

MODELS FOR PARTICULATE MATTER IN USE IN EUROPE - A COST633 EXERCISE

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1 Why to model PM?

Increased understanding of the health issues associated to elevated concentrations of particulate matter (PM) has made this one of the critical air pollution problems in Europe. Exceedance of thresholds has been reported by the majority of the EU member countries, mainly in urban agglomerations, where human exposure is also higher (EEA, 2005).

Air quality models simulate the transport and transformation of PM and their precursor compounds in the atmosphere. Thus they can provide important information on the relation between PM emissions and ambient air concentrations. Therefore, modelled PM concentration fields are a fundamental tool when exposure and health effects are under assessment and/or air quality management strategies should be defined.

2 Objective

The main objective of this work is to provide an overview of the application of PM models in European COST633 Action member countries, within Working Group 3 (Sources, Emissions, Modelling, Economic Aspects) activities.

The approach was mainly case-study oriented trying to summarise PM modelling application in each country. The resulting overview allows potential users of air quality models to understand which geographical areas have been covered already by extensive information.

3 Methodology

Several models are already available and in use in European countries. A questionnaire was sent out to identify PM modelling work in a common usable framework.

This questionnaire was forwarded to Member States modellers. The collected information was compiled in a database.

Answer Country	Case Study	Model used + web page	PM modelling		Time resolution	Spatial resolution	Domain	Validation	Contact Person	Available documents (papers, reports,...)	Other Info
			Primary	Secondary							
Austria...											

4 Results

Ten member countries replied to the questionnaire reporting a total of 30 case studies applications.

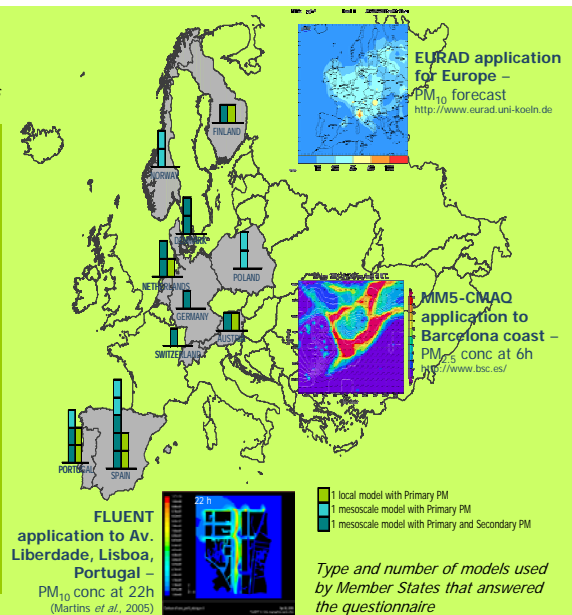
Primary aerosols were simulated in all the case studies, whereas secondary aerosols were included in 50% of the cases, estimating not only PM₁₀, but also PM_{2.5} and SOA (secondary organic aerosol).

Several models were applied, in a total of 20, with different scopes and covering different modelling scales, from the local (only simulating primary PM) to the regional scale.

Validation work is associated to each reported case study.

Local and mesoscale models currently used in Europe accordingly to the questionnaire answers

Member State	Used Model	Primary	Secondary	Scale
Austria	CAMx	Yes	Yes	Mesoscale
	NEMO/GRAMM/GRAL	Yes	No	Local
Denmark	DEHM	Yes	Yes	Mesoscale
	THOR	Yes	Yes	Mesoscale
Finland	CAR-MONO32	Yes	No	Local
	SILAM	Yes	Yes	Mesoscale
Germany	EURAD	Yes	Yes	Mesoscale
Norway	AFOUR	Yes	No	Mesoscale
	EPISODE	Yes	No	Mesoscale
Poland	CALMET/CALPUFF	Yes	No	Mesoscale
	AOPS	Yes	No	Mesoscale
Portugal	VADIS	Yes	No	Local
	FLUENT	Yes	No	Local
	MENO	Yes	No	Mesoscale
	CAMx	Yes	Yes	Mesoscale
Spain	CHIMERE	Yes	Yes	Mesoscale
	DREAM	Yes	No	Mesoscale
	CMAQ	Yes	Yes	Mesoscale
	CALMET/MELPUFF	Yes	No	Mesoscale
	CALMET/CALPUFF	Yes	Yes	Mesoscale
	MELPUFF	Yes	No	Local
	SLP-2D	Yes	No	Local
CHIMERE	Yes	Yes	Mesoscale	
Switzerland	CAMx	Yes	Yes	Mesoscale
The Netherlands	CARII	Yes	No	Local
Other	OPS	Yes	Yes	Mesoscale
	LOTOS-EUROS	Yes	Yes	Mesoscale



5 Final Remarks

This overview work is limited to the COST633 member countries and to the individuals participating in the survey. Thus it includes national activities otherwise not available. International exercises like CITY-DELTA (Thunis and Cuvelier, 2004), or EUROTRAC-2 (Noone et al., 2002) are in general considered to be accessible anyway.

It allowed verifying that, in general, member countries are already simulating PM and using models as useful tools to air quality management, namely in what concerns the Air Quality Framework Directive. Modelling should also be regarded as a helpful tool for exposure assessment in the framework of epidemiological studies.

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