Review of the manuscript acpd-15-10341-2015

Variability of aerosol forecasts over the Mediterranean area and during July 2013 (ADRIMED/CHARMEX)

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Summary

The manuscript presents a verification study of the WRF/CHIMERE modelling system. The study is of interest for the scientific community

Recommendation

Accept after **major** revision. I would like to stress out that I support the potential publication of this paper due to its scientific interest. On the other hand, many aspects of the manuscript need to be extensively improved; otherwise I will not be able to support final publication. As such, I strongly advice the authors to take into serious consideration all of the following major and minor remarks in order to improve the quality of the presentation of their work. To state it even more clearly, the quality of the manuscript must be strengthened a lot or else it would be extremely difficult to be finally accepted.

Major remarks

1. The use of English must greatly improve if the paper is to be published in ACP. I urge the authors to advice a native English speaker for doing so. Further, they need to advice similar papers in order to improve the overall presentation of their work.
2. The manuscript's abstract needs to be thoroughly revised. Rather simplistic questions (e.g. P10342, L8-10) must be avoided and the scope of the study must be properly highlighted. In addition, a concise summary of the key findings should be present.
3. The "Introduction" section of the manuscript requires extensive revision. First of all, the authors need to expand the review of literature that is relevant to their study. Second, and probably most importantly, the aim of the study needs to be properly highlighted and justified. Instead of setting their aim in the frame of a simplistic question (reviewer's personal point of view), I would suggest that the authors attempt to present the key objectives of their study with regards to what is currently known (i.e. literature), thus highlighting the added value of the paper.
4. Section 2, "The observations", is hardly useful in its current form. Although some information about the measurement stations is provided in Table 1, further details must be given. What were the measured variables? What was the sampling interval? What are the specific measurements mentioned? This section could be also enhanced by moving the information about the specific field campaign, currently placed in "Introduction".
5. To my point of view, Section 3.1 is written in an amateurish way, far away from the quality standards that a manuscript needs to meet for being published in ACP. The

description of the modelling system components' is almost chaotic, while the use of terminology and language is too simplified. For instance: "The first step is to calculate regional forecasted meteorology", "they are then used for several calculations:" etc. I urge the authors to re-write this section from scratch.
6. Section 3.2: To my view, this is not a proper presentation of the configuration adopted for WRF. Again, information is provided in a rather chaotic way that is very hard to follow. The authors should consult similar "modelling papers" to view how the setup of a modelling system should be properly presented and justified.
7. It is not very supportive for the manuscript to continuously refer to a previous publication, when presenting the modelling system. I agree that credit should be given to a previous work, nevertheless this should be done with caution and not continuously to avoid presenting information that could be useful for the interested reader.
8. Discussion of results (Section 4 and thereafter) significantly lacks quality. One striking example:
- P10349, L22-23: The statement that it is difficult to find any explanation and no relative information is available, is too simplistic. A low mean bias could be computed from large biases in both directions (i.e. both negative and positive). A bad model behaviour always occurs for some reason, either related to initialization data or to physics representation. Hence, to just state that model performance is bad but there is no clear reason for this degrades the quality of the manuscript.
Overall, Section 4 does not contain a single reference to any previous work, as part of a discussion for the results obtained in this study. Are the computed verification metrics within the ranges observed in similar past studies? What has been found in past studies, regarding model performance? These questions need to be properly addressed in order to enhance discussion of results. The same comment is valid for Section 5, which also does not include any reference to similar past studies.
9. Conclusions are not presented properly. Mainly, this is because the presentation of results lacks any discussion in terms of the international literature. Simplistic and amateurish conclusions exist:
- "the answer is certainly a bit of each": this is something to say during an oral presentation and something that it cannot be written in a manuscript considered for publication.

Minor remarks
1. P10343, L1: "In this context, …". This sentence does not really fit in this place, as it does not "connect" well with what is written before and after it. Please, consider removing it and placing it where appropriate.
2. P10345, L8-10: I would prefer a better description of the modelling system, instead of just referring to a previous publication that utilized the same system. In fact, I do believe that this lowers the quality of the manuscript's presentation.
3. P10345, L11-19: Does this paragraph add anything to the manuscript, especially at this place? My opinion is that it does not. Consider revising accordingly.

4. NCEP/GFS appears as an abbreviation but no prior definition is given. Revise accordingly.
5. E-OBS data are used for verification. Have they been previously defined? What are these data? Where do they come from? How many stations (?) have been used for the verification?
6. P10350, L19-20: When computing percentage differences there is no reason to keep in mind the units of measurement. Revise accordingly.
7. A separate section for the different results obtained? Consider revising by using a general "Results and discussion" section, and sub-sections for the various parameters examined.