

Interactive comment on “A copula-based assessment of Bartlett–Lewis type of rainfall models for preserving drought statistics” by M. T. Pham et al.

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We thank the reviewer for his/her positive feedback on our paper. Following is our response to the comments by the reviewer.

1. Title. I agree that the title should refer more on the particular assessment than on the copula use.

We will change the title into “An assessment of Bartlett-Lewis type of rainfall models for preserving drought statistics” as Guillaume Evin’s comment.

2. Page 7471 line 23. Maybe, here, I would avoid to cite paper more applied oriented
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(like Shiao 2006, Shiao and Modarres 2009, Vanderberghe et al., 2011).

We will remove the suggested references.

3. Page 7471 line 26. I would start a new paragraph with “This study aims....”.

We will do as you suggest.

4. Page 7473 line 10. The reference Onof et al. 2013 (mentioned several times in the text) is not present in the reference list, or maybe in the list is 2012.

It is a mistake in the list; we will correct it in the revised manuscript. It should be Onof et al. 2013.

5. Page 7473 lines 10-25. I had some problems in the visualization of parameter symbols.

We did not encounter any problems, but will make sure to check the paper proof carefully.

6. Page 7475 lines 14-21. This paragraph could be removed since it repeats something already mentioned in the Introduction.

We will do as you suggest; the paragraph will be partly moved to the introduction.

7. Page 7476 line 17. A physical explanation of Effective Precipitation could help the reader.

The explanation of EP will be improved in the revised manuscript as you suggest.

8. Page 7476 line 23. Equation 1 and all the equations seem to have some problems in the format, maybe it is my computer problem.

See the answer to comment No. 5.

9. Page 7477 lines 9-14. These lines are unclear and can be improved.

We will rephrase these sentences; the paragraph will be rearranged and the definition

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of “Standard period” will be added.

10. Page 7477 lines 19-21. As before, maybe a more touchable explanation of EDI could help the reader.

We will add the explanation of EDI in the revised manuscript.

11. Page 7478 line 3. Please include in the text the reference Morid et al., 2006 (as done in the Table).

In this research we defined the drought definition based on the classification (table 1) proposed by Morid et al., 2006. The sentence will be updated clearer in the revised manuscript.

12. Page 7478 lines 12-25. These lines can be reduced since the content is already present in the Introduction.

We will do as you suggest in the revised manuscript; those lines will be removed and also some changes in the introduction will be made.

13. Page 7480 line 15. Maybe the reference on multivariate return period review “Gräler et al. 2013” could be added.

Thanks for your suggestion; this article may provide useful information for our introduction on copula applications.

14. Page 7481 line 9. The 5.1 section title could be improved.

We may change the title into “General rainfall characteristic evaluation of BL models”.

15. Page 7482 line 15. It seems to me a “qualitative” and not a “quantitative assessment”.

We will correct this in the revised manuscript.

16. Page 7485-7486 lines 21 - 15. The RMSE and the GoF tests should be included in the section 4.1 and not in the results section.

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We will change this in the revised manuscript.

17. Page 7487 lines 1-3. Maybe yet the differences in the GoF tests are an evidence of the imperfect performance of rainfall simulator.

At the moment, we cannot provide concrete evidence for this conclusion. GoF tests may only reflect whether a copula is suitable to a time series. It may need further research.

18. In the following I will list the first author of references present in the list but not mentioned in the text: Bogner; Engida; Glasbey; Gyasi-Agyei; Gyasi-AgyeiKhalig; Marani; Pui; Smithers; Velghe.

It is our mistake in an early version of the manuscript. We had a paragraph introducing the applications of Bartlett-Lewis models that mentioned those references. However we found it unnecessary and removed it. We will remove them in final text.

19. In Table 2 there are some problems in the equation format.

See the answer to comment No. 5.

20. In Table 3 it could be better explained what are Auto-covariance (to which lag is referred?) and ZDP (that is not explained). “3rd Moment” is not so elegant.

We will update the explanations of those terms in the revised manuscript.

21. Figure 4, 5, 6, and 7. The comparison plot could be more effective using other scales.

We tried other scales and formats, but none of them were clearer. Therefore we decided to keep these figures.

Important remark: During the period of public review and discussion, we have found that by using an improved approximation of the analytical expression of the variance, the problem of producing unrealistic model parameter sets, obtained when the 3rd or-

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der moment was included in the calibration, was solved; it seems no longer needed to include these 3rd order moments in the calibration. We therefore recalibrated the different models using the improved approximation and including only the first and second order moments and the zero depth probability as classically done. This has minor impact on the results and the conclusion, but as the results are obtained through better approximations, we believe that these better calibrated models had to be compared. In the revised paper we then will also include these newly calibrated models, even though the results do not significantly change.

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