WG1 - Source apportionment

Exercise SA Practices Methods

RSE

Université de Strasbourg

European Commission

Different SA Methods : Practices

Exercise on SA Practices Methods

- Inventory of tools and practices
- Draw lessons on best practices

Different SA Methods : Practices

Exercise on SA Practices Methods

- Each participant chose its own domain. (In case the participants does not have any preferences it choses between Paris, Berlin, Krakov or Barcelona)
- Participants are asked to answer the following question: **Contribute designing an air quality plan in the framework of the EU directive over your chosen domain for PM**.
- The addresses of various websites are provided to find the « *default available EU information* », which **must** be consulted. If the participants do not use one or more of these sites, they **must** explain why. Otherwise, they should explain how they use the information on the chosen sites.
- Participants who have their own (local) tool can also use it to complement (or compare) the information obtained using the « *default available EU information* ».

Fill-in Template

1 - Location of the receptor (point where exceedance(s) occur(s))

2 - Short or long-term? Are SA results aiming at supporting short-term (episodes) or long-term (years) action plans?

3 - Use of mandatory SA

A. Did you use **SHERPA** results? If yes, how (targeted sectors and areas) and why? If not, why?
B. Did you use **CAMS-ACT** results? If yes, how (targeted sectors and areas) and why? If not, why?
C. Did you use **CAMS-EMEP-SR** results? If yes, how (targeted sectors and areas) and why? If not, why?
D. Did you use **CAMS-LOTOS-EUROS** results? If yes, how (targeted sectors and areas) and why? If not, why?
E. Did you use **TOPAS** results? If yes, how (targeted sectors and areas)and why? If not, why?

4 - If you used a **method non included under 3**, indicate which one, explain why and how (targeted sectors and areas, approach details [e.g. emission reduction strength for brute force, molecular or mass precursor aggregation for tagging…])?

5 - If you used methods in complement to each other, explain how and why ?

6 - Which sector(s) do you recommend to act on? At which scale?

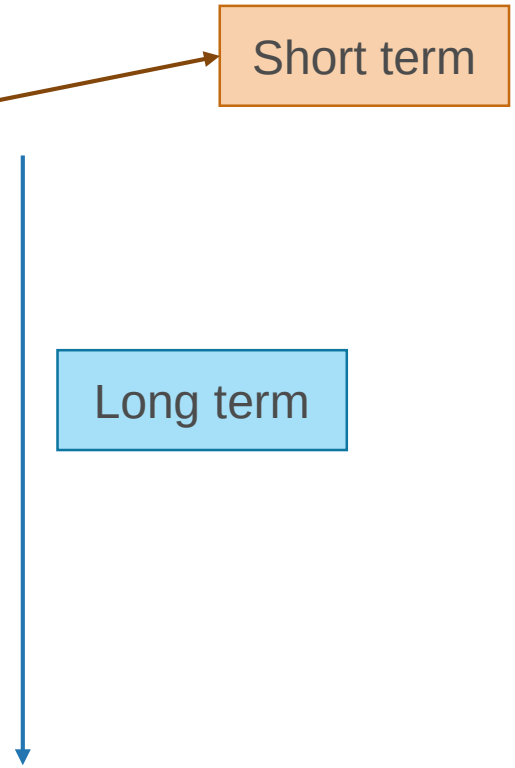
The main prupose of the exercise is to answer this question: « How can you solve the exceedance of indicator X for pollutant Y (here PM..) that you observe at receptor Z? ». The final answer should be: “to solve my exceedance I would reduce sector S1 in area A1 by P11 %, Sector S1 in area A2 by P12%, sector S2 in area A3 by P23%, etc…”
Answers to this question would ideally be structured in terms of an area-sector matrix in which quantitative estimates are provided.

Participants and Receptor Sites

Participants	Country	Receptor location
INERIS (Palmira Messina)	France	Milan
ARPAE (Roberta Amorati)	Italy	Emilia-Romagna (west, east, Bologna)
INERIS (Elsa Real)	France	**Paris**
LANUV NRW (Sabine Wurzler)	Germany	**Berlin**
CIEMAT (Mark Theobald)	Spain	**Barcelona**
RSE (Elena De Angelis)	Italy	Milan
Uni. Aveiro (Alexandra Monteiro)	Portugal	Lisbon, Porto
ARPA Lombardia (Loris Colombo)	Italy	Milan, Lombardy Region
DHMZ (Velimir Milić)	Croatia	Zagreb FUA

