

Author comments to the reviewer 1 comments

We acknowledge the reviewer for the useful and constructive comments.

In this paper the authors have implemented in RAMS model a methodology, previously implemented in COSMO model, for the simulation of lightning activity. The authors show detailed results of the model application for 2 case studies, while they also verify the methodology for a total number of 6 cases. The paper is very well organised and well written. The results are interesting and therefore I propose the publication of this paper subject to some minor corrections given below.

Minor comments

- Page 12, lines 15-17: Are you using any observational data set that you assimilate in the model? If not I guess that you are just nudging the lateral boundaries towards the ECMWF analyses. Please specify.

-We are nudging the lateral boundaries towards ECMWF analyses. This will be clarified in the revised version of the paper (Section 3).

- Page 13 line 7: are you discussing the model simulated fields or your graphs are based on ECMWF analyses? Please clarify.

- Figure 2 (referred to at Page 13 line 7) is derived from the output of the RAMS model. This is written in the captions of Figure 2 and 7. However, as suggested by the reviewer we will clarify this point in the text for better readability as well as in the Figure captions.

- Page 14 line 4. Why are you showing a subdomain of the inner domain of your simulations? The same holds also for the verification procedure presented in the following section.

The reason for showing a subdomain of the inner domain of the RAMS model is that we focus this study over the Lazio Region (central area of the inner domain, as shown in Fig. 1-b) affected by the events considered in this paper. The subdomain selected to show the results covers most of the RAMS inner domain, while focusing on that region.

Focusing the verification over the Lazio region helped to perform the verification of the lightning simulation over an area where lightning were both predicted (even if with spatial and temporal errors) and detected (all the cases we selected had an impact over Lazio). This allows a more direct verification of the flash module implemented in RAMS, which is the main goal of the paper, with lesser impact of the quality of the model simulation. The importance of this point in the context of this paper was highlighted also by Reviewer 2 (see the last comment of the Reviewer 2 comments).

In addition, it is important to note that the choice to consider a subdomain of the modelled domain is important if the verification of the flashes is done over the first domain. In this case, considering a sub-area of the model domain, is important to exclude the boundaries of the model domain, where boundary conditions plays a major role. This point, while not applicable for this specific paper, is the main reason to have designed a verification scheme over a sub-domain of the RAMS model, which exclude the areas near the boundary of the domain.

We will add a note on Page 14 line 4 to clarify the above points and the Lazio borders will be plotted in Figures 3, 4, 8 and 9.

Page 17, line 23. I would like to draw your attention in a recent paper by Lagouvardos et al (2013): Study of a heavy precipitation event over southern France, in the frame of HYMEX project: Observational analysis and model results using assimilation of lightning. Atmospheric Research,

Volume 134, 1 December 2013, Pages 45-55. The authors also showed how the assimilation of lightning improved the simulation of a heavy precipitation event and the improvement of the spatial distribution of convection and rainfall.

- Thank you for pointing this out. A reference to this paper, as well as a short comment on the results, will be added in the revised version of the paper when discussing the results of the 15 October 2012 (HyMex SOP-1) case study.

Page 18. Section 3.3: It might be preferable to calculate the Equitable threat score instead of the TS.

- In the revised version of the paper we will use the Equitable Threat score instead of TS. Moreover, as suggested by reviewer 3 the time interval between two calls of the lightning scheme will be 5 minutes (instead of 10 minutes) in the revised version of the paper. The new table can be found at the end of the answer to the reviewer 3 (Table T5).

Page 24, lines 29-32: please revise the titles of the first of the two papers that are now identical

- Thank you for pointing this out. It will be done.

- Figure 1b does not give any additional information except the location of Lazio Region. Can't you draw Lazio region in Figure 1a and omit 1b?

- Lazio region will be drawn in Figure 1-a according to this comment. We will remove Figure 1-b.

Figure 3 shows a domain that it does not coincide with either the coarse or the inner model domain. It is preferable to keep consistency with the domains so that the graphs could be comparable.

- As suggested by the reviewer we will keep consistency with the domains by plotting the KI index (Figures 3 and 8) on the subdomain area (10.5 – 14.5 E, 40.5 – 43.5 N) that is used for the evaluation of the results throughout the paper.