

Minutes of the 3rd Workshop on  
"The Source Apportionment of Atmospheric Pollutants"  
Ispra, 27th-28th February 2013

### Introduction

The workshop, co-organized by European Commission - Joint Research Centre and ACCENT PLUS took place on 27th-28th February 2013 in Ispra (Italy) and was attended by more than 50 experts from 13 different countries. The main objectives of the workshop were to discuss the progress of the harmonization activity carried out within the framework of the JRC Initiative on Receptor Models in collaboration with FAIRMODE and AQUILA. In particular, were discussed: the review of source apportionment studies using receptor models in Europe, the preliminary results of the second intercomparison for receptor models and the draft of the European protocol for receptor models. In addition, new developments in the field of source apportionment, like the new PSI toolkit and a comparative study using Chemical Transport Models (CTMs) and Receptor Models (RMs), were also illustrated. The opening speech was given by Elisabetta Vignati, Head of the Unit Air and Climate. The keynote "New Tools for Improved PMF analysis" was presented by the special guest Prof. Philip K. Hopke from Clarkson University (New York State, US).

The workshop was structured in three sessions

- Session 1. Source Apportionment: US Experience and EU Developments
- Session 2. European Intercomparison Exercise for Source Apportionment with Receptor Models 2012-2013
- Session 3. Receptor Model Technical Protocol (RMTP)

### Summary of the presentations

In the first session the relevance of the initiative in the broader context of the JRC activity in the field of air pollution and the revision of the Thematic Strategy of Air Pollution was discussed by Elisabetta Vignati and Annette Borowiak. Stefano Galmarini and Philippe Thunis presented the progress achieved in FAIRMODE and APPRAISAL projects, respectively, and their connections with the source apportionment work.

Claudio Belis outlined the JRC initiative "Harmonisation of Source Apportionment using Receptor Models in Europe" and summarized the review on receptor models.

Monica Crippa (PSI) presented the new user-friendly multilinear engine (ME) tool developed by the PSI for the advanced treatment of aerosol data collected with spectrometric techniques (e.g. Aerosol Mass Spectrometer).

In the keynote speech by Philip Hopke, Nicholas Marshall and Pentti Paatero, a preview of the new features of the next EPA PMF version for enhanced uncertainty estimation with particular reference to the new algorithms to assess rotational uncertainty was given.

In the second session the focus was on the methodology to develop a synthetic dataset using a CTM, presented by Guido Pirovano (RSE), followed by the discussion of the methodological aspects and preliminary results of the intercomparison evaluation presented by Federico Karagulian and Claudio Belis.

Imad El Haddad (PSI) described the methodology used for resolving the sources using the CMB approach.

Luca Spano (PANOPPLIS A – Engineering) illustrated the structure, currently available services and future developments of the new JRC source apportionment website: <http://source-apportionment.jrc.ec.europa.eu/>.

The third session was devoted to the illustration of the second draft of the European Common Protocol for receptor models and the comments and suggestions from the audience.

The last presentation by Martjin Schaap aimed at illustrating an innovative approach to quantify source contribution by comparing CTM and PMF approaches in north-western Europe.

### Main outcome of the workshop

- The relevance of source apportionment for air quality management with particular reference to the development of abatement measures is widely recognized.
- Source Apportionment methods are continuously evolving thanks to the developments in the measurement techniques and the refinement and integration of the data elaboration tools.
- The three main tasks of the JRC initiative on source apportionment are completed or at an advanced stage:
  - the review of RM in Europe is completed (2 scientific publications),
  - the evaluation of the first step of the intercomparison exercise is completed (report published and copies distributed during the workshop),
  - the second intercomparison step has been evaluated and the preliminary results are available (report in preparation),
  - the second draft of the European protocol for receptor models and will be published as a JRC special report.
- The participation of Hector Jorquera (Chile) and Paulo Artaxo (Brasil) has extended the scope of the intercomparison beyond the European borders promoting harmonization in an international context.
- The results of the first intercomparison step and the first draft of the European common protocol for receptor models were presented in the European Aerosol Conference 2012 (Granada). An abstract with the preliminary results of the second step was submitted to the 2013 European Aerosol Conference to be held in Prague.
- The majority of the participants agreed on the opportunity to organize a third intercomparison exercise preferably using a real-world dataset containing organic

markers. The JRC will take the necessary steps and participants will provide datasets to be selected for the exercise.

- There was a general agreement on the need to create a European repository of source profiles to support the source apportionment studies in Europe. The JRC will propose a new task inviting the experts to contribute.
- With aim of promoting the exchange of information between European source apportionment experts, the JRC will maintain and develop the source apportionment website (<http://source-apportionment.jrc.ec.europa.eu/>).
- The presentations of the workshop will be available on the above mentioned website.

