Hydrology and Earth System Sciences

Discussions

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comment

Interactive comment on "Design water demand of irrigation for a large region using a high-dimensional Gaussian copula" *by* Xinjun Tu et al.

Anonymous Referee #2

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General comment In this paper, authors used the multivariate Gaussian copula and the general normal distribution to develop an eight-dimensional joint distribution of sub-regional precipitations. Using three design methods, i.e. equalized frequency, typical year and most-likely weight function, design combinations of sub-regional precipitation for a given cumulative frequency of entire regional precipitation were proposed and applied to analyze water demand of irrigation in a large region and its sub-regions. In a large region, design combinations of sub-regional water demand of irrigation were produced by the linkage between the regional CDF of precipitation and the joint CDF of sub-regional precipitation, which is impressive and innovative. The technical methods are overall sound, and the recommended design approach is useful for the water re-

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source managers in long-term planning. I would recommend accepting this manuscript after the following concerns have been fully addressed.

Specific comments 1. [P6: 2.4.1], the Gaussian copula may not work for all cases, did authors consider other available copula functions at higher dimensions? For instance, t-copula is conceptually similar to Gaussian copula and also available at higher dimensions. 2. [P9: Lines 8-11], why is the entire region divided into eight sub-regions? Are there any references that authors can provide to support agricultural division in the study region? 3. [P10: Lines 1-5], the explanation of the box plot should be addressed in the title of Figure 4. 4. [P11: Lines 10-14], the confidence interval (CI) was mentioned many times after here, why use it and how to calculate it, should be addressed in Methodology. 5. [P20: Figures 3 and 4], the implication of Figures 3 and 4 is similar. Figure 3 may be deleted. 6. [P21: Figure 5], the label of X-axis is unconventional. Kindly suggest using general axis for the X-axis or giving an explanation about it. 7. [P22: Figure 7], how to calculate multivariate empirical CDF? 8. [P22: Figure 8], the illustrations of two subfigures are undifferentiated except the ticks of X-axis. Delete one of them.

