Source Origin of Fine Aerosol Particles in Budapest

A contribution to subproject SATURN

L. Bozó

Hungarian Meteorological Service
H-1675 Budapest, P.O.Box 39.
HUNGARY

Summary

The concentration of different species in the atmospheric aerosol is influenced significantly by human activities, so the study of the source origin of elements in aerosol particles is of crucial importance for environmental management on urban scale. Receptor modeling applied in present report provides quantitative estimates of the impacts of sources on ambient air. In contrast to dispersion modeling it applies only minimal meteorological and emission inventory information.

Aim of the research

Local sampling and measurements, as well as the Chemical Mass Balance method has been applied to estimate the source contributions to ambient concentration levels of trace elements in Budapest. Its general aim is to reach minimum cost emission control strategies that will be effective in reducing the ambient concentrations of pollutants considered.

Activities during the year

Source profiles of Cd, Cu, Ni, Pb, V and Zn for *waste incineration*, *traffic*, *oil* and *coal* burning were applied for model calculations. Aerosol sampling for fine size range aerosol particles was carried out by Harvard-type impactors at the sources and at two receptor point, in the downtown of Budapest during November-December, 1999, and summer month in 2000 and 2001. One of the sampling sites (OKI) is located at the SE edge of the downtown with relatively heavy traffic in its vicinity while another site (ELTE) is located next to the River Danube that crossing the city in N-S direction. This site is rather intensively ventillated so it can be expected that a good mixture of source categories are detected here (Figure 1.)

Principal results

It was found that high amount of Zn, Pb and Cu is emitted from a waste incinerator in Budapest, while regarding the traffic profile, the most important element is still Pb, however, its relative contribution decreased rapidly during the past 5 years.

Main conclusions

It was concluded based on multiyear sampling and measurements that *waste incineration* provides the most significant contribution to the toxic metal load in Budapest (65-70%). The relative contribution of *traffic sources* is between 11-17% (Table 1.) Coal burning has no significant importance in Budapest regarding the contribution to the receptor profile. It can be explained by the fact that coal consumption was significantly reduced in Budapest during the past decades since it was

replaced by natural gas at most of the industrial, energetical and residential sources. In co-operation with NOAA, three dimensional backward trajectories were also computed so that to estimate the origin of air masses on different days. It was found that episodes with relatively high concentrations of Ni and V measured in Budapest are accompanied by S winds indicating the effects of an oil refinery located 25 km South of Budapest.

Aims for the coming year

Measurement campaigns are being continued at 3 receptor points in Budapest as well as in the plumes of relevant point and line sources so that to extend the investigations towards the relationships between *meteorological conditions* and *receptor profiles*.

References

Bozó L. (2000) Estimation of historical lead (Pb) deposition over Hungary. Idõjárás 104, 161-172.

Havasi Á., Bozó L. and Zlatev Z. (2001) Model simulation on the transboundary contribution to the atmospheric sulfur concentration and deposition in Hungary. Idõjárás 105, 135-144.

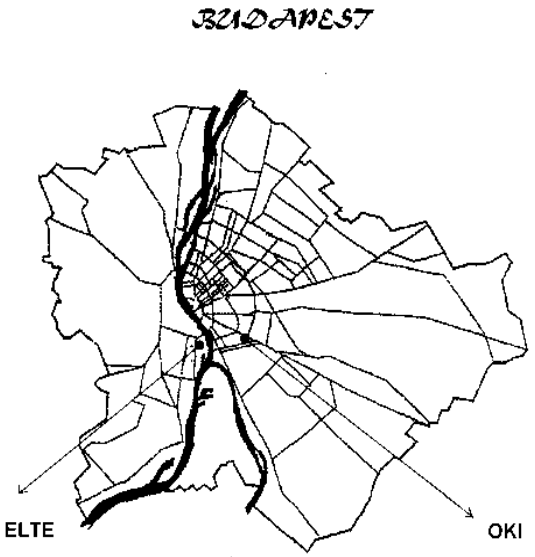

Figure 1. Sampling locations in Budapest

Table 1. Relative contribution (%) of source categories to ambient trace element concentrations

	OKI	ELTE
Waste incineration	65	70
Traffic	17	11
Coal burning	5	6
Oil burning	6	6
Other sources	7	7