## References

- Belis C.A., F. Karagulian, B. R. Larsen, F. Amato, O. Favez, I. El Haddad, R.M. Harrison, A. Prevot, U. Quass, R. Vecchi, M. Viana, P. Paatero, P.K. Hopke. 2012. Towards a European Common Protocol for Receptor Modelling. European Intercomparison for Receptor Models:Preliminary Results. European Aerosol Conference, Granada 2-7 September 2012. Abstract
- Belis C. A., Karagulian F., Larsen B. R., Hopke P. K., 2013. Critical review and meta-analysis of ambient particulate matter source apportionment using receptor models in Europe. Atmospheric Environment 69, 94-108.
- Belis C.A., F. Karagulian, F. Amato, M. Almeida, G. Argyropoulos, P. Artaxo, M.C. Bove, D. Cesari, D. Contini, E. Diapouli, K. Eleftheriadis, I. El Haddad, R.M. Harrison, S. Hellebust, E. Jang, H. Jorquera, D. Mooibroek, S.Nava, J. K. Nøjgaard, M. Pandolfi, M.G. Perrone, A. Pietrodangelo, G. Pirovano, P. Pokorná, P.Prati, C. Samara, D. Saraga, A. Sfetsos, G. Valli, R. Vecchi, M. Vestenius, E. Yubero, P.K. Hopke. 2013. European Intercomparison for Receptor Models Using a Synthetic Database. European Aerosol Conference 2013 (submitted abstract).
- Karagulian F. Belis C.A., 2012. Enhancing Source Apportionment with receptor models to Foster the Air Quality Directive Implementation. International Journal of Environmental Pollution 50, 190-199.
- Karagulian F., Belis C. A., Borowiak A., 2012. Results of the European Intercomparison exercise for receptor models 2011-2012. Part I. JRC Report EUR 25727 EN.
- Karagulian F., C.A. Belis, F. Amato, D.C.S. Beddows, V. Bernardoni, S. Carbone, D. Cesari, E. Cuccia, D. Contini, O. Favez, I. El Haddad, R.M. Harrison, T. Kammermeier, M.Karl, F. Lucarelli, S.Nava, J. K. Nøjgaard, M. Pandolfi, M.G. Perrone, J.E. Petit, A. Pietrodangelo, P. Prati, A.S.H. Prevot, U. Quass, X. Querol, D. Saraga, J. Sciare, A. Sfetsos, G. Valli, R. Vecchi, M. Vestenius, J.J. Schauer, J.R. Turner, P. Paatero, P.K. Hopke, 2013. European Intercomparison for Receptor Models:Preliminary Results. European Aerosol Conference, Granada 2-7 September 2012. Abstract.



## AGENDA

Initiative on Harmonization of Source Apportionment with Receptor Models  
 3<sup>rd</sup> Workshop on "The Source Apportionment of Atmospheric Pollutants"  
 27<sup>th</sup>-28<sup>th</sup> February 2013

Co-organized by European Commission - Joint Research Centre and ACCENT Plus  
 Venue: Via E. Fermi 2749 - 21027 Ispra (Italy) - Building 36, Room 1 (Amphitheatre)

<b>FIRST DAY</b>		
<b>Session 1. Source Apportionment: US Experience and EU Developments</b>		
09:00	Opening speech	E. Vignati, EC-JRC – HoU, Air and Climate
09:20	Evidence on Health Aspects of Air Pollution to Review EU policies	A. Borowiak, EC-JRC
09:40	Fairmode and the Air Quality Directive Review Process	S. Galmarini, EC-JRC
10:00	The project APPRAISAL: Integrated Assessment for Local Air Quality Policies	P. Thunis, EC-JRC
10:20	COFFEE BREAK	
10:40	The initiative: "Harmonisation of Source Apportionment using Receptor Models in Europe": Outline and Developments	C. A. Belis, EC-JRC
11:00	<b>Keynote:</b> New Tools for Improved PMF Analyses	P. Hopke, Clarkson University & P. Paatero, University of Helsinki
12:00	New PSI Toolkit for Source Apportionment	M. Crippa, PSI
12:20	LUNCH IN THE JRC MENSA	
<b>Session 2. European Intercomparison Exercise for Source Apportionment with Receptor Models 2012-2013</b>		
14:00	Presentation of the Synthetic Dataset	G. Pirovano, RSE
14:20	Methodological Approach in Data Elaboration	C. A. Belis, EC-JRC
14:40	Intercomparison Second Step: Preliminary Results	F. Karagulian, EC-JRC
16:00	COFFEE BREAK	
16:20	CMB Approach Used to Model the Synthetic Dataset	I. El Haddad, PSI
16:40	Discussion of the Preliminary Results	ALL
17:20	A Website to Support Source Apportionment in Europe	L. Spano, PANOPLIS A – Engineering
17:40	Conclusions of the First Day	ALL
18:00	END OF FIRST DAY	
<b>SECOND DAY</b>		
<b>Session 3. Receptor Model Technical Protocol (RMTP)</b>		
09:00	Presentation of the Receptor Model Technical Protocol Drafting Committee: F. Amato, C. A. Belis, O. Favez, I. El Haddad, R. Harrison, P.K. Hopke, F. Karagulian, B. R. Larsen, P. Paatero, A. Prévôt, U. Quass, R. Vecchi, and M. Viana	C.A. Belis, EC-JRC
10:30	COFFEE BREAK	
11:00	Discussion on the Receptor Model Technical Protocol	ALL
11:30	Comparing Source Apportionment by CTM and PMF in North Western Europe	M. Schaap, TNO
12:00	Final Discussion and Conclusions of the Workshop	ALL
13:00	LUNCH IN THE JRC MENSA	

## List of participants

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HOPKE PHILIP K.	Clarkson University, CARES
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