

Physical and chemical properties of urban particles in high pollution conditions during ESCOMPTE experiment

A contribution to subproject SATURN

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Summary

Atmospheric particles constitute one of the main factors of urban air pollution. It is recognized that particles in urban air are responsible for serious health effects (Harrison et al., 2000; Seaton et al., 1995), i.e. long term effect like cancer and cardiovascular disease and acute effects like allergy or irritation of eyes, nose and throat.

Among different sources, emissions from road transport are considered to be a major source of anthropogenic sub micrometer particles in urban environment, but the corresponding study needs generally cooperative experiments. The cooperative experiment ESCOMPTE (Field experiments to constrain models of atmospheric pollution and transport of emissions) that took place in south of France, in the Marseille region, between June 4th and July 16th, 2001, gave us the opportunity to develop a quite complete study.

Among the numerous objectives of this campaign, one concerned the physical and chemical characterisation of aerosol particles at roof level in an urban site, in order to better define the “urban aerosol” input data, which should be used in regional chemical and transport models.

The urban site was located in Marseille downtown. Measurements have been made on the “Prefecture” roof, ~30 m above street level, close to a heavily trafficked road (Prado avenue). Particle size distribution in the size range 0.015-0.45 μm were measured with a Scanning Mobility Particle Sizer (SMPS TSI Model) and in the size range 0.5-25 μm with an optical counter (HIAC-ROYCO). Particle mass concentration was measured with two TEOM, each one equipped respectively with PM₁₀ and PM₁ size-selective inlets. Aethalometer for BC information and cascade impactor (Dekati) for ionic composition were used in order to characterise and to identify the different sources of the particles.

The different results presented concern:

- ✓ The size distribution between 15 nm and 15 μm , and their behaviour with respect to different meteorological conditions, strong pollution and non-pollution events...
- ✓ The ionic chemical composition of the particles by size classes, the differences between low and high pollution events and according to different meteorological conditions. The analysis of these data to better identify the different sources (local, regional,...) and their respective strengths.
- ✓ A comparison PM₁ / PM₁₀.

References

Harrison R.M., Yin J., (2000), Particulate matter in the atmosphere : which particle properties are important for its effects on health?, *The Science of the Total Environment*, 249, 85-101

Seaton, A., MacNee, W., Donaldson, K., Godden, D., (1995), Particulate air pollution and acute health effects, *The Lancet*, 345, 176-178