

***Interactive comment on* “The representation of dust transport and missing urban sources as major issues for the simulation of PM episodes in a Mediterranean area” by E. Flaounas et al.**

Anonymous Referee #1

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General comments

This study focuses on the simulation, with the CHIMERE model, of PM₁₀ concentrations in the South of France during 2 (1 episode in the abstract) successive PM episodes in June 2006, attributed to the Saharan dust input of PM over local and regional sources. Output of the model is compared with surface measurements. This study shows the relevance of the contributions of external dust (Sahara) and of road dust resuspension in Southern Europe, and demonstrates the need of identifying and quantifying these sources for PM modelling. The importance of these sources in Southern Europe has been already highlighted by a number of papers on PM measurements

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and characterization (not conveniently cited in the paper). But, nevertheless, it is important to stress the significance of these sources for modelling.

Specific comments One of the major conclusions of the paper is the necessity of taking into account the external dust inputs as “a potentially major participant to PM events in Europe”. Thus in the conclusion section it is stated: ” We first demonstrated that it is of primary importance for CTMs to identify and to properly quantify the large-scale advection of dust particles in the Mediterranean. Indeed, we showed that dust outbreak phenomena can influence particle levels in south-western Europe even under the form of moderate episodes, and this has to be taken into account when dealing with regulatory background levels of PM10”.

The contribution of Saharan dust to PM10 levels in southern Europe is a well known and a widely described topic. A number of papers published in the last years aimed to identify and quantify the contribution of Saharan dust on PM in Europe (mainly in the Mediterranean area). These studies have been addressed to evaluate the impact of Saharan dust with three different objectives: impact on health, climate and on the compliance of the EU directives. Most of these papers are not cited in the present study.

As some examples:

Sahara dust episodes in the Mediterranean Astitha, M. et al. (2008). Air pollution modelling in the Mediterranean Region: Analysis and forecasting of episodes. *Atmospheric Research* 89 (2008) 358–364; and references therein Rodríguez S., et al. 2002. Sources and processes affecting levels and composition of atmospheric aerosol in the Western Mediterranean. *Journal of Geophysical Research – Atmospheres*, 107 D24 doi:10.1029/2001JD001488

Impact of Saharan dust on PM Querol X., et al. (2009) African dust contributions to mean ambient PM10 mass-levels across the Mediterranean Basin. *Atmospheric Environment*, 43, 4266- 4277, and references therein Moreno T, et al. 2005. Exotic dust

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incursions into central Spain: Implications for legislative controls on atmospheric particulates. *Atmospheric Environment*, 39, 6109–6120 Rodriguez S., et al. (2001) Saharan dust contributions to PM₁₀ and TSP levels in Southern and Eastern Spain. *Atmospheric Environment*, 35, 2433–2447,

Methods for quantification of Saharan dust contribution to PM₁₀ Ganor, E et al. 2009. A method to determine the effect of mineral dust aerosols on air quality. DOI:10.1016/j.atmosenv.2009.07.028 Mitsakou, C., et al. 2008: Saharan dust levels in Greece and received inhalation doses, *Atmos. Chem. Phys.*, 8, 7181–7192 Escudero, M., et al. 2007, A methodology for the quantification of the net African dust load in air quality monitoring networks, *Atmos. Env.* 41, pp. 5516–5524

In my opinion, it is necessary to include some of these papers in the introduction and discussion sections. Mainly, because the conclusion stated in the paper (cited above) has been previously concluded in most of these papers.

Technical corrections:

Concerning the PM₁₀ annual limit values: the European Directive 2008/50/EC establishes an annual limit value for PM₁₀ of 40 $\mu\text{g}/\text{m}^3$. The more restrictive limit value previously established in the Directive 1999/30/EC (20 $\mu\text{g}/\text{m}^3$) was finally not considered in the more recent Directive.

Methodology: type of PM₁₀ monitors; are these monitors EN12341 type approval? If no; are measurements obtained corrected by comparison with gravimetric methods in accordance to EN12341?

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