

Qualitative differences in particulate air pollution at different locations throughout Europe (RAIAP)

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Introduction

Given the widely different prevalence rates of respiratory allergies and asthma between the countries of Europe and the substantial exposure to ambient particles in urban environments, the EU project Respiratory Allergy and Inflammation Due to Ambient Particles (RAIAP) aimed to relate the chemical composition of collected ambient particulate matter (PM) to different health endpoints. With the aid of high-volume cascade impactor (HVCI), coarse (2.5-10 µm) and fine (0.1-2.5 µm) PM samples were collected in Amsterdam (NL), Rome (I), Lodz (PL), Oslo (N) and the Dutch sea-side background (De Zilk) during spring, summer and winter. The sampling campaign has been successfully performed in the period of March 2001 - April 2002.

Results

- PM yields were usually higher in winter compared to the other two seasons, which may reflect contributions of combustion processes for heating purposes.
- In addition, higher PM concentrations were observed in Lodz and Rome compared to Oslo and Amsterdam. In general less secondary aerosol was measured in the coarse fraction when related to the fine fraction.
- Significant contrast in chemical composition was observed. Metal concentrations were high in Rome, with the exception of zinc, which was high in Lodz.
- The location in Amsterdam is characterized by relatively high magnesium (Mg) and vanadium (V) levels. As expected, sea-spray aerosol was significantly present in samples taken in Amsterdam and De Zilk.



Figure 1: RAIAP PM collection device with the HVCI on top of a box with the pump pull the air through the impactor (right panel) and the inside of the HVCI showing the pink PUF with collected PM (black) of the fine mode stage (left panel).

- Relatively high levels of PAHs were measured in Lodz, in particular during winter season. A more diverse pattern is found for the traffic markers (hopanes and steranes).
- Traffic markers: Although generally higher amounts are found in the fine fraction, relatively high amounts of steranes were observed for both winter and summer samples of the location in Oslo, as well as the winter sample from Rome and the summer sample from Lodz. This pattern is not reflected in the hopane levels, which seem to be more dominant in both the spring and winter from Lodz, Oslo and Rome.

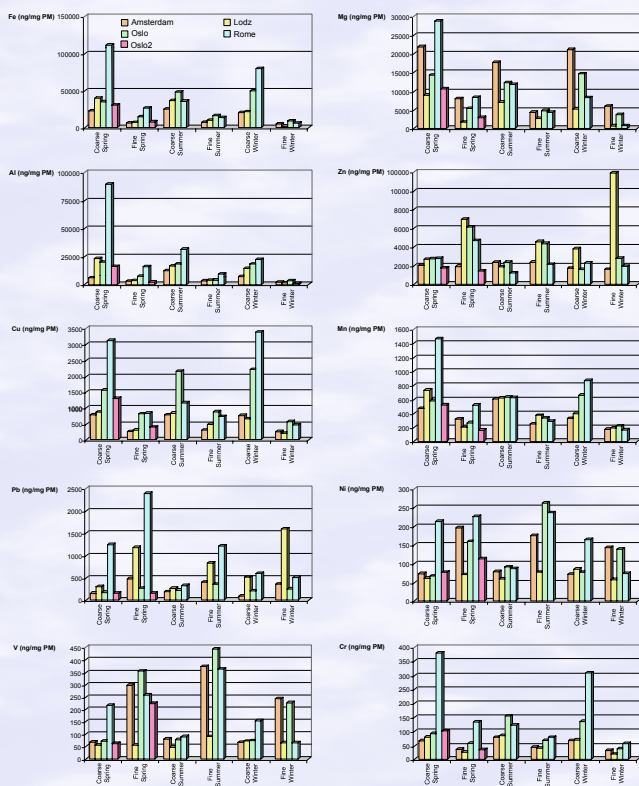


Figure 2: Transition metal contents of PM of spring, winter and summer PM samples from Amsterdam, Lodz, Oslo and Rome.

These data will provide valuable information for *in vitro* and *in vivo* toxicity studies performed within this project.

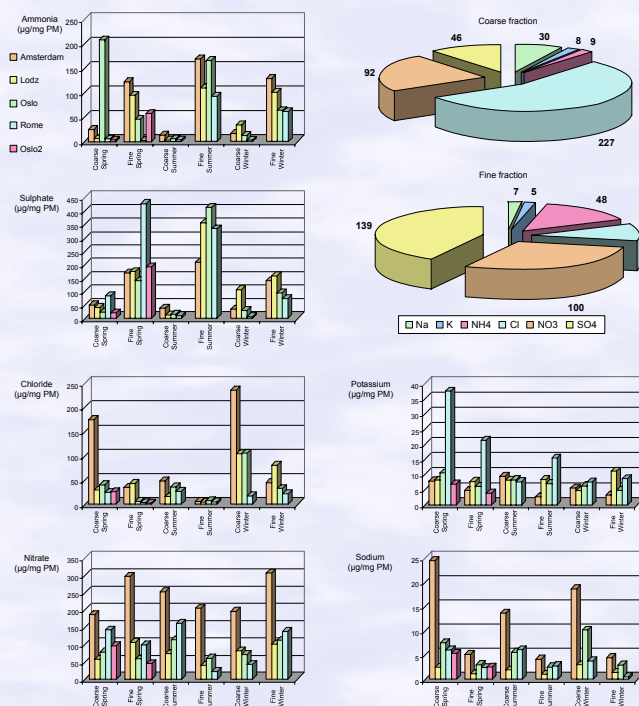


Figure 3: Inorganic contents of PM of spring, winter and summer PM samples from Amsterdam, Lodz, Oslo and Rome. The pie charts are for De Zilk.