Agenda WG1

Wednesday 24th June 2015

- 17:45-18:00 Methodology to detect outliers in the AirBase database (O. Kracht, JRC)

Thursday 25th June 2015

- 11:00-13:00 WG1 - Session 5 – CCA Spatial Representativeness
  - 11:00-12:30 Outcomes of the survey & conclusions on the feasibility and possible design of an intercomparison exercise (F. Martin, J.L. Santiago, M. Gerboles & O. Kracht; CIEMAT, JRC)
  - 12:30-13:00 Discussion (all WG1 participants)

Agenda WG1

Thursday 25th June 2015

- 11:00-11:15 Methodology to detect outliers in the AirBase database (O. Kracht, JRC)
- 11:20-13:00 WG1 - Session 5 – CCA Spatial Representativeness
  - 11:20-12:30 Outcomes of the survey & conclusions on the feasibility and possible design of an intercomparison exercise (F. Martin, J.L. Santiago, M. Gerboles & O. Kracht; CIEMAT, JRC)
  - 12:30-13:00 Discussion (all WG1 participants)

Proposed Intercomparison Exercise: Spatial Representativeness of Air Quality Monitoring Stations

Oliver Kracht, Michel Gerboles (JRC)

Fernando Martín, José Luís Santiago, Laura García

CIEMAT, SPAIN

FAIRMODE
Forum for air quality modelling in Europe

CCA Spatial Representativeness

Fairmode Technical Meeting
24th and 25th June 2015

Aveiro - Portugal

IC Exercise

Overview

Introduction (O. Kracht, 10 min)

J.L. Santiago (20-25 min)

- State of the art (literature study results)
- Survey design
- Survey results

F. Martin (20-25 min)

- Feasibility study
- Outcomes and conclusions
- Proposal of the intercomparison exercise
- Need of detailed dataset specifications

Discussion with the participants (30 min)

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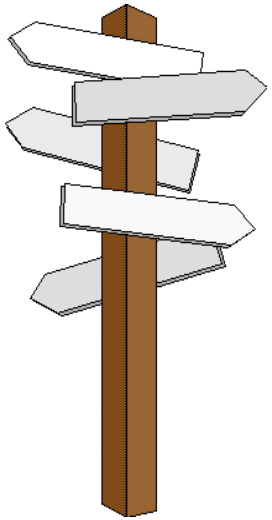
FAIRMODE proposed 2014 – 2016 roadmap:

Cross-cutting activity on spatial representativeness



- **…**
- Evaluate the feasibility of **methodological comparisons on SR**, preferably on shared datasets. The methodological diversity of the different approaches might impose significant challenges in this regard.

Work Plan

The exercise shall:

- Be **executed by different groups**, but on the same **shared dataset**.
- Cover as much as possible the total **variety and diversity of procedures which are in use today** - ranging from methods with moderate complexity, used for pragmatic purposes, to those which involve higher levels of data requirements and computational efforts.

We anticipate a **considerable variety** of different types of spatial representativeness methods:

1. Methods immediately **based on an estimate of the spatial distribution of pollutants** combined with a set of statistical similarity criteria

   a. Concentration fields derived from **observations**

   b. Concentration fields derived from air quality **modelling**

2. Methods **based on pollutant proxies and / or surrogate data** (e.g. emissions, population density, land use) in combination with a set of statistical similarity criteria

3. Methods **linked to the classification** of stations or sites

Outputs (SR results) may range from:

1. Detailed **geospatial descriptions** of the SR area (spatial polygons, maps …)
2. Quantifications by **simplified geometric concepts** (radius of the SR area, length of street segment …)
3. **Semi-quantitative estimates** (scale or the order of magnitude of the SR area)
4. An estimated spatial variance or other **statistical parameters**
5. Characterisations by surrogate categorical attributes (different types of **station classification schemes**)
6. Other means of reporting, including **qualitative descriptions**

