

Intercomparison Exercise: Feasibility Study

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Important link:

<http://fairmode.jrc.ec.europa.eu/cca1.survey.2015.html>

Outline

- Scope of the feasibility study
- Literature study and overview of spatial representativeness (SR) methods
- Survey with questionnaire on spatial representativeness (SR) methods
- First feedbacks results and impressions
- Comments and discussion

Scope of the feasibility study

- To prepare and evaluate the feasibility of the actual methodological intercomparison study.
- Identification of :
 - candidate methodologies,
 - requirements on shared datasets,
- Assessment of the comparability of the different types of spatial representativeness results.
- To investigate about the best way to compare the outcomes of the different spatial representativeness (SR) methods
- To identify the limitations to be expected.

Expected benefits

- To gather a comprehensive information about the state of art of spatial representativeness (SR) of AQ stations.
- To identify the requirements for carrying out an intercomparison exercise including as many methodologies as possible.
- To help to the design of the intercomparison exercise

Literature study and overview of spatial representativeness methods

- Compiled more than 50 papers, reports and conference/ workshop presentations and posters.
- Still finding and receiving more references especially from participants or reviewers of the survey.
- Oldest references are from 70s (Ott and Eliassen, 1973)
- Some studies shows the use of different methodologies.
- Related to station classification, combination of models and measurements, air quality assessment, model evaluation, etc
- Covering from remote stations to urban-traffic stations, different pollutants, etc.

Literature study and overview of spatial representativeness methods

- **No well-established procedure for assessing spatial representativeness.**
 - There is no unique definition of spatial representativeness. Only common aspect: the concentration in the SR area must be similar to that measured at the station site.
 - There are several methods for estimating SR area.
 - There are several types of outputs.

Design of the survey and questionnaire

- Context (station sitting, data assimilation, model evaluation, AQ reporting, etc) and purpose. **Questions 1 and 2.**
- Definition of SR. **Question 3.**
- Methodologies:
 - Description including time and spatial scale, pollutant, etc. **Question 4.**
 - Input data. **Question 5.**
 - Output data. **Question 6.**
 - Transferability to other regions. **Question 7**
- Intercomparison exercise:
 - Participation. **Question 8.**
 - Requirements related to the SR methodology. **Question 9.**
 - Recommendations about the type of comparison. **Question 10.**
 - Confidentiality. **Question 11.**

To whom questionnaire was sent?

- Review process:
 - Questionnaire draft sent for review and feed-back to:
 - FAIRMODE Steering Group members
 - Few representatives of the AQUILA-SCREAM group.
- Survey (launched January 2015):
 - Final version of questionnaire was sent to:
 - FAIRMODE members.
 - AQUILA members.
 - FAIRMODE national contact points.
 - International experts.

Feedbacks from Review Process

- Feedback from 7 reviewers.
- Two of them also sent the filled questionnaire.
- Main comments and suggestions about the questionnaire:
 - To focus strictly on spatial representativeness leaving out other aspects as station classification.
 - No changes in the main structure.
 - Some small changes to clarify questions and preselected answers.
- Some suggestions about how to carry out the intercomparison exercise:
 - Need of a previous agreement on SR definition taking into account time scales.
 - Only compare methodologies based on same SR definition.

First overview of replies from participants so far

- Right now 4 replies to the questionnaire:
- **Question 1. Context.**
 - Mostly for station siting, network design and population exposure,
 - Also for station classification, model benchmarking and evaluation and air quality reporting, and one for data assimilation.
- **Question 2. Regulatory purpose.**
 - Yes in 2 cases.

First overview of replies from participants so far

- **Question 3. Definition.**
 - 1 based on AQ Directive definitions
 - 1 no use any definition
 - 2 use definition of Spangl (2007) based on similarity in air concentrations and also in emission and dispersion conditions during at least one year.

First overview of replies from participants so far

- **Question 4. Methodologies.**

- Most of them use all type of methodologies (model, proxies and measurements). Not clear in what cases use each method.
- All use modelling.
- Most cover all main pollutants and all type of stations.
- Mostly yearly basis, but one participant also applies methodology to daily and hourly concentration data.
- Spatial scales mostly ranging from 100 m to 5 km, but one participant said it can be extended to any scale with suitable data.
- Some answers about limitations of methodologies: expert knowledge, model uncertainties, proxies(emissions) data uncertainties, time scale (annual), linked to directive metrics, etc.

First overview of replies from participants so far

Question 4. Methodologies.

- Methods which are based on an estimate of the spatial distribution of pollutants to which a set of suitable statistical similarity criteria is then applied.
 - Concentration fields derived from observations
 - Concentration fields derived from air quality modelling
 - Methods which are based on pollutant proxies and / or surrogate data.
 - Methods which are linked to the classification of stations or sites
- We encourage contributions from all of these methodologies.***

First overview of replies from participants so far

- **Question 5. Input data.**
 - Regular AQ monitoring station data. 3 replies
 - Sampling campaigns. 2 replies.
 - AQ modelling. 4 replies (all).
 - Emission inventories. 3 replies.
 - Meteorological or/and climatological data. 4 replies (mostly for models).
 - Other surrogate data. 4 replies (all) (Land use, traffic intensities, etc).
 - Station classification. No replies.

First overview of replies from participants so far

- **Question 6. Output data.**
 - No feedback from one participant.
 - All remaining participants providing detailed maps of the area of representativeness.
 - From these maps other outputs (scale, area, etc) could be derived.
- **Question 7. Transferability of the methodology to other regions.**
 - Most of participants said yes with suitable input data.
 - One participant remarks the limitation of his methodology to flat terrain.

First overview of replies from participants so far

- **Question 8. Participation in the intercomparison exercise:**
 - All said yes, but one is not sure of having the capacity to do it.
 - Timetable (6 months) is OK for most of those who replied.

First overview of replies from participants so far

- **Question 9. Requirements related to the SR methodology:**
 - One reply: limited to NO₂ and PM10,
 - Other 3 replies: no pollutant limited
 - Concerning site limitations (no feedback from two participants), one reply no limitation, one reply limited to a domain of 3x3 km.
 - Concerning data set limitation (no feedback in one reply), mostly limited to availability of the input data (emissions, meteorology, concentrations, land cover, traffic intensities, etc)

First overview of replies from participants so far

- **Question 10. Recommendations about the exercise:**
 - Compare the extent of SR areas and its characteristics.
 - Compare SR maps from different methods.
 - Compare with unified reference SR, → How to agree that?
 - Compare intermediate steps outputs as concentration maps.

First overview of replies from participants so far

- **Question 10. Recommendations about the exercise (continued):**
 - One person suggests:
 - Needed prior agreement on:
 - SR definition
 - SR assessment methodologies. Based on time scale, metrics, parameters of SR and similarity criteria.
 - Only results based on same definitions can be compared.
- **Question 11. Confidentiality:**
 - No problem.

Final remarks

We highly encourage participants to fill the questionnaire

Questionnaire can be downloaded from:

<http://fairmode.jrc.ec.europa.eu/cca1.survey.2015.html>

Two documents:

- *Questionnaire:*
- *Preamble and explanations:*

Discussion