Time Scale

Participants	Time scale
INERIS (Palmira Messina)	Short-term
ARPAE (Roberta Amorati)	Long-term
INERIS (Elsa Real)	Long-term
LANUV NRW (Sabine Wurzler)	Long-term
CIEMAT (Mark Theobald)	Long-term
RSE (Elena De Angelis)	Long-term
Uni. Aveiro (Alexandra Monteiro)	Long-term
ARPA Lombardia (Loris Colombo)	Long-term
DHMZ (Velimir Milić)	Long-term



Tools

Participants	Time scale	SHERPA	CAMS-ACT	CAMS-EMEP-SR	CAMS-LOTOS-EUROS	TOPAS	Other method
INERIS (Palmira Messina)	Short-term	No	Yes	Yes	No	No	No
ARPAE (Roberta Amorati)	Long-term	No	No	No	No	No	Yes
INERIS (Elsa Real)	Long-term	Yes	No	No	No	No	No
LANUV NRW (Sabine Wurzler)	Long-term	Yes	No	Yes	Yes	No	No
CIEMAT (Mark Theobald)	Long-term	Yes	Yes	No	No	Yes	Yes
RSE (Elena De Angelis)	Long-term	Yes	Yes	No	No	Yes	Yes
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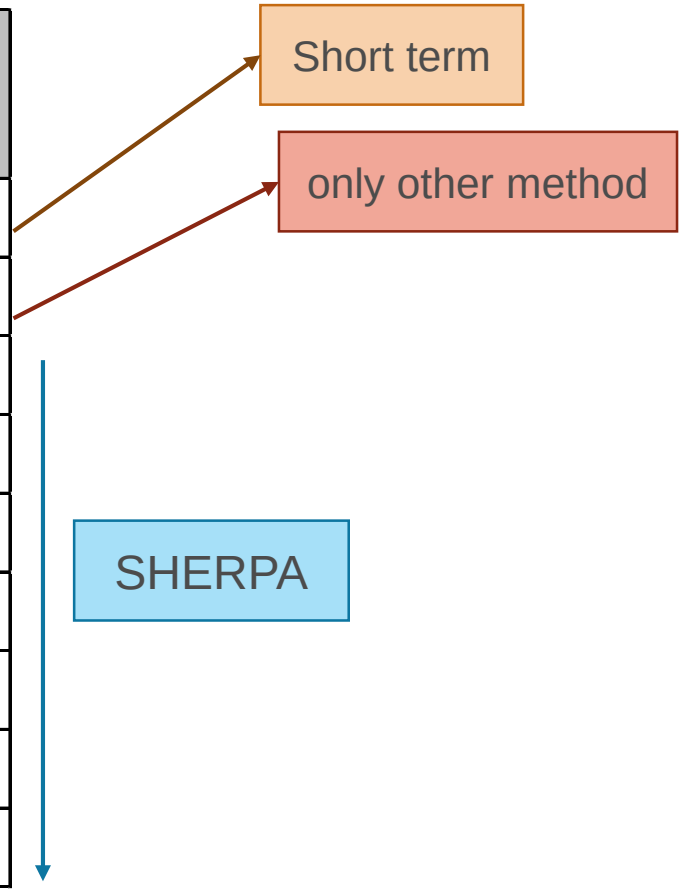

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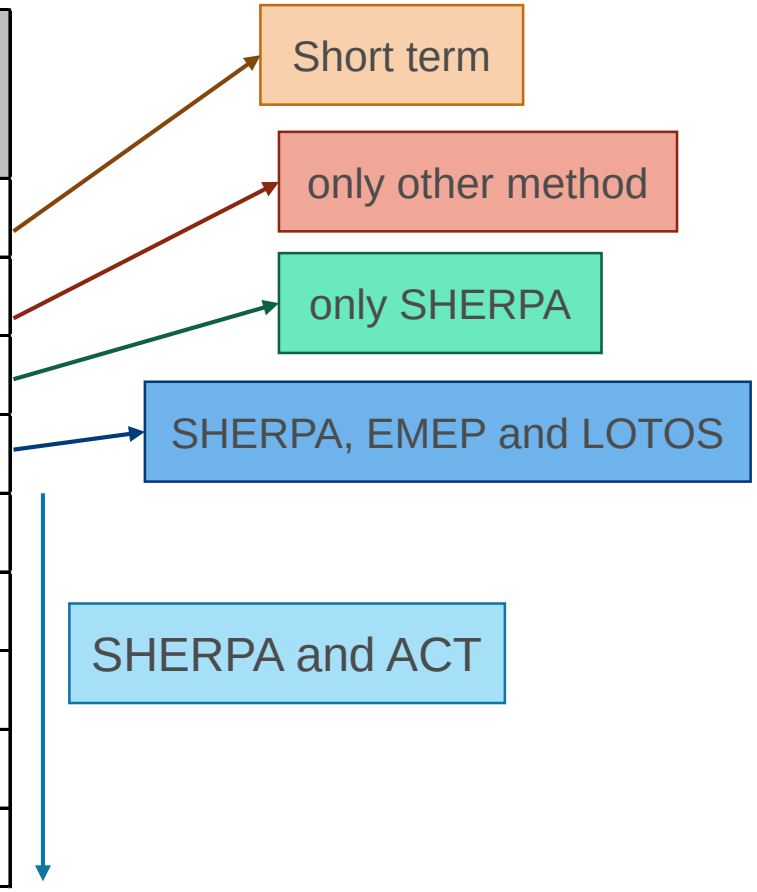

