Interactive comment on "Online coupled regional meteorology-chemistry models in Europe: current status and prospects" by A. Baklanov et al.

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This paper reviews the state of online coupled meteorological-chemistry models applied in Europe. It follows from previous reviews of North American based online coupled meteorological-chemical models by Zhang (2008) and offline plus online coupled chemical-weather operational forecasting models in Europe by Kukkonen et al. (2012) and worldwide by Zhang et al. (2012a,b). Overall, the paper is comprehensive and unique in several respects, as described below, so it would be good to see it published after some minor modification.

Thank you for reviewing our manuscript and providing valuable comments. Your comments and suggestions have been considered when revising our paper. Please see below our point-by-point replies to the specific comments. Please find all our replies in red colour, following your remarks, which we copied and kept in black.

The primary differences between the present study and previous reviews are that the present study focuses only on online coupled models and more on the feedbacks occurring among meteorological, chemical, cloud, and radiative processes. It also discusses several numerical methods and correction methods often used in models in more detail. The inclusion of the survey (Table 3) of important feedbacks between chemistry and meteorology is also a unique feature of this paper that is valuable for assessing the importance of different processes treated in different models. Similarly, Table 1 (and B1), which identifies effects of meteorology on chemistry, and Table 2 (and B2), which identifies effects of chemistry on meteorology, are unique and important tables not found in previous reviews.

One area that the current paper can be improved slightly is in identifying numerical methods used in each model for some processes, such as gas chemistry, condensation, and coagulation, for example, in a table since different numerical schemes have different known levels of accuracy, and identifying the schemes used help to differentiate among the different online coupled models. The paper already identifies in the text schemes for radiation and advection. That information would be more accessible in a single table along with a list of schemes used for the other processes listed above. Ultimately, the accuracy of the models depends on the numerical schemes used, so this would be one of the more important tables in the paper.

Yes, we agree that it would be good to build a detailed numerics table covering both meteorology and chemistry processes. However, considering the already very large size of the paper (as indicated by several reviewers), and the fact that it would be a very long and not easy to read table, we decided to incorporate such information into a paper of the COST Action that focuses on numerical schemes.

Second, Section 7 (Conclusions and recommendations) could be made more concise and be broken into separate sections (e.g., Major Challenges, Recommendations, and Conclusions, for example).

Many people will want to jump right to the conclusions, so this should be a concise, stand-alone section.

Section 7 has been thoroughly rewritten. In particular, it has been shortened and streamlined to include more concise information.

Overall, the paper will be an excellent and important addition to the literature.

References Kukkonen et al., Atmos. Chem. Phys. 12, 1-87, 2012. Zhang, Y., Atmos. Chem. Phys. 8, 2895-2932, 2008. Zhang, Y., et al., Atmos. Environ., 60, 632-655, 2012a. Zhang, Y., et al., Atmos. Environ., 60, 656-676, 2012b.