

**Review of the manuscript entitled *Sensitivity of surface solar radiation to aerosol-radiation and aerosol-cloud interactions over Europe in WRFv3.6.1 climatic runs with fully interactive aerosols*,  
by S. Jerez et al.**

This is the revised version of the manuscript, submitted to *Geoscientific Model Development*, which presents a sensitivity study on the role of dynamic aerosols in regional climate simulations over Europe, carried out with the WRF model.

The authors have made substantial efforts to improve the manuscript, and to take into account the different suggestions of the reviewers. The objective of the paper and the results are clarified and better presented. English spelling has also been improved. However, before the publication in GMD, I recommend the following corrections.

**Main comments:**

- The conclusions about the prevailing of aerosol indirect effects over direct effects should be moderated, since they could be very model-dependent. They could also depend on the choice of the parameterization of cloud-aerosol interactions. More discussions about this aspect should be added in the text.
- Many figures are in supplementary material, and are often used in the text of the manuscript. Some sections entirely rely on supplementary figures. At the end, the revised version has only 4 figures in the main text. I think that more figures (not all obviously) should be included in the main text rather than in the supplementary. These figures are essential to better understand the study.
- Section 3.1 : The brief evaluation of AOD (as shown in Figure page 21 in your replies) should be added to the manuscript (at least for JJA). It is an important point to understand the rest of the study. It would come in addition to the brief validation of RSDS in the beginning of section 3.1 (line 229).
- Sections 3.1 and 3.2 could be separated in different subsections in order to avoid too long paragraphs, and to make reading more fluent.
- The authors have mentioned in their replies that they have included in the discussions the justification of keeping constant emissions in future simulations to evaluate the climate change penalty. However I did not find that in the revised version.

**Other comments:**

- page 1 line 12: please avoid undefined acronyms (IPCC) in the abstract
- page 1 line 19: Since the period of simulations is 1991-2010, “historical period” would be better than “present-day conditions” (1991 is 30 years ago!). In the whole paper, present could be replaced by historic (or past).
- page 5 line 121: Is the RRTM radiative scheme used both for shortwave and longwave or longwave only? Please mention the radiative scheme for shortwave in the second option.
- page 5 line 132: please use subscript characters for chemical species such as NO<sub>3</sub> and O<sub>3</sub>
- page 5 line 142: through instead of trough
- page 6 line 148: “Anthropogenic emissions ... were kept unchanged in 148 the simulation periods (we considered the 2010 monthly values)”. Anthropogenic emissions have been dramatically

reduced between the 1980s and 2010, so keeping 2010 values and comparing simulated aerosols over the whole 1991-2010 period could lead to an underestimation of AOD.

- page 6 line 155: “aerosol optical properties assuming wet particle diameters”. Which humidity is used for the calculation of aerosol optical properties? Is the variation of humidity taken into account on-line in the simulation to allow variations of optical properties (through pre-defined intervals for example) ?

- page 8 line 216: Could you give the level of significance for the t-test ?

- page 13 line 389-390: This point about the autoconversion scheme seems to me very important. Could you explain why you could not use the same scheme, but for example with constant value of autoconversion in the case without aerosols ?