Schedule and Mode of Operation

A. <u>Feasibility study and survey</u>

1. Timeframe: October 2014 until June / July 2015
2. Organisation:
   - Mainly the hands of CIEMAT (F. Martin & J. L. Santiago Del Rio)
   - JRC functions as a coordinator

B. <u>Preparation of shared datasets / Preparation of the Intercomparison exercise</u>

1. Timeframe: from ca October 2015
2. Organisation:
   - JRC

Schedule and Mode of Operation

C. <u>Actual execution of the intercomparison</u>

1. Timeframe: in the course of 2016
2. Prerequisites:
   - Check of input data availability for each participant
   - Coordinate systems …
   - Agreement on data treatment for the outcomes
     - Suggestions welcome

Scope of the Feasibility Study (✓done)

- **Evaluate the feasibility** of the actual methodological intercomparison exercise
- Identification of **candidate methods**
- Requirements on **shared datasets**
- Assessment of the **comparability** of the different types of spatial representativeness results
- Investigate about the **best way to compare** the outcomes of the different spatial representativeness methods
- Identify the **limitations** to be expected

IC Exercise

European Commission

Survey

Feasibility Study and Survey

Nov. / Dec. 2014: Design of Questionnaires

FAIRMODE Survey on Spatial Representativeness Methods 26/01/2015

Intercomparison Exercise:

Spatial Representativeness of Ambient Air Quality Monitoring Stations

Introduction and Background

Oliver Kracht (JRC)

Part I:

- Survey about methodologies for estimating the spatial representativeness (SR) of air quality monitoring stations (AQMS)
- Feasibility study for a prospective intercomparison exercise

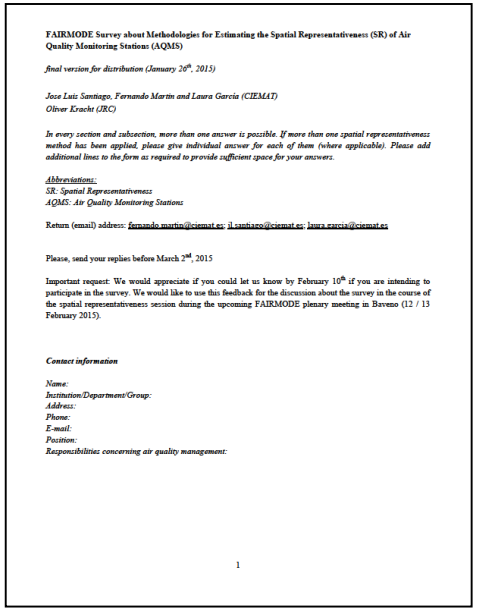
Introduction

Spatial representativeness of air quality monitoring stations has been investigated and discussed intensively in the past within FAIRMODE and AQUILA. However, no well-established procedure for assessing spatial representativeness has been identified so far. Also in the scientific literature, there is no unified agreement to address this complex problem.

It is FAIRMODE's ambition to further explore this topic and make progress in the assessment procedure of spatial representativeness. As a next step into this direction, we would like to propose the organization of an intercomparison exercise of methods for the assessment of the spatial representativeness of monitoring sites. The main objective of this exercise will be to explore the strengths and weaknesses of the different contemporary approaches by applying them to a jointly used example case study. For this purpose, we would like to cover as much as possible of the total variety and diversity of procedures which are in use today - ranging from methods with moderate complexity, used for pragmatic purposes, to those which involve higher levels of data requirements and computational efforts. In consequence, this will likely imply that we need to deliberately accept that for this first intercomparison exercise the pool of investigated methods will not necessarily share a strictly unique definition of spatial representativeness. It shall actually be one of the aims of the preceding feasibility study to investigate about the best way to compare the outcomes of the different spatial representativeness methods (i.e. to evaluate if the intercomparison should rather be directed towards a comparison of methodologies, or towards an actual validation).

