FAIRMODE
Forum for air quality modelling in Europe

WG3 Source Apportionment

FAIRMODE Technical Meeting: 19-21 June 2017, Athens, Greece

Source Apportionment Survey and Guide: current status and open questions

Guido Pirovano

Mihaela Mircea Giuseppe Calori

Claudio Belis

Italian National Agency for New Technologies, Energy and Sustainable Economic Development

FAIRMODE WG3 Survey about estimation of particulate matter source contributions with source oriented models (SM) and/or receptor (RM) models

Please, send your replies before June 10th, 2017

Type of study: 1) SM&RM 2) SM 3) RM

1) SM&RM: Please describe your study in 1-2 pages, considering the following:

-specify if your study addresses source categories or source regions contributions;

-give details about the investigated area, spatial resolution of simulations, AQ model, input data (meteorology, emissions, and boundary conditions), model validation;

-specify if you used assimilation techniques;

-describe the measured data, the RM model and the approach used;

Please add a brief presentation of results and of the problems you encountered in this study.

In which context did you perform the study? *(more than one answer is possible)*

a) Is the study linked to legislative or regulatory purposes (e.g., air quality management, legislation compliance or development of new legislation)?

b) Air quality reporting (including reporting of exceedances)?

c) Other kind of study? (please give details)

FAIRMODE WG3 Survey about estimation of particulate matter source contributions with source oriented models (SM) and/or receptor (RM) models (continued)

Similar requests for **2) SM** and **3) RM** studies

AND

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

Survey summary

Study type:	SM&RM	SM	RM
Number of studies received:	**2**	**10**	**115**

SM&RM – research studies

Country	Pollutant	RM	CTM	SA approach	Resolution	Year
Italy	PM2.5	CMB	CAMX	PSAT	5 km	2005
Italy	PM2.5 and PM10	PMF	CAMX	PSAT	1.1 km	June - August 2011 November, 15 - December, 15 2011

AND

Source apportionment inter-comparison exercise RM-SM initiated in 2015 with data from the reference site Lens (France)

Survey summary (continued)

Study type:	SM&RM	SM	RM
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- **SM** – 6 studies in support to air quality management, 1 for support for derogation from limit values and 3 for air quality management and legislation compliance

Study area	Pollutant	CTM	SA approach	Resolution	Year	
Berlin	PM10	LOTOS-EUROS		7 x 7 km	2015	
Dutch territory	PM10, PM2.5	LOTOS-EUROS	labeling routine	7 x 7 km	2007-2009	
Flanders	PM10, PM2.5	LOTOS-EUROS	labeling routine	7 x 7 km	2007-2011	
Slovakia	PM10	CALPUFF		horizontal resolution of 200–500 m, depending on the complexity of the terrain.	-	Lagrangian air quality model
Europe AQMEII	PM2.5	CAMX	OSAT/PSAT	23 km	-	
Iberian Peninsula,the Azorean, Balearic and Canary archipelagos	PM10	-	Hidden Markov models (HMM)	-	2009-2013	Quantification of Saharan dust contribution
from a street canyon to a whole city/several cities	PM10	EURAD, LASAT, Miskam, EURAD-IM, EURAD-Fladis	-	from single meters to 250 m, in some cases up to 1 km	-	
Italy	PM10	AMS-MINNI	brute force method	20 km	scenarious 2011	
Flanders	PM10, PM2.5	BelEUROS	brut force method	60km, 15 km	2007, scenarious 2020	
port of Ghent, Flanders	PM10, PM2.5	RIO-IFDM-OSPM	-	-	-	

Survey summary (continued)

Study type:	SM&RM	SM	RM
Number of studies received:	**2**	**10**	**115**

RM: 16+14+28+45 studies published or carried out after 2010
28: reported by Greece 9, Italy 5, Hungary 4, Czech Republic 4, Netherlands 3, Serbia 1, Poland 1 and Bulgaria 1
14: reported by UK
28: reported by France
45: reported by US and cover Asia, Africa, North America and Europe
Most of them use **PMF**, different versions, very few PCA and CMB.
Almost all are research studies.
Particular case: factor analysis techniques applied to Proton-Nuclear Magnetic Resonance (^{1}H-NMR) spectroscopy datasets for the identification of recurrent source contributions to the aerosol water soluble organic carbon (WSOC).

Source Apportionment Guide – new proposal

Title : European Guide on Air Pollution Source Apportionment for estimating particulate matter source contributions with source oriented and receptor models

1 Introduction

1.1 Aims – link with WG4 (…)

1.2 Audience (…)

1.3 Why use source oriented models (SM) and receptor models (RM)? (…)

1.4 Source apportionment with source oriented models -link with WG1 (Primary aerosol: Gaussian steady-state and Lagrangian and Lagrangian puff models, Primary and secondary aerosol: Eulerian photochemical grid models, Sensitivity analysis methods, Reactive tracer methods) (Giuseppe Calori – ARIANET; Guido Pirovano – RSE, ….)

