



Planning and Source Apportionment

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Conclusions of the IE (1)



GENERAL

In general models show **better performances in estimating the average source contribution for longer time windows** than the contributions for single time steps (time series). This is likely due to the influence of non linear processes.

The comparability between **RMs and CTMs** changes from source to source.

RMS

- RMs present **comparable results** which are also coherent with measured PM.
- There is a convergence towards one particular model: **EPA PMF5**.
- **Industry** source category in RM needs better definition because often used to represent a wide variety of different sources.
- The experience of the practitioner influences the performance

Conclusions of the IE (2)



CTMs

- CTMs show **good performances** when tested using an ensemble reference.
- No significant differences in performance between sites suggest that CTM have a rather comparable **geographical pattern** likely due to same input data.
- The sensitivity analysis for CTM demonstrates the influence of the **spatial resolution** on the SA performance of models in densely populated areas.
- More effort is needed to improve and harmonise the estimation of **soil and road dust** sources, in particular in the emission inventories.
- Differences between **tagged species and brute force** are mainly observed in sources involved in **secondary processes** (agriculture, power plants, traffic, biomass burning, etc.)

Terminology matters

application	Source apportionment	Scenario analysis
definition	quantification of the CONTRIBUTION of the emissions from a source the concentration of a pollutant	Estimation of the relationship between change in emissions and change in concentrations. So called EFFECT
Useful for	<ul style="list-style-type: none"> Identify sources that caused the exceedance Point out sources to be further explored with scenario analysis (to reduce n. of runs) Fulfil e-reporting obligations Evaluate policy effectiveness "a posteriori" Test robustness of models 	<ul style="list-style-type: none"> Assess the effect of emission reduction on concentrations Evaluate policy effect "ex-ante" Analysis of model response to emission inventory Fulfil e-reporting obligations
Suitable tools		
Receptor models	yes	Conditional (only if non linearities are negligible)
Tagged species	yes	Conditional (only if non linearities are negligible)
Sensitivity analysis (no interaction)	Conditional (only if non linearities are negligible)	yes (differences base case - sensitivity run have to be considered one by one and not summed up nor normalised)
Sensitivity analysis (with interactions)	yes	yes

Terminology matters

Not to confound:

a) “**source apportionment**” with the “**SA methods**”: Receptor Models, CTM tagged species approach (t.s.a.).

b) “**Planning**” with “**sensitivity analysis**”. Because planning involves many steps and sensitivity analysis is only one of them

The previous clarification leads to two similar but different questions:

- 1) “***is source apportionment suitable for planning?***”
- 2) “***are RMs and CTM t.s.a suitable for scenario analysis?***”

The answer to the first question is: “***yes, because SA is involved in the analysis of the exceedance which is the first step of planning and in assessment of the plan effectiveness a-posteriori.***”

The answer to the second question is: “***only when non linearities are negligible***”.

And the same applies for the use of sensitivity analysis for source apportionment purposes