Author comments to reviewer 2 comments

We acknowledge the reviewer for the useful and constructive comments.

The paper "Simulating lightning into the RAMS model: implementation and preliminary results", by S. Federico and coworkers, presents the results of the application of a methodology to simulate lightning activity, implemented into the Regional Atmospheric Modeling System (RAMS). The methodology is a refined version of an already published algorithm and is applied to two case studies over central Italy, that are analyzed with some detail, while a more significant statistics (obtained over a larger number of simulation) is discussed. Lightning ground network is used to validate the simulations and to highlight how to improve the technique. The paper is interesting, well written and within the scope of NHESS. My suggestion is to publish the paper, after few modifications I indicate below.

Abstract. I suggest to be more quantitative in the abstract, including some number to show to the reader the overall quality of the results, not only saying "the model predicts reasonably well. . ." which is rather meaningless in scientific context.

- Thank you for your suggestion. We will add quantitative results in the abstract in the revised version of the paper.

I suggest to change the title of section 2 (Material and methods) to a more proper "data and methodology" or "data and algorithm".

- We will change the title of section 2 to "Data and methodology" in the revised version of the paper.

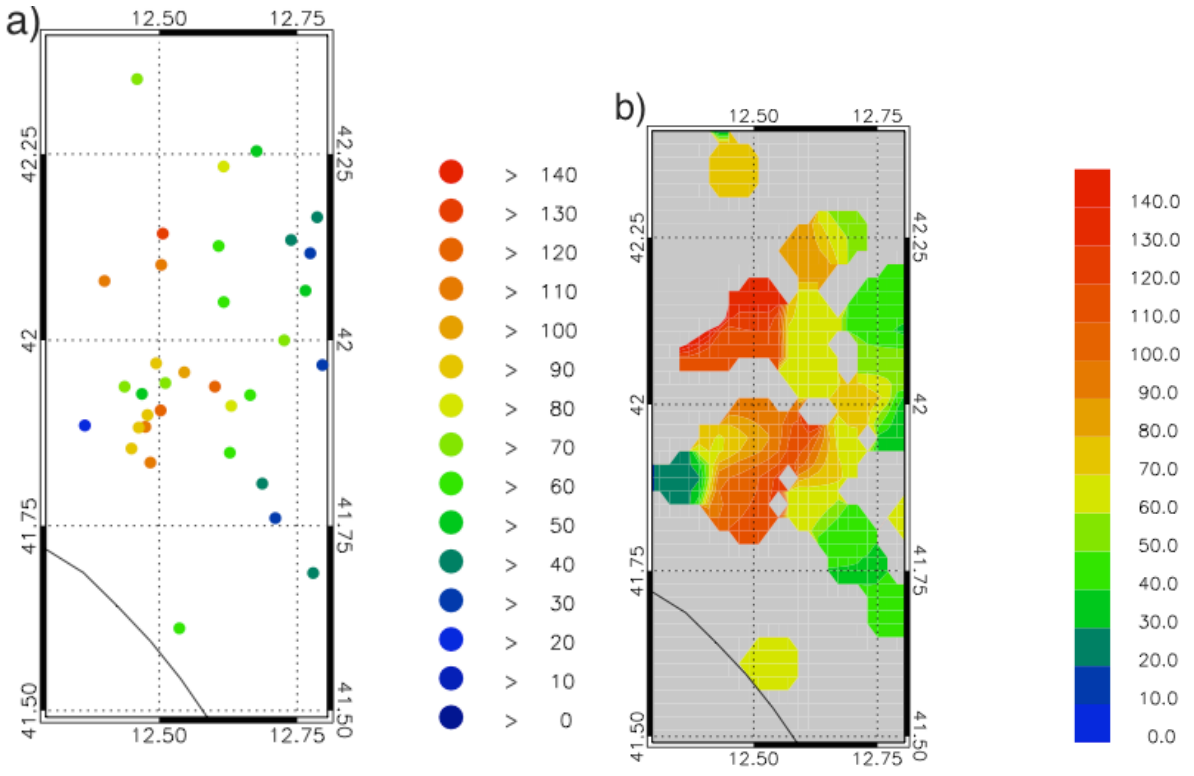
Section 3.3. The Authors make use of POD FAR and TS indicators to assess the model performances in detecting lightning. Some concern can be raised on the use of TS, since it is not equitable. Basically, TS overestimate the error for rare events, and gives a values higher than 0 for a random assignment of yes/no values in the maps. To overcome partially these drawbacks, other indicators such as Hansen and Kuiper or equitable threat score should be used. See a discussion on indicators in Hogan et al., 2010, Weather and Forecasting. The Authors should either compute ETS/H&K instead of TS, either justify the choice of a not-equitable skill score.