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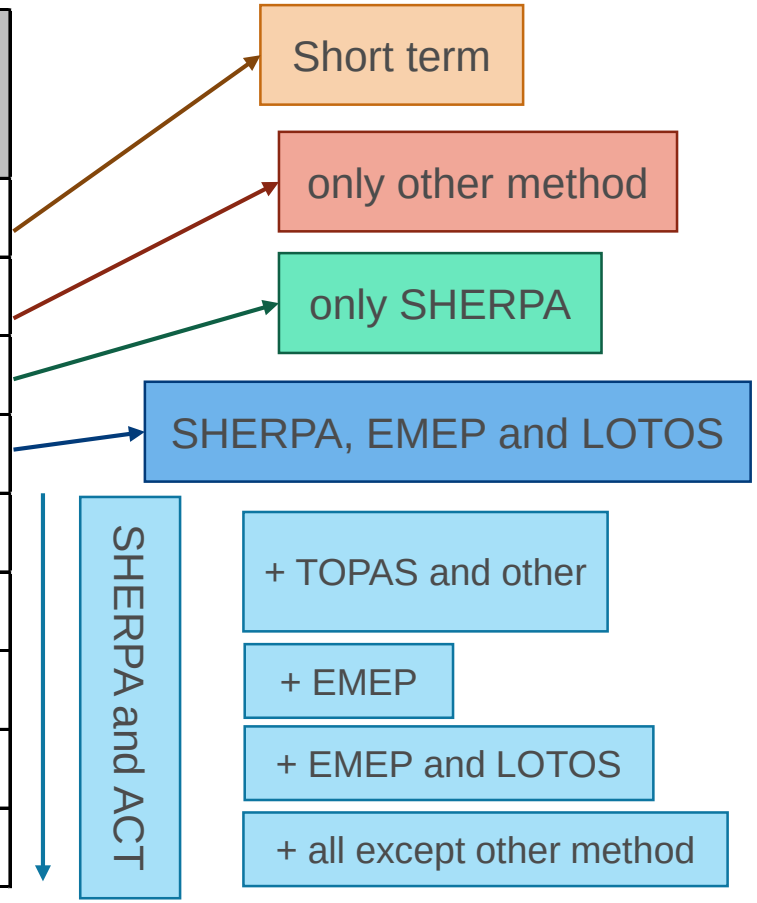

Presentations of the Participants

Some Questions

How to analyse the sectors with CAMS-EMEP and CAMS-LOTOS?

Some Questions

How did you handle the different time scales when you compare SHERPA and ACT results?

Some Questions

How do you interpret the comparison between impacts and contributions when you compare the results of CAMS-EMEP and CAMS-LOTOS and the results of SHERPA and TOPAS?

Thank you for your attention

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SHERPA

Easy to applied and have an idea of the main relevant sectors for long-term analysis

LONG TERM SECTOR IMPACTS

Targeted sectors for the grid cells containing the stations with exceedances, over various domains (Core city, Commuting zone, Spain, etc).

SPATIAL

to compute sectorial potential impacts to be compared to our model results

I use SHERPA to compare scenarios method with FARM CTM brute force method.

It has the highest resolution of all tools. It is useful for source apportionment. We tried to find realistic values for reduction scenarios. This turned out to be not as easy as it appeared to be on the first sight.

