

Macro tracer model as a technique for source apportionment of particulate matter in Krakow agglomeration - an optimization approach

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Introduction:

Receptor models are mathematical procedures used to identify the sources of pollutant emissions and to estimate their contribution in the overall balance of atmospheric aerosol emissions based on measurements of the concentrations of aerosol components, without the need to carry out an inventory of emission sources or data describing meteorological conditions. The concept of a *macro tracer* model consists in determining a chemical compound - an indicator - specific to a given source. The basis of the model is the work of P. Lenschow et al. who took the first steps to match a given indicator compound with a given particulate matter emitter¹. The *macro tracer* model was then developed in Austria by scientists from Vienna University of Technology^{2,3}. The assumptions of the model had to be optimized in order to implement this model to the region where coal is the main source of energy. New factors have been calculated on the basis of source profiles obtained in preliminary studies presented by Katarzyna Szramowiat-Sala et al.⁴. Afterwards, the optimized *macro tracer* model was used for the identification of emission sources of atmospheric aerosols from Krakow agglomeration.

Results & Conclusions:

The *macro tracer* model enabled to obtain reliable results on the contributions of individual sources of atmospheric aerosols in the Krakow agglomeration in winter. The optimized model allowed to reconstruct the PM mass with the higher R² linear coefficient than using the F coefficients estimated by Gonçalves et al and Kistler et al. However, to obtain more appropriate results, it is necessary to broaden the research studies on chemical composition of particulate matter from individual sources and to identify the more specific tracer for them.

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References

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