

## ***Interactive comment on “Assimilation of surface NO<sub>2</sub> and O<sub>3</sub> observations into the SILAM chemistry transport model” by J. Vira and M. Sofiev***

### **Anonymous Referee #1**

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This paper presents the set-up and results of an assimilation system based on the regional chemical transport model SILAM and using a 3D-VAR method for the assimilation. The system allows assimilating hourly surface observations of ozone and NO<sub>2</sub>, two important species from the air quality point of view. Specific work has been done to built the error matrix (using Desroziers diagnostics) that are key point of the assimilation system either to estimate relative weight of observations against simulation either to disseminate the information getting from these observations. The paper is clear and well-written and even if results are not ground-breaking, it deserves to be published in GMD. Indeed, new experiments are still valuable in the context of the assimilation for air quality purposes and this system used within important European project has to be documented. Nevertheless, I have some questions and remarks that, I hope, could improve the paper. Especially, it seems to me that difficulties of such assimilation

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experiment are not put forward enough.

First concerning O<sub>3</sub> assimilation results, i do not well understand how you explain the increase of the bias when using the tuned B matrix. Also, could you explain why results for EMEP stations are less good than for MACC stations.

Concerning NO<sub>2</sub> assimilation results, it seems also that biases are not always reduced. How do you explain this? I understand that you select background rural stations for NO<sub>2</sub> for representativeness issues but for these stations you can have measurements problems, indeed with most common devices (using molybden converters) your are measuring NO<sub>2</sub> only but also other nitrogen oxides such like PAN, HNO<sub>3</sub>, HONO. This issues have been raised by Dunlea et al (2007) and Steinbacher et al (2007). I think that you have to mention these aspects.

Also have you checked the impact of assimilating NO<sub>2</sub> on O<sub>3</sub> ? You do not mention it.

You are showing that the results of the assimilation on forecast do not last more than 24hours. Do you think that you could do better ? Do you need more data, different data (I'm thinking to satellite data for example) ?

You show that assimilation improves the simulation of daily maxima for ozone and it is of importance for AQ control but do you have checked if you were improving the highest values of the distribution or values exceeding the regulation thresholds ?

To finish, just a short remark on the form. You are referring to figure 6 before figure 5, it is only a detail but you should invert the order of these two figures.

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Interactive comment on Geosci. Model Dev. Discuss., 7, 5589, 2014.

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