

Physical Properties and Chemical Composition of Aerosols sampled in T1 site during MILAGRO Campaign.

Castro T. (1) , Mamani-Paco R. (1), Saavedra Ma. I. (1) , García J. (1), Amador, O.(1), Carabali G.(1), Salcido A.(2), Herrera E.(3), Báez A. (1)

(1) Grupo Aerosoles Atmosféricos, Centro de Ciencias de la Atmósfera, UNAM, México. (2) Gerencia de Sistemas de Calidad, Ambiente y Seguridad, Instituto de Investigaciones Eléctricas, Morelos, México. (3) Centro de Investigación en Materiales Avanzados. Chihuahua. México (telma@servidor.unam.mx / salcido@iie.org.mx)

Results from pollutant measurements and meteorological variables corresponding to the month of March of 2006 during the MILAGRO campaign at site T1 are presented (Tecamac, State of Mexico). Three 8-stage cascade impactors (MOUDI) were employed to obtain aerosol samples of different sizes. For organic species analysis, samples were collected with a PM_{2.5} High Volume sampler. Mass and chemical composition (inorganic and organic species) were obtained with the use of analytical techniques. Particle morphology analysis was done with a TEM-EDAX System. Physical properties of aerosols were measured with a PSAP, a nephelometer and a CPC.

According with area meteorology, days with Mexico City urban influence on T1 (March 9-12) and without influence (March 14 and 15) were analyzed. The particle average concentration during the whole campaign was 20,000 *particles/cm³*. For the days with and without urban influence the average concentrations were 17,500 and 8,000 *particles/cm³* respectively. From the MOUDI data the highest particle concentration through the campaign was during the morning in the mode $d_{50}=0.32$ μm . On the other hand, the cumulative highest concentration of all the stages was observed for March 19 followed by March 9. Scattering and absorption coefficients average obtained on T1 were $5.1 \times 10^{-5} \text{ m}^{-1}$ and $2.54 \times 10^{-5} \text{ m}^{-1}$ respectively and single scattering albedo was 0.676. These values show T1 as a polluted atmosphere, just as happens with megacities.

Morphology of particles captured in a MOUDI impactor was studied. Particles between $d_{50}=0.18 \mu\text{m}$ and $d_{50}=1.8 \mu\text{m}$ sampled in T1 associated with urban influence (March 9) tended to show less irregular shapes through different periods of that day. These findings suggest the presence of large numbers of secondary aerosols and aged agglomerated particles. Particles ranging from $d_{50}=0.18 \mu\text{m}$ to $d_{50}=1.8 \mu\text{m}$ sampled in T1 and associated mainly with surrounding areas influence, e.g. Tizayuca Industrial Park (March 15) showed variation in morphology with size. More irregular particles were found in the smallest size, and less irregular particles were present in the largest size.

The highest concentrations of ions present in all 8 stages of the MOUDI were chlorine, sodium, calcium, and magnesium. For stages less than $1 \mu\text{m}$, the dominant ions were sulfate, ammonium, and potassium. The nitrate ion showed an irregular behavior through the campaign. For the days with influence (March 10 to 12), the nitrate ion presented its higher concentration. During episodes without influence (March 14 and 15), potassium, chlorine, and ammonium ions showed high concentration.

On average, polycyclic aromatic hydrocarbons present in PM_{2.5} (from acenaphthylene to benzo[ghi]perylene) had concentrations between 0.2 to 0.5 ng/m^3 . In particular, naphthalene had a concentration of 2.5 ng/m^3 .

Our results show that Tecamac population is certainly exposed to high levels of pollution from Mexico megacity.