1.5 Source apportionment with receptor models (see previous guide, http://source-apportionment.jrc.ec.europa.eu/downloads.aspx) (Claudio Belis, JRC; …)

Source Apportionment Guide – new proposal (continued)

Title : European Guide on Air Pollution Source Apportionment for estimating particulate matter source contributions with source oriented and receptor models

2 Modelling source impacts

4.1 Source categories and/or source regions **-** link with WG2 (…)
4.2 Representativeness of the domain and time period**-**link with CCA1 - Spatial representativeness (…)
4.3 Spatial and temporal resolutions of simulations (…)
4.3 Emission inventories **-** link with WG2 (Assimakopoulos)
4.4 Natural emissions (Assimakopoulos)
4.5 Boundary conditions (…)
4.6 Meteorology (…)
4.7 Model evaluation-MQO **-** link with WG1 (…)
4.8 Estimate modelled source contributions (…)

3. Updates of receptor modelling guidance

3.1 Wind and trajectory analysis in source apportionment. The advantage of Trajectory Statistical Methods and Classifications of Atmospheric Circulation Patterns. (Pedro Salvador – CIEMAT; Argyropoulos, Vratolis)
3.2 Use of Proton-Nuclear Magnetic Resonance (^{1}H-NMR) spectroscopy datasets to improve the identification of source contributions to the aerosol water soluble organic carbon (WSOC). (CNR Bologna?)
3.3 Use of spectrometric techniques for SA of the fine aerosol organic fraction (AMS, ACSM, etc.) (El Haddad?)
3.4 Methods for the apportionment of the carbonaceous fraction (aethalometer, 14C, etc. (Diapouli)
3.5 Revise CMB section (Harrison, Argyropoulos)
3.6

Source Apportionment Guide – new proposal (continued)

Title : European Guide on Air Pollution Source Apportionment for estimating particulate matter source contributions with source oriented and receptor models

4 Evaluation of estimated source contributions

4.1 Impact of input data uncertainties (sensitivity) on source contributions from AQ/CTM (…)

4.2 Impact of uncertainties on source contributions from RM (Diapouli, Manousakas)

4.3 Comparison of source contributions from AQ/CTM and receptor modelling (RM) approaches **-** link with previous and ongoing work in WG4 (Martijn Schaap -TNO, Ulrich Quass – IUTA; …)

4.4 Combined use of AQ/CTM and RM source contributions: hybrid approaches **-** link with previous and ongoing work in WG4 (Guido Pirovano – RSE;…)

References

Appendix 1: Applications of AQ/CTM and RM models for estimating particulate matter source contributions in Europe

New applications with respect to those from **Guidance on the use of models for the European Air Quality Directive**

Many thanks to all participants at SA survey !!!!!!!!!!!!!!!

Name	Institution
Paolo Prati	Department of Phsyics and INFN, Italy
Sabine Banzhaf	Freie Universitaet Berlin, Institute of Meteorology, Germany
Martijn Schaap	Climate, Air and Sustainability, Utrecht, the Netherlands
Jana Matejovicová	Slovak Hydrometeorological Institute, Bratislava, Slovakia
Álvaro Gómez Losada	European Commission, Joint Research Centre, Economics of Climate Change, Energy and Transport, Seville, Spain
José Carlos M Pires	University of Oporto / LEPABE, Portugal
Heike Hebbinghaus	LANUV NRW, FB 41, Essen, Germany
Sabine Wurzler	LANUV NRW, FB 41, Essen, Germany
Peter Viaene	VITO, Belgium
Hans Hooyberghs	VITO, Belgium
Jean-Luc Jaffrezo	CNRS – IGE Grenoble, France
Dennis Mooibroek	RIVM, the Netherlands
Jordy Vercauteren	VMM (Flemish Environment Agency), Belgium
Dikaia Saraga	NCSR Demokritos, Environmental Research Laboratory; Athens, Greece
Georgios Argyropoulos	Environmental Pollution Control Laboratory, Aristotle University of Thessaloniki
Konstantinos Eleftheriad	NCSR “Demokritos”, INRASTES, Environmental Radioactivity Laboratory, Greece
Anastasia Poupkou	Laboratory of Atmospheric Physics, Department of Physics, Aristotle University of Thessaloniki, Greece
Zsófia Kertész	Institute for Nuclear Research, Hungarian Academy of Sciences, Laboratory of Ion Beam Physics, Debrecen, Hungary
Mirjana Radenkovic	Vinca Institute of Nuclear Sciences/Radiation and Environmnetal Protection Laboratory , Belgrade, Serbia
Petra Pokorná	Institute for Environmental studies, Faculty of Science, Charles University/Institute of Chemical Process Fundamentals, Cze
Ondřej Vlček	Czech Hydrometeorological Institute, Air Quality Division, Modelling and Assessment Department, Prague, Czech Republic
Blagorodka Veleva	National Institute of Meteorology and Hydrology, Sofia, Bulgaria
Magdalena Reizer	Warsaw University of Technology (WUT), Faculty of Building Services, Hydro and Environmental Engineering, Air Pollution C
Roberta Vecchi	University of Milan, Dept. of Physics, Italy
Silvia Nava	INFN, Florence, Italy
Marco Paglione	National Research Council of Italy – Institute of Atmospheric Sciences and Climate (CNR-ISAC), Atmospheric chemistry gro
Stefano Decesari	Institute of Atmospheric Sciences and Climate (CNR-ISAC), Atmospheric chemistry group, Bologna, Italy
Daniele Contini	Institute of Atmospheric Sciences and Climate (CNR-ISAC), Atmospheric chemistry group, Bologna, Italy
Maria Grazia Perrone	Research Center POLARIS, University of Milano-Bicocca, Milan, Italy
Roy M. Harrison	School of Geography, Earth & Environmental Sciences, University of Birmingham, UK
Philip K. Hopke	Clarkson University , Postdam, NY, US

I apologise for the errors.
I am waiting for your corrections/suggestions/etc…

Interested to contribute to the SA guide????

mihaela.mircea@enea.it

Please, send a message to the email address above before 15 July 2017.

Due date for the contributions is 15 September 2017 (some extra time may be agreed upon)