From a regulatory point of view, directive 2008/50/EC stipulates several requirements for the siting of fixed monitoring stations, including considerations concerning their spatial representativeness. The Implementing Decision 2011/850/EU specifies in ANNEX II that information about spatial representativeness should be reported "where available", as part of

1



FAIRMODE Survey about Methodologies for Estimating the Spatial Representativeness (SR) of Air Quality Monitoring Stations (AQMS)

final version for distribution (January 26th, 2015)

Jose Luis Santiago, Fernando Martin and Laura Garcia (CIEMAT)
Oliver Kracht (JRC)

In every section and subsection, more than one answer is possible. If more than one spatial representativeness method has been applied, please give individual answer for each of them (where applicable). Please add additional lines to the form as required to provide sufficient space for your answers.

Abbreviations:
SR: Spatial Representativeness
AQMS: Air Quality Monitoring Stations

Return (email) address: fernando.martin@ciemat.es; jl.santiago@ciemat.es; laura.garcia@ciemat.es

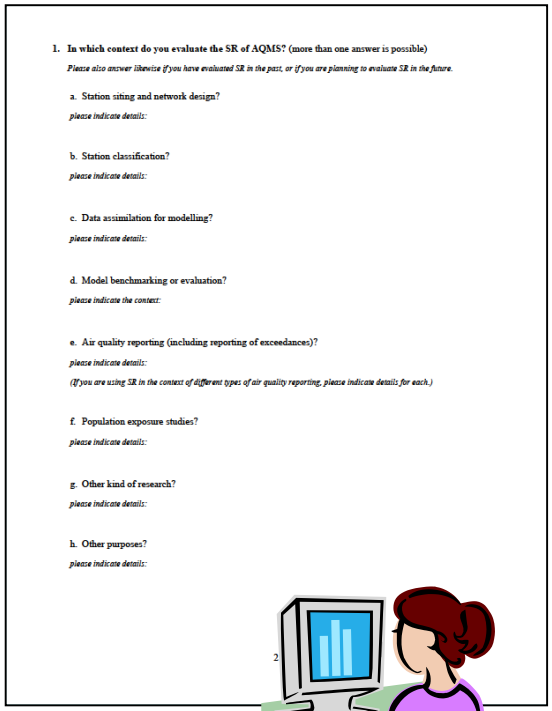
Please, send your replies before March 2nd, 2015

Important request: We would appreciate if you could let us know by February 10th if you are intending to participate in the survey. We would like to use this feedback for the discussion about the survey in the course of the spatial representativeness session during the upcoming FAIRMODE plenary meeting in Baveno (12 / 13 February 2015).

Contact information

Name:
Institution/Department/Group:
Address:
Phone:
E-mail:
Position:
Responsibilities concerning air quality management:

1



1. **In which context do you evaluate the SR of AQMS?** (more than one answer is possible)

Please also answer likewise if you have evaluated SR in the past, or if you are planning to evaluate SR in the future.

a. Station siting and network design?

please indicate details:

b. Station classification?

please indicate details:

c. Data assimilation for modelling?

please indicate details:

d. Model benchmarking or evaluation?

please indicate the context:

e. Air quality reporting (including reporting of exceedances)?

please indicate details:

(If you are using SR in the context of different types of air quality reporting, please indicate details for each.)

f. Population exposure studies?

please indicate details:

g. Other kind of research?

please indicate details:

h. Other purposes?

please indicate details:

2

Joint Research Centre

European Commission

Feasibility Study and Survey

- ✓ Nov. / Dec. 2014: Design of Questionnaires
- ✓ Jan. 2015: Review of Questionnaires

Many thanks to J. Geiger, A. G. Ortiz, G. Pirovano, F. de Leeuw, L. Malherbe, M. Ross-Jones, and W. Spangl !

