/2)

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- Intercomparison of Gravimetric systems at T1 shows that an important fraction of PM is volatilized and needed to be accounted for 24-h  $PM_{2.5}$  mass averages
  - $Na^+$  & crustals ( $Ca^{2+}$ ,  $Mg^{2+}$ ) are important species in  $PM_{2.5}$ . They are concentrated on the  $PM_{2.5-1}$  size fraction
  - Electroneutrality balances are achieved when presence of dust is not dominant (during MILAGRO, T1, after 24th March)
  - There is a potential interference with alkaline soil measuring  $SO_4$  on filter-based measurement (regular basis)
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- $PM_{2.5}$  sulfate is  $\sim PM_1$  sulfate (combustion processes)
  - K/Na weight mass ratios, levels of  $[PM_{2.5}]$  are indicative of some degree of anthropogenic influence at T1 but not be conclusive where the anthropogenic influence comes from.

# Works related

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- PILS and Filter-based PM data were used for aerosol modeling at T1 -----Fountoukis et al. (*ACPD, in submission May 2007 & POSTER at this meeting*)
- PM fine (inorganic component) ---Matias et al. (*in submission May 2007 & POSTER at this meeting*)
- Work in progress on other components of PM fine (Metals, PAH's) ---Ramirez et al., POSTER at this meeting

Aknowledgments:  
NSF, NOAA, PAPIIT-UNAM, CONACyT-Mexico