

Paper/Poster-Abstract Form

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Title: Sources of ultra-fine particles in ambient air of the City of Bolzano

Extended summary

Introduction

The air quality and in particular the presence of fine particulate is a topic that in the last years assumed more and more public importance. Concerns about possible health effects related to the presence of pollutants like fine dust (PM 10 and PM 2,5) and NO_x are widely discussed. Since a few years also the presence of ultra-fine particles is under investigation of the scientific community. The presence in ambient air of anthropogenic derived ultra-fine particles, the so called "nano-particles" is considered a potential threat to human health.

Frequently in the public opinion industrial sources like the incineration of municipal waste are considered to be the main emitters of this kind of pollutants.

The aim of this study was to investigate the relative contribution of the different sources of ultra-fine particles in ambient air.

Experimental

We made ambient air measurements in different parts of the basin of the Bolzano city. Different sampling sites, with different urban character were chosen in order to assess the possible contribution of predominant sources. One sampling site (Casanova) was close to one of the suspected sources, the municipal waste incineration plant. Other sites (Laboratorio) were a small industrialized area and Bolzano downtown.

For the measurements we utilized scanning mobility particle sizers (SMPS, from TSI and Grimm) able to characterize the concentration of particles of different sizes from 10 to approximately 250 nm.

All measurements have been performed between February and March 2011, the period of invernale thermic inversion. It is in fact in this period of time that the highest PM₁₀ levels are observed in the Bolzano basin. Nonetheless due to the actions taken over the last years to reduce PM₁₀ levels, they have indeed dropped significantly.

The downtown station in via Amba Alagi was used as a reference station (Amba Alagi) to confront the two different devices used for the determination. These measurements confirmed validity of data of both instruments.

All three sampling sites showed a similar ground scheme: The level of nanoparticles present in air are related to the traffic levels, with evident peaks during rush hours.

Total peak count is related to the distance to the main traffic roads, the maximum levels measured are identical in all three sampling sites: ca. 40.000 p/cm³

To conclude, it can be stated that the ultra-fine dust levels for Bolzano are directly correlated with traffic; NO_x, a typical traffic related pollutant, correlates with the particles present in the air. No significant single source point for ultra fine particles was found in the period considered.

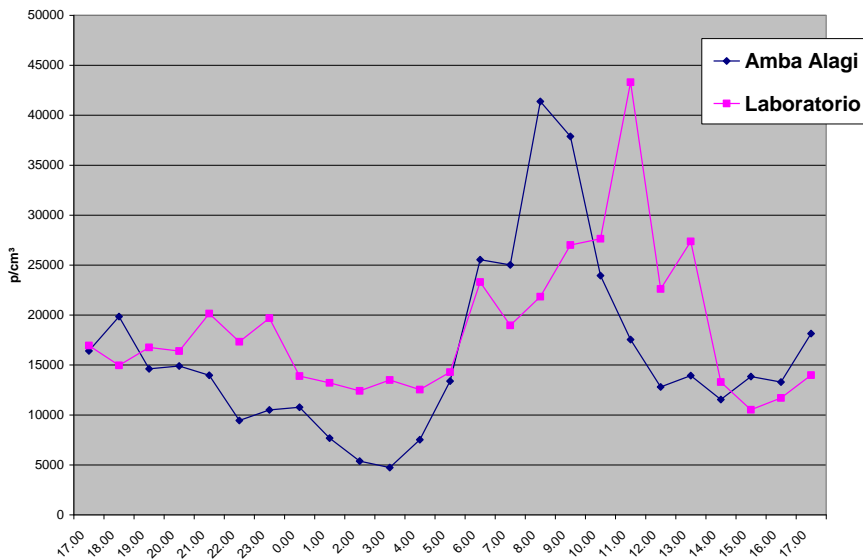


Figure 1 : Particle concentration in ambient air of the reference location and in the industrialize area from 28/02 – 01/03/2011

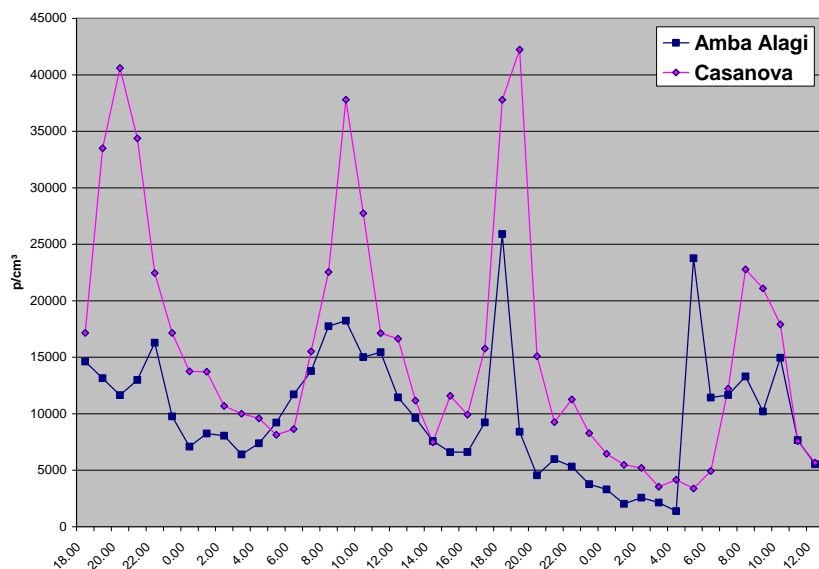


Figure 2 : Particle concentration in ambient air in the reference location and in the Casanova area from 21/2 – 23/2/2011

References

Birmili W. (2006), *Räumlich-zeitliche Verteilung, Eigenschaften und Verhalten ultrafeiner Aereosolpartikel (>100 nm) in der Atmosphäre, sowie die Entwicklung von Empfehlungen zu ihrer Systematischen Überwachung in Deutschland, UBA-FB 000942*

Angelucci, Tirlir, Bedin, Verdi; *“Fine particles, ultrafine and nano particles in emission of a municipal solid waste incineration plant”, 8th International Conference on Emissions Monitoring, 5 – 6 September CEM 2007*

Short CV:

Werner Tirlir earned the master degree in Chemistry at the University of Vienna, Austria, in 1991 and the Ph.D. in Chemistry, in 2004 from the same institution with a dissertation on the optimization of spectroscopic and chromatographic. parameters for the analysis of persistent organic pollutants. He is currently director of an environmental analytical laboratory.

