

Interactive comment on “Probabilistic Risk Assessment of Livestock Snow Disasters in the Qinghai-Tibetan Plateau” by Tao Ye et al.

Anonymous Referee #2

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[General comments]

“Probabilistic risk assessment of livestock snow disasters in the Qinghai-Tibetan Plateau” by Ye et al. applies boosted regression tree and general additive modeling methods to the snow disasters in the Qinghai-Tibetan Plateau, as an event-based evaluation, and the results are basically consistent with existing studies. The research topic is within the scope of the journal, but there are some substantial flaws in the study, which should be addressed. The major concerns are:

1: The advantage of event-based evaluation is not clear. Rather than hay preparation based on event-based analysis of this study, that based on annual-based analysis will work well when the intervals between the two events are very short (as time to prepare for the next event is not enough, preparation for annual basis is better, particularly when

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modeled annual frequency > 1).

2. The authors say probabilistic analysis is one of the advantages of the study. However I consider a year-by-year evaluation is more sophisticated, and the probabilistic analysis used here is not necessarily an advantage, but a result of taking a simple evaluation dealing with what should be separately treated as one set of data. An effective PRA would be a result from a probabilistic function, not a result from treating various conditions as one case.

3: To evaluate livestock number by carrying capacity, and to evaluate carrying capacity by grassland type is questionable. The appropriateness of them should be more carefully discussed.

4. Explanation and discussion on Eq. 1 is not sufficient. The form of functions for each term in the right hand side, and the performance of the equation should be clearly presented.

[Specific comments]

Page 3 Line 1: Do you mean that the final metrics should always be mortality, not mortality rate? It looks the study considered mortality rate as the final metrics, and I think each study can use its own final metric.

Page 3 Line 13: Provide the rationale of “some of the highest livestock snow disasters”. What is “highest”, by the way? Largest damage? Highest frequency?

Page 3 Line 14: Provide literature for “This region is also a hot spot in climate change”.

Page 4 Fig 1: It is difficult to understand the relationship between Timing, and Duration and Wind speed from the figure.

Page 4 Sect. 2.1: Fig 1 indicates GDP part is the vulnerability function, while Sect. 2.1 reads Eq. 1 (to derive mortality rate from GDP as well as hazard indicators). Which is true?

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Page 4 Line 10 (eq 1): Present the detailed forms of $s(\text{Duration})$, $s(\text{Wind})$, $s(P)$ and $s(\text{GDP})$. (all parameters of spline curves)

Page 4 Line 14: More detailed performance check is needed (not for InLR, but for LR). How large is RMSE? Is the error random or systematic? I want to see the scatterplot of observed and modelled values.

Page 5 Line 19: How the data of the previous days are used?

Page 6 Lines 12-13: How do you compromise when the two standards are different with each other?

Page 6 Line 14: Why since the last snow fall day?

Page 7 Lines 1-2: This sentence dose not explain why satellite is not used here.

Page 7 Lines 4-6: Are there no bias between the two data?

Page 7 Line 11: Explain the meanings of I_r and t_c .

Page 7 Lines 13-14: How the number of the variables and prediction power is weighted? Any kind of criteria like AIC or BIC is used?

Page 7 Line 14: The cross validation is how many fold?

Page 7 Line 20: Is “prediction error” random? If they are systematic, to take average may not be a good solution.

Page 8 Lines 18-20: More careful discussion on the validity of this method is needed. I want to see the scatterplot of observed and estimated values.

Page 8 Lines 21-22: More careful discussion on the validity of this method is needed. I want to see the scatterplot of observed and estimated values.

Page 9 Line 9: How good is the performance of the equation?

Page 10 Line 4: Why SD, minWind and Pre were excluded?

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Page 10 Line 7: How relative contribution is calculated?

Page 10 Line 19 “well captured”: p-values of 0.118 and 0.189 are not necessarily good (not statistically significant with 10% level). To check the model’s representability more carefully, let us see not cumulative but probability density function before accumulation.

Page 12 Fig. 5: Better to present the annual total number of SDDs.

Page 13 Line 11 (also for Page 18 Line 1): It is obvious when the Gaussian approximation is used.

Page 13 Line 13: Fig 5b shows annual aggregate snow disaster duration? But the caption says “mean event duration”.

Page 13 Lines 18-19: If “The distribution of annual average mortality rate is extremely positively skewed”, the Gaussian kernel function (Page 9 lines 21-22) is not appropriate, is it? BTW, is it related to the dependent variable in Eq .1 is lnLR, not LR?

Page 18 Table 1: What is the trend of actual herd size in QTP? To consider a static herd size is reasonable?

Page 18 Line 8: Why mortality becomes small by the constraint of herd size by carrying capacity?

Page 19 Lines 15-16: It is better to compare the modeled mortality with observed (historical) ones. Page 19 Lines 27-28: Is there no possibility that this study overestimates?

Page 19 Sect. 4.2: As “more than one snow disaster a year is unlikely”, annual evaluation is enough, isn’t it? For me it looks to prepare hay based on annual evaluation is OK.

Page 21 Line 8 “two critical indices”: Is this presented in the Result section?

Page 21 Lines 19-20: More careful evaluation is needed for the performance of herd

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size estimation.

Page 22 Line 18: How the study can be applied for future? I consider that the method used here is not suitable when the climate is changing.

[Technical corrections]

Page 1 Lines 20,22: 1/20a -> 20 years (also for all similar expressions).

Page 5 Lines 4-6: Hard to understand. Too many “and”s. “its needs” -> “it needs”?
Delete one of the two “provide”s?

Page 5 Line 5: Insert “in Eq. 1 “ after Duration and Wind will be helpful.

Page 7 Line 4: “W. Wang et al” -> “Wang et al”

Page 9 Line 7: “although unlikely” should be rephrased with better expression.

Page 10 Line 14: Fig. 3 -> Fig. 4?

Page 13 Line 2: topology -> topography?

Pages 14-15 Fig 6: To be multi-colored like Fig 7 would be more reader-friendly.

Page 19 Line 22: There is no Table 2.

Page 19 Line 26 (also in Page 21 Line 28): higher -> longer.

Page 20 Line 8: Fig A2 -> A3?

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