Tool proved to be useful, well organised and easy to use.
Source allocation – sectoral was used first on Zagreb FUA with no reduction scenarios to estimate relative GNFR contributions for base case. Highest contribution came from GNFR 3 (21.19%) followed by GNFR 2 (7.84%) with significant contributions from sources “outside of control” (63.59%).
Source allocation – precursors were also used on Zagreb FUA with no reduction scenario as initial estimate for base case. Highest contribution came from PPM10 (36.4%) followed by NOx (6.22%) and NH3 with (2.71%). There is also significant contribution from “out of control” (52.72%). This indicates that primary source of PM10 within Zagreb FUA comes from GNFR 3 (small combustion) and is mostly due to primary emissions of PM10. So, based on that information I tried several scenarios for analysis.

Not SHERPA itself, but RIAT+ with SHERPA S/R functions.

For SA the same model setup (CTM and inventory) as to evaluate action plans in Emilia-Romagna was used .

Several of my co-workers did not use Sherpa because of the 2 way identification login procedure, that makes the use of their private cellular phone necessary. :(

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CAMS-ACT

To explore the impact of mitigation measures (after applying sector apportionment)

SECTOR IMPACTS

It was decided to use ACT for the Milan case study because it provides a source apportionment evaluation every day. The tool is suitable for assessing every hour the impact of the reduction of one or more particular emission sectors on concentration.

SHORT TERM

To obtain estimates of sector impacts to compare with SHERPA

SECTOR IMPACTS

to compute sectorial potential impacts to be compared to our model results

SECTOR IMPACTS

we use this tool in order to understand the main contribuiton of sectors in Milan.

SECTOR IMPACTS

I consulted CAMS ACT results, but since it's mostly oriented at short term plans, interface was a bit more challenging to use (compared to SHERPA), but it provided a nice insight into seasonal impact of scenarios. Since most of daily exceedances occur in colder part of the year (due to increased demand for residential heating) I used cams ACT to explore impact of various changes for 2 random days in different "heating" regimes. One in summer (11.7.2023.) and one in winter (12.12.2023.), in both cases using D+0 forecast horizon for PM10 daily mean focusing on "hot spot" in Zagreb FUA domain.

How to deal between short term and long term?

How to compare SHERPA and ACT results?

Not used, because the target area is Emilia-Romagna

The link lead only to daily values. That was not helpful for long-term considerations for unexperienced users. Experienced users can find more information. So it would be very helpful to guide the user a little better ;-).

CAMS-EMEP-SR

we use this tool in order to understand the main contribution of sectors in Milan. It can be used to understand time variability (ions) and what sector to act

We used it to estimate the contributions of other states. That worked relatively well, but we are missing a legend explaining the abbreviations. Most we could guess, but by the way: what is SHP? We think it would be very helpful to give information on thresholds with respect to which states are considered/listed. Is it really helpful to give decimal places of values covering an area of several km2?

CAMS-EMEP-SR was explored but only for yearly air pollution analysis (since aim was long term action planning). I only explored daily analysis for reference and to familiarize myself with the tool. Domain of interest was city of Zagreb. Results were consulted to confirm/gain confidence in results obtained with different tools and to get the idea of seasonal characteristics (SHERPA provides only one number).

How to analyse the sector with CAMS-EMEP and CAMS-LOTOS?

Because it doesn't provide sector impacts

No, because we used both SHERPA and CAMS-ACT

Not used, because the target area is Emilia-Romagna

CAMS-LOTOS-EUROS

we use this tool in order to understand the main contribuiton of sectors in Milan. It can be used to understand time variability (ions) and what sector to act

We used it to estimate the contributions of other states. That worked relatively well. We found it a bit confusing that we got other states listed as compared to the results we obtained with CAMS-EMEP-SR. We think it would be very helpful to give information on thresholds with respect to which states are considered/listed. Is it really helpful to give decimal places of values covering an area of several km2?

There is no specific information for Zagreb (local contribution), but strong transboundary signal can be picked up (48%)

How do you interpret the comparison between CAMS-EMEP and CAMS-LOTOS?

Because our goal was to do sector apportionment and not chemical speciation

Because it doesn't provide sector impacts

No, because we used both SHERPA and CAMS-ACT

Not used, because the target area is Emilia-Romagna

TOPAS

To obtain estimates of sector contributions to compare with SHERPA impacts

we used TOPAS to compare our SA contribution results obtained with CAMX/PSAT

It is a nice addition that speciation data for entire year can be downloaded for specified cities. Along with SHERPA “base cases” this was the among the first available tools used to get the country and sector relative contribution to target the relevant sectors for planning.

How do you interpret the comparison between SHERPA and TOPAS?

Need of instalation (not easy-friendly)

Not used, because the target area is Emilia-Romagna

The link does not lead to the model. We didn't find it.