Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2020-28-RC1, 2020
© Author(s) 2020. This work is distributed under
the Creative Commons Attribution 4.0 License.

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Evaluating the efficacy of bivariate extreme modelling approaches for multi-hazard scenarios" *by* Aloïs Tilloy et al.

Anonymous Referee #1

Received and published: 16 March 2020

General Comments:

The paper assesses the capability of six bivariate statistical approaches to model 60 distinct synthetic (bivariate) datasets, some of which possess asymptotic independence and others asymptotic independence. The results are used to develop a systematic framework for selecting among the competing statistical models. The framework is then demonstrated by way of two real world examples. The framework offers a novel approach for selecting among multivariate models. The manuscript is generally well written and relevant to the topic of "Advances in extreme value analysis and application to natural hazards". In the opinion of this reviewer it is therefore worthy of publication in this special issue of Natural Hazards and Earth System Science. Nevertheless, the manuscript would benefit from a slight reorganization, additional explanation at certain

Printer-friendly version

Discussion paper

points and a thorough review of grammar and spelling.

Specific comments:

The abstract is missing a sentence describing the link between the synthetic datasets part and the application of the framework to environmental data (i.e., the work on the synthetic datasets aids in the creation of the framework). At present, the abstract states that the benefit of a systematic modeling framework are highlighted without any introduction/description of the framework.

The manuscript would benefit from a more precise definition of what constitutes a hazard in relation to other recent literature on compound and cascading hazards. For instance, Zscheischler et al. (2018) defines compound events as "The combination of multiple drivers and/or hazards that contributes to societal or environmental impacts.". Therefore, they may consider rain, lightening and hail as drivers and a landslide as a hazard, whereas here all four are considered as hazards.

P2 L49 to P3 L83 in the introduction focuses on methodology and introduces specific subsections of the methodology section before the methodology section is introduced in the final (roadmap) paragraph at the end of the introduction. I recommend moving the text to the start of the methodology section. Perhaps, a paragraph giving a broad summary of the synthetic dataset work and the modelling framework including the link between them could be added.

For the wildfire example, would χ=0.7 with marginals AC also be a relevant test case.

The (subjective) selection of the AND should also be discussed in the "Choices influencing the results of the simulation study" part of the conclusion.

Technical corrections:

Abstract: "match" implies that synthetic data was based on specific examples of environment data "be representative of" maybe a more appropriate expression.

CC BY

P2 L46: “Copulas” refers to a specific type of model whereas “multivariate model” is more general, perhaps replace the latter with a more specific description of the models.

P4 L94-95: The sentence “A theoretical background on extreme value theory is given in Supplement S1.1.” should appear earlier in the paragraph, after the sentence which starts “Extreme Value Theory . . .”. P4 L106: Typo. Remove “Then”.

P4 L116: Typo. Remove “.”.

P6 L166: Typo. Replace “F_X2 (x_2))” with “F_X2 (x_2)”.

P6 L170: Use “e.g.,” here and elsewhere before citations where there are other relevant papers omitted due to the need for brevity.

P7 L175: “Formally, the application of a copula model can be summarized in four main steps”. It should be made clear here and elsewhere that “the application” refers to the application in this study and may vary elsewhere for instance in terms of marginal distributions etc.

P7 L181: “joint distribution” may refer to the full multivariate distribution including marginals. Consider changing to “dependence structure” or similar.

P7 L210: “extrapolate the conditional model to simulate new extreme data.” Do you do this?

P8 L218: Subjective term. Remove “very”.

P11 L186: Perhaps change “amount” to “number” to be more specific.

P13 L323: “Confront” seems like an unusual term to use here. Consider replacing it with “compare and contrast” or simply remove “confront or”.

Table 2: Spelling. Change “thorough” to “throughout”. P13 L334: Typo. “Random variables x”. Consider capitalizing X and Y as they denote random variables.

P14 L338: Why characterize log-normal distributors by the coefficient of variation?

CC BY

Table 3: Typo. Replace “dataset” with “datasets”.

P16 L379 Typo. Add space “test(”. P16 L378 & L379 & L392: Typo. Remove first names “(Arnold, Taylor and Emerson, John, 2011)”.