- According to your recommendation we will replace TS with ETS in the analysis and we will revise the paper accordingly. This change is suggested also by the reviewer 1. Moreover, as suggested by reviewer 3, the time interval between two calls of the lightning scheme will be 5 minutes in the revised version of the paper (instead of 10 minutes). The new scores table can be found at the end of the author comments to the reviewer 3 comments (Table T5).

A possible way to overcome the limitations pointed out in lines 10-13 on page 3374 could be to restrict the computation of the skill parameters to those areas where convection is correctly forecasted by the model. I suggest to compare model derived precipitation maps to some ground based precipitation rate measurement (i.e. form radar or raingauges) and to perform model flashes validation only in the areas where forecasted and observed convective precipitation are in reasonable agreement. This would result in a more direct verification of the "flash" module in the model with lesser impact

of model timing and position errors, especially at finer scales.

As suggested by the reviewer, this point is important and is tied to the testing of the flash module (Section 2.2) and to its implementation into the model (i.e. the calibration, see also Dahl et al. 2011b section 3). This problem was considered in this work but, as also suggested by several authors, it is not an easy task because of the quality/quantity of the observations required to establish where convection is correctly forecasted. In this work we encountered three problems: a) unavailability of the data over the second domain of the RAMS model for some case studies (for example both radar and raingauges for 11 and 28 November 2012); b) for some cases studies the convection occurred mainly over the Tyrrhenian Sea making the comparison between the model and ground based data difficult (30 September 2012); c) less satisfactory performance of the model for cases characterized by weak and scattered convection (15 October and 3 September 2012). Therefore, only few areas could have been found for testing the flash module of RAMS where forecasted and observed convective precipitation are in reasonable agreement.
For the case study of 20 October 2011, however, one of these areas was found around Rome (12.30 E- 12.80 E, 41.50 N – 42.40 N, hereafter referred also as target area), which was the area most affected by the storm. For the target area, the model is able to simulate a daily rain amount in good agreement with observations (see figures below). In particular, both the modelled and observed precipitation for the whole day show two rain bands, oriented in the southwest-northeast direction, whose amount is above 100 mm. So the target area is a good domain for testing the lightning module of RAMS. For that area the lightning number predicted by the scheme (4318) is in good agreement with observations (3978), showing a good performance of the flash module.
Future work, based on the comparison between modelled and observed convection (using both raingauges and radar), will consider in further detail the problem of the verification of the flash module and its improvement. A discussion about this point will be added in the Conclusions section of the revised version of the paper ("Discussion and Conclusions" in the revised version of the paper), when pointing out the limits of the proposed approach and of the verification methodology.



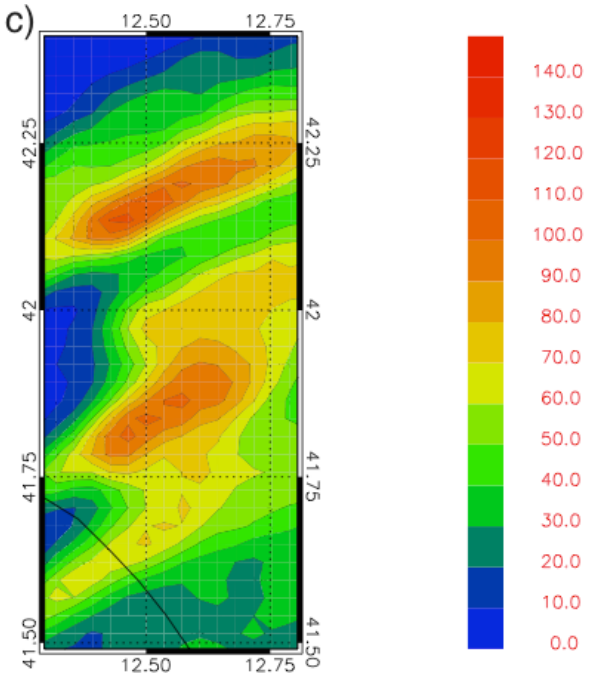


Fig. 1 a) Daily rain amount recorded by the raingauges over the target area. ; b) Objective analysis of raingauges observations by a Cressman filter with a 0.05° search radius; c) RAMS daily accumulated rainfall over the target area. All the maps are shown for the 20 October 2011.