Sources of ultra-fine particles in ambient air of the City of Bolzano

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Introduction

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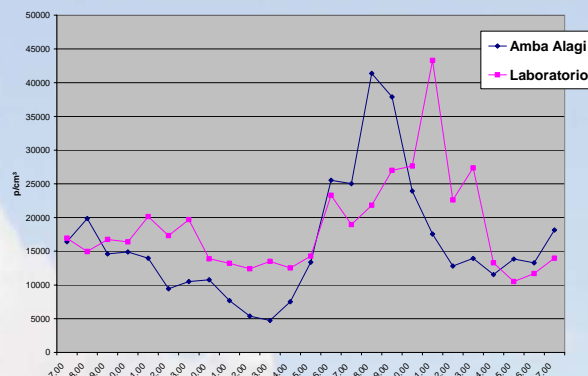


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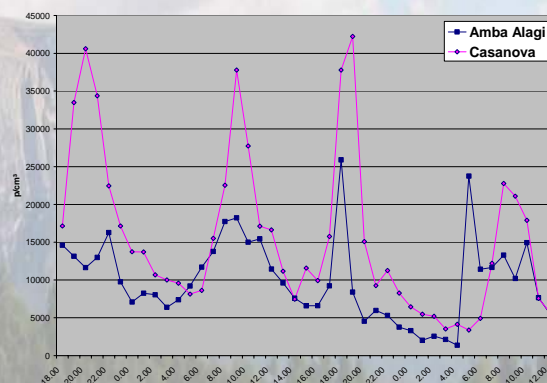


Figure 2 : Particle concentration in ambient air in the reference location and in the Casanova area from 21/2 – 23/2/2011

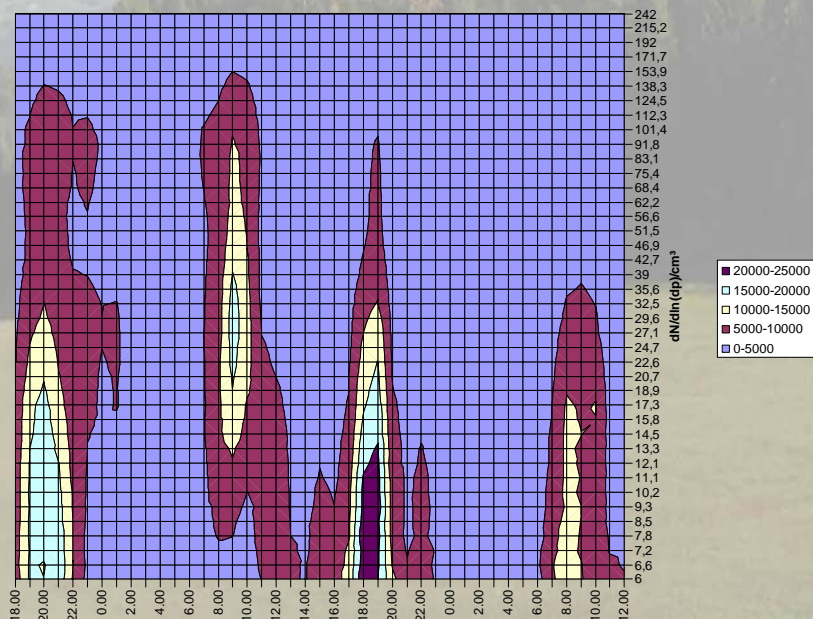
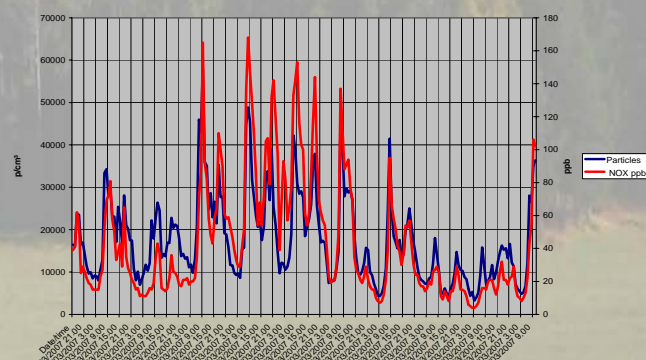


Figure 3 : Particle concentration and distribution in ambient air in the Casanova area of Bolzano from 21/2 – 23/2/2011



Time trend for ultra-fine particles and NOx in Bolzano ambient air

References

- Birmili W. (2006), Räumlich-zeitliche Verteilung, Eigenschaften und Verhalten ultrafeiner Aerosolpartikel (>100 nm) in der Atmosphäre, sowie die Entwicklung von Empfehlungen zu ihrer Systematischen Überwachung in Deutschland, UBA-FB 000942
- Angelucci G , Tirler W , Bedin K, Verdi L; "Fine particles, ultrafine and nano particles in emission of a municipal solid waste incineration plant", 8th International Conference on Emissions Monitoring, 5 – 6 September CEM 2007