Natural Hazards
and Earth System
Sciences
Discussions

Interactive comment on "Predictive modeling of hourly probabilities for weather-related road accidents" *by* Nico Becker et al.

Anonymous Referee #3

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General comments

The paper deals with a very interesting subject, examining the impact of weather characteristics on hourly road accident probabilities, and assessing the respective models. It uses an appropriate methodology and produces promising novel research results. There are some issues in the present form of the paper that should be addressed before it is accepted for publication.

Specific comments

- On page 1, lines 17-18, it is mentioned that "weather is one of the most important factors contributing to road traffic safety". This is a strong statement that requires a corresponding reference. To the experience of the reviewer, there is a significant amount

of studies where weather-related variables are not as significant for road crashes as others (such as behavioral variables), or not at all.

- On page 2, lines 11-13, there is a very recent review on that point, and pertinent with the study in general, which the authors may want to consult:

Ziakopoulos, A., & Yannis, G. (2020). A review of spatial approaches in road safety. Accident Analysis & Prevention, 135, 105323.

- On page 3, lines 24-27, it is mentioned that "However, almost 8% of the accidents were indicated as being caused by adverse road conditions, which includes a wet, snowy or icy road, but also mud or dirt on the road. This class of accidents, which we refer to as weather-related accidents, is selected to generate the response variable used in the logistic regression models."

Firstly, it would be informative if the total number of considered accidents is mentioned (a rough calculation suggests it is about 345,000?). Secondly, and more importantly, this approach introduces a bias inherent from the subjectivity of crash recording, as it relies on indicators by policemen. The authors are suggested to elaborate on this bias, its extents and any implications it might have had on the results.

- For binary logistic models, the Hosmer-Lemeshow test is also customary to indicate the degree of correct predictions per population stratum. The authors can examine the HL for their best predictive models, or at least utilize it in future research.

- More importantly, a critical component of the study that is missing is a table with model coefficients (i.e. the influence of each variable) and their metrics (standard error, significance). The respective commentary of the effect of each variable is also critical. The authors should definitely add this part, at least for the best-performing models, as very useful knowledge and conclusions can be drawn, which are now left in the dark. After all, this is the main advantage of econometric models (such as logistic regression) vs. machine learning models, which are "black boxes".

Technical corrections

- In the abstract, the authors mention 'skillful' predictions, which is an unclear term. Do they mean informed predictions? Furthermore, there is mention of model hit rates. Is this a percentage of accurate predictions? Please clarify these points so that the abstract is more comprehensive.

- On page 4, lines 25, it is stated that "τ is the difference between the time the model is initialized and the time the forecast is valid for". Shouldn't a more useful interval be between model finish and validity headway?

- The English language needs minor revisions throughout the paper and in the abstract to avoid typographical mistakes (e.g. assess instead of asses). Also the authors are urged to select either 'crash' (more widely used) or 'accident' and use a single term consistently throughout the text.