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Geoscientific
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Interactive comment on "Ground-level ozone concentration over Spain: an application of Kalman Filter post-processing to reduce model uncertainties" *by* V. Sicardi et al.

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General comments

Referee #1: *This manuscript presents an analysis of the performance of Kalman filter post-processing for ground-level ozone over Spain. Although I would rate the scientific*

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Interactive Discussion

Discussion Paper

quality and reproducibility, and presentation quality as "good", the scientific significance is "poor", given that the presented material introduces little (if any) innovation. Indeed, very similar results can be found in previous peer-reviewed contributions, few of which are actually cited by the authors. For this reason, in my opinion this manuscript should not be accepted for final publication

Response to Referee #1

Authors: We are grateful to Referee #1 for reviewing our manuscript, but we believe that the decision to not recommend the paper for publishing in GMD is poor justified. With all due respect to Referee #1, we consider that the given motivation is not supported by any direct or indirect additional information to justify the decision to not accept our paper. We agree with the referee that the Kalman Filter (KF), as such, is not an innovative method in the post-processing of the data. Indeed, in the paper we never present it as a brand new method and to avoid any misunderstanding we add the following sentence in section 3.1: "The Kalman Filter bias adjustment is a well known and wide used technique, and therefore a full description of the method is here omitted". We do not intend to present a new methodology, but rather a demonstration of the efficiency of the Kalman filter post-processing in the CALIOPE modeling system across the Iberian Peninsula domain. In this sense, we would like to draw your attention to several points that we consider to be of relevance. After reading the following points, we ask you to reconsider our manuscript for publishing in GMD.

1- There are no other studies done in which the KF is applied either in modeling studies over the Iberian Peninsula, or with resolution of 4 km x 4km, and least of all with the modeling system we use, CALIOPE. As such, we have added in section 3.1 several references out of the many that exist in this direction. These references, on one hand confirm the wide application of the KF on studies over the European

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domains; on the other hand they demonstrate that no application of the KF has been carried out over the Iberian Peninsula using the modeling system CALIOPE. The references added are the following:

van Loon M. and Heemink, A.W. (1997) Kalman filtering for nonlinear atmospheric chemistry models: first experiences, Modelling, Analysis and Simulation (MAS). Technical Report MAS-R9711. ISSN 1386-3703 CWI P.O. Box 94079 1090 GB Amsterdam, The Netherlands.

van Loon, M., P. J. H. Builtjes, and A. Segers (2000) Data assimilation of ozone in the atmospheric transport chemistry model LOTOS. Env. Mod. and Softw., 15, 603-609.

Sagers, A. (2002) Data assimilation in atmospheric chemistry models using Kalman filtering. PhD. Dissertation. Delft University Press. ISBN 90-407-2286-2.

Hanea, R. G., G. J. M. Velders, and A. Heemink (2004) Data assimilation of ground-level ozone in Europe with a Kalman filter and chemistry transport model, J. Geophys. Res., 109, D10302, doi:10.1029/2003JD004283.

Eben K., Jurus, P., Resler, J., Belda, M., Pelikan, E., Kruger, B.C., Keder, J. (2005) An ensemble Kalman filter for short-term forecasting of tropospheric ozone concentrations. Q. J. R. Meteorol. Soc. (2005), 131, pp. 3313–3322.

2- Our paper is the result of the developing work done within the CALIOPE project which aims at establishing an air quality forecasting system for Spain. Our study is to be considered a diagnosis for the system in the prospective of applying the post-processing to the near real time forecast system.

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3- In our work we present not only a quality and quantity evaluation of the statistical parameters, but also an evaluation of the model uncertainty according to the European Directive 2008/50/CE and according to the Spanish law Real Decreto 102/2011 (BOE, 2011), related to the air quality in Spain. No other study, to our knowledge, verifies the accomplishment of this Directive.

4- In our work we apply the KF to one full year simulation and to a total of 82 stations from a Spanish network, which comprises of different kind of stations classified according to the type of zone (urban, suburban and rural) and the dominant emission sources (traffic, industrial, and background). The analysis has been carried out for all the stations.

5- The high resolution used in this study is a key factor in accurately simulating air pollution issues, especially across complex topography (Jiménez et al., 2006) and meteorology patterns (Baldasano et al., 1994; Millán et al., 2002)

We expect that these comments have contributed to demonstrating the scientific significance of our paper and hope you will reconsider our manuscript for publication.

Interactive comment on Geosci. Model Dev. Discuss., 4, 343, 2011.