

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 to our paper. Following is our response to the comments by the reviewer.

1. Page 7473. Parameters of point process models represent what kind of rainfall characteristics should briefly state in the text.

We will update this in the revised manuscript.

2. Page 7481. The values of parameters used for 5 Bartlett-Lewis models should be stated.

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The parameters of the 5 BL models will be presented in the revised manuscript.

3. A summary table is suggested to list results of comparisons among 5 Bartlett-Lewis models for EDI values, YAEDI365 values, and copula-based frequency analysis.

We understand the suggestion, however we have tried to make such table, but found it is very complicated due to the variability of comparison results.

4. The authors should explain why the shape of the 5-year joint return periods of $D \geq d$ or $S \geq s$ (Figure 9, right above) is different with results of 10-year joint return periods (Figure 10, right above).

We thank the reviewer for this important remark. We agree that 5- and 10-year joint return periods should have the same shape. We found out that the cause of this problem is a too coarse discretization of U and V , leading to fewer simulations of severe events and unreasonable shape of return periods for extreme events. This issue is solved by using a finer discretization of U and V , the new results and figures will be updated in the revised manuscript.

5. Other minor editorial suggestions:

5.1. Page 7480, line 2. The name of AMH, A12, and A14 should be spell out.

We will update this in the revised manuscript.

5.2. Onof et al., 2013 in page 7473 (lines 9-10), page 7474 (line 10), and page 7482 (line 4) are not consistent with Onof et al., 2012 in Reference section (page 7493).

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

5.3. The following references listed in Reference section are not cited in text, including Glasbey et al., 1995, Gyasi-Agyei, 1999 (page 7491), Gyasi-Agyei and Willgoose, 1999, Khaliq and Cunnane, 1992, Marani and Zanetti, 2007 (page 7491), Pui et al, 2012 (page 7493), Simthers et al., 2002, Vandenberghe, 2012, Velghe et al., 1994

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(page 7494).

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.

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 order 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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