1 General Comments

After reading the revised manuscript, I got the impression that the authors generally implemented the referee comments satisfactorily. However, some questions and suggestions for improvement still arose.

In the introduction the authors mention, that the main motivation to process raw data by a statistical model is to improve the signal-to-noise ratio. Therefore, I would suggest to show two figures with the spatial distribution of the coefficient of determination R^2 for the probability and the intensity of lightning. This may help to visualize the effect of the proposed smoothing and would show how much variance of the observations could be explained by this statistical model.

2 Specific Comments

2.1 Generalized additive models

page 5, line 1: Is there a relationship between λ and the degree of freedom? If there is a relationship, it would be helpful to mention it, because the selection of your λ has an impact on your d.o.f., which is (as far as I understand) one of your models main benchmarks.

In terms of d.o.f., it would also be helpful to explain its values, i.e. d.o.f=0 is a linear fit, d.o.f=1 and d.o.f=2 are quadratic and cubic polynomials...

As far as I know, degree of freedom often is defined as the number of independent scores that go into the estimate minus the number of parameters, while you are defining the d.o.f. only as number of parameters. Do I misunderstood sth.?

2.2 Verification

page 5, line 28: which parameters were estimated, $\beta_0, \beta_1, ...$ or λ or both? At this point I would like to know, how do you estimate λ? Du you simultaneously estimate β_j and λ during the training period and try to find an optimum β_j and λ that minimize your negative maximum likelihood for the validation period? Or do you initially set λ to a certain value (e.g. 100000), then estimate β_j during the training period and calculate the log-likelihood within your validation period with the estimated β_j and the preset λ?

2.3 Discussion

page 9, line 1-3: I got confused by the difference between cross-validation with day-wise blocks and cross-validation without these day-wise blocks. Maybe it would be helpful, if you write that day-wise means cross-validation at every grid point with 6x123 data points/days and without day-wise means cross-validation with every grid point and

every day (in this case 6x123x25 data points). You are explaining this term already in the verification section, but for me it was difficult to transfer from day-wise block bootstrapping to without day-wise cross-validation, since without day-wise could have various meanings.

page 9, line 3: Is there a reason for setting the maximum d.o.f. to 30?