FAIRMODE Survey on Spatial Representativeness Methods 28/01/2015

Intercomparison Exercise:

Spatial Representativeness of Ambient Air Quality Monitoring Stations

Introduction and Background

Oliver Kracht (JRC)

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FAIRMODE Survey about Methodologies for Estimating the Spatial Representativeness (SR) of Air Quality Monitoring Stations (AQMS)

final version for distribution (January 26th, 2015)

Jose Luis Santiago, Fernando Martin and Laura Garcia (CIEMAT)
Oliver Kracht (JRC)

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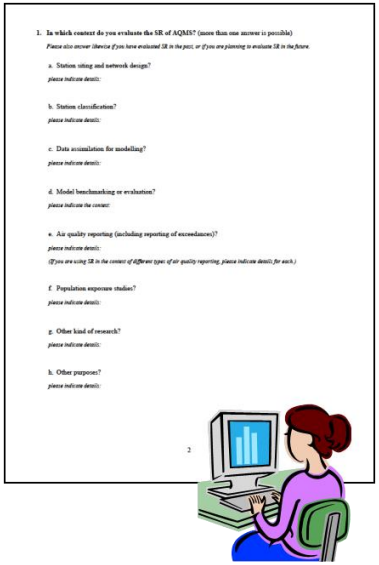

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please indicate details:

g. Other kind of research?
please indicate details:

h. Other purposes?
please indicate details:

2

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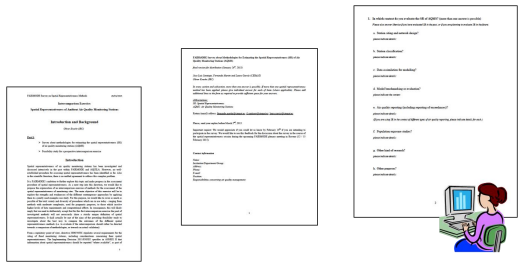
Main comments / suggestions by the reviewers:

1. To focus strictly on spatial representativeness leaving out other aspects as station classification.
2. No changes in the main structure.
3. Some smaller changes to clarify questions and preselected answers.



Discussion about how to carry out the intercomparison exercise:

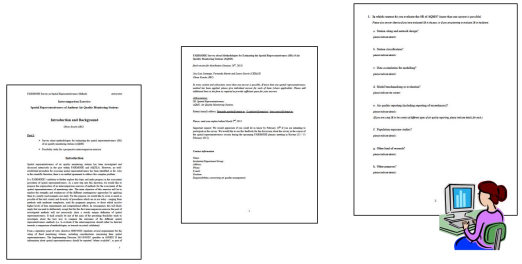
1. Need of a previous agreement on SR definition taking into account time scales?
2. Only compare methodologies based on same SR definition?

Finally decided that it would probably be necessary to accept that the pool of investigated methods will not necessarily share a strictly unique definition of spatial representativeness.

Feasibility Study and Survey

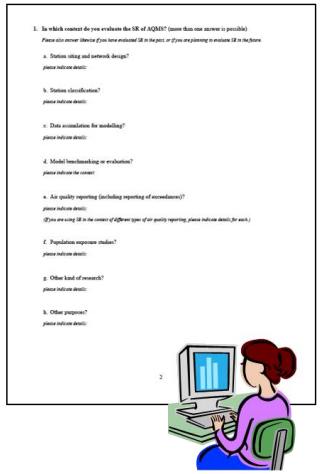
- ✓ Dec. 2014: Design of Questionnaires
- ✓ Jan. 2015: Review of Questionnaires
- ✓ Final version of questionnaire was sent to:
  - FAIRMODE members
  - AQUILA members
  - FAIRMODE national contact points
  - International experts

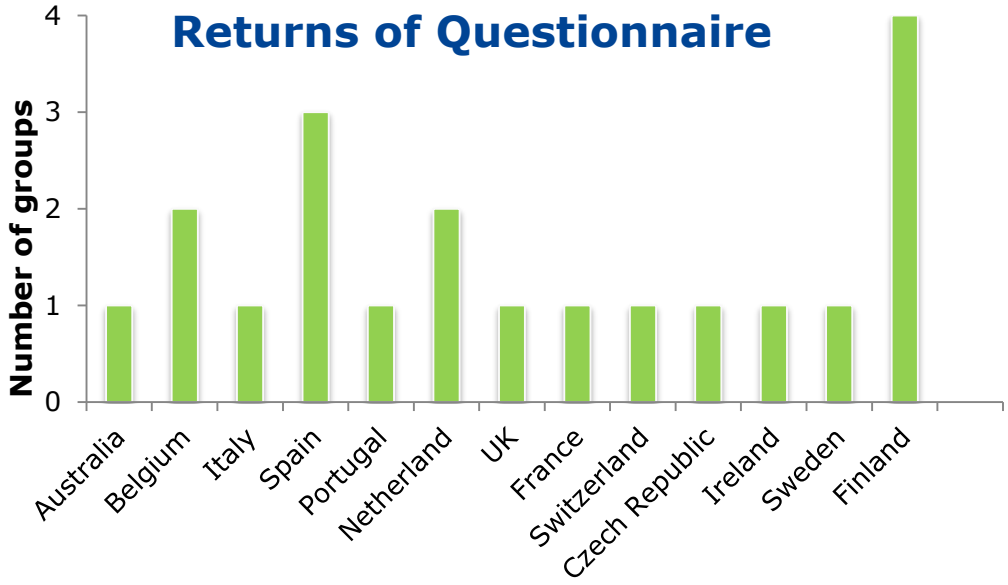
  (identified from literature study)



Feasibility Study and Survey

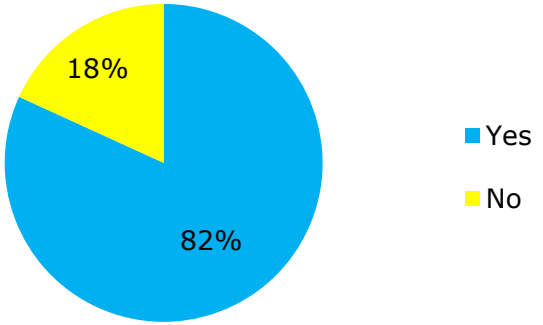
- ✓ Dec. 2014: Design of Questionnaires
- ✓ Jan. 2015: Review of Questionnaires
- ✓ March 2015: Final Collection of Replies
- ✓ June / July 2015: Evaluations and Report