P16 L389: Grammar. “issue is” or “issues are”.

P16 L391-393: “The measures mentioned above are not suitable as they imply parametric distributions to be compared against observations (Stephens, 1970; Arnold, Taylor and Emerson, John, 2011). It is then not possible to compare the goodness-of-fit on the whole range of the data.” I am not clear as to the exact limitation being discussed here.

P16 L399: A description of the reference level curve is required that it comes from the “underlying bivariate (X_1,X_2) distribution of the data” as stated in Figure 6 should be added to the main body of text.

P19 L461: Consider adding “in general” or similar before “outperform all the other. . .”.

P19 L468-469: Grammar. Rephrase “Gumbel and Galambos copulas show very similar behaviours with respectively 68% [53–93%] and 68% [52–93%] cases with wd < 0.1.”.

P20 L473 Grammar. Change “less” to “least”.

P20 L494 I believe “Fig. 6” should be “Fig. 5”.

P20 L497 Grammar. Change “abilities of each models for the selected datasets in step (ii)” to “abilities of each model for the datasets selected in step (ii)”.

P20 L510 & P21 L519: “London Heathrow airport, UK” and “Heathrow airport (London UK)” be consistent with names, only need to specify it is in the UK on first mention.

P21 L515: Typo. Add spaces: “Season(Hawkes”.

P22 L544-545: Repetition: Remove “Daily rainfall data from E-OBS (Cornes et al.,

CC BY

2018) and wind gust data (maximum 3 s wind 545 velocity in a day) from the Met Office (2019)." as the information is already given in the text.

P23 L555-556: Repetition. Remove "Daily rainfall data from E-OBS (Cornes et al., 2018) and wind gust data (the 555 maximum 3 s wind velocity in a day) from the Met Office (2019)." as the information is already given in the text.

P23 L560: I believe "Figs. 9 and 6" should read "Figs. 9 and 5".

P23 L565 - 568: Consider replacing circle bullet points with numbers 1-4 so the cases correspond to the relevant rows of Table 4.

P23 L573: Add "average" before "confidence score".

P24 L578: Grammar. Replace "model" with "models".

P24 L591: Grammar. Replace "curve" with "curves".

P25 L612 & P25 L612: "2395 km2" and "1,1778,146" be consistent with use of commas to separate numbers here and throughout the manuscript.

P27 L643 – 644: Repetition. Remove "Daily mean temperature data from E-OBS (Cornes et al., 2018) and wildfire data from Pereira et al. (2011)." as the information is already given in the text.

P28 L653-654: Repetition. Remove "Daily mean temperature data from E-OBS (Cornes et al., 2018) and wildfire data from Pereira et al. (2011). as the information is already given in the text.

P28 L660: I believe "Figs. 13 and 6" should read "Figs. 13 and 5".

P28 L666 - 669: Consider replacing circle bullet points with numbers 1-4 so the cases correspond to the relevant rows of Table 6.

P28 L666 - 669: Replace "B-C" with "BC".

P30 L713: Typo. Replace "four following" with "following three".

CC BY

P31 L742-744: Grammar: Change “One of these disadvantages is the that the parametric nature of copulas lead to a lack of flexibility while going to higher dimensionality.” to “One of these disadvantages is that the parametric nature of copula leads to a lack of flexibility when going to higher dimensionality.” or similar.

P31 L747: Pair Copula Construction and vine copula are not synonymous rather vine copulas are a type of Pair Copula Construction.

P32 L787: Typo. “ηResults” add “.”

P32 L783: Perhaps add a sentence to make it clear that the RMSE comes from the calculation of the dependence measures for the 100 realizations of the 60 datasets.

P36 L887: Remove “pp.”

References:

Zscheischler, J., Westra, S., Van Den Hurk, B.J., Seneviratne, S.I., Ward, P.J., Pitman, A., AghaKouchak, A., Bresch, D.N., Leonard, M., Wahl, T. and Zhang, X., 2018. Future climate risk from compound events. Nature Climate Change, 8(6), pp.469-477.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-28, 2020.

Printer-friendly version

Discussion paper

CC BY