22 Replies

Interested in Participating

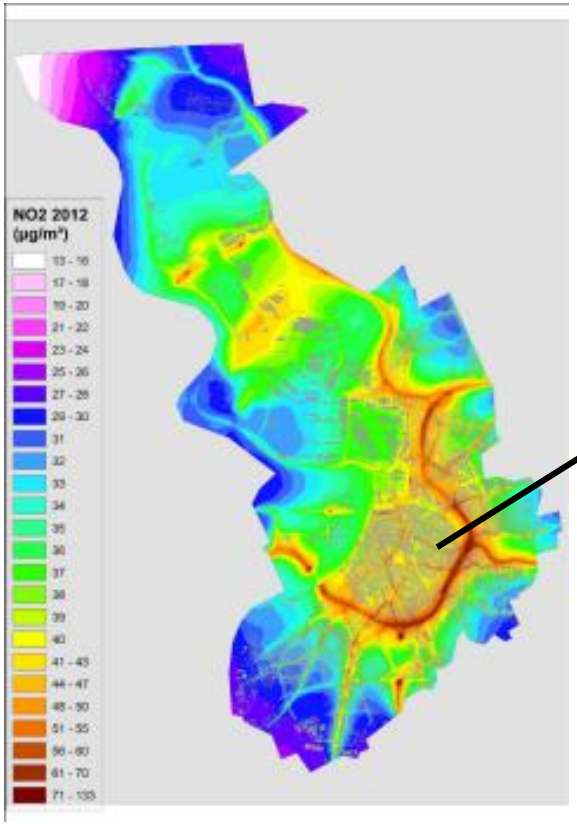


Prospective Participation for the Intercomparison Exercise

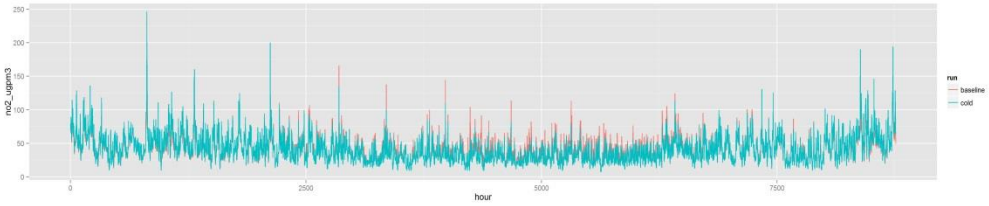
Participation	Number of groups
Yes	18
No	4
Total	22

Suggestions for Shared Datasets

Example: 2012 IFDM Model results for Antwerp



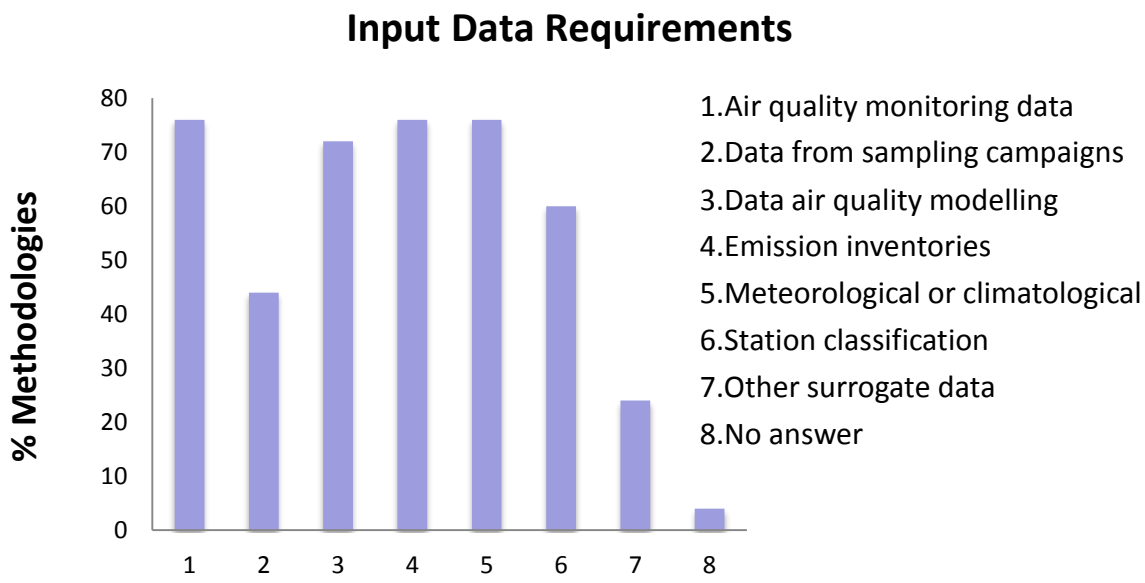
- Annual average concentration, res≈20m (irregular grid)
- Hourly time series on previously specified points, e.g. monitoring stations, sampler positions. (8760 values, 140KB/pt)



The modelling domain can be adapted and extended.

Required Dataset Specifications

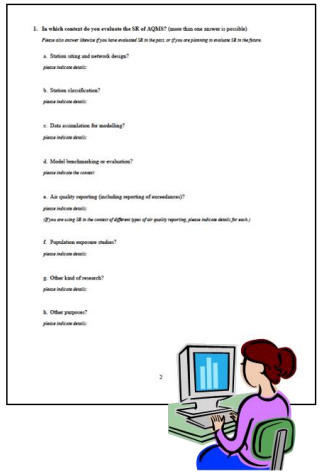
More detailed information about the group-specific requirements for the set of input data is needed.



European Commission

Thank you for your attention!

Now more details will follow about the outcomes of the survey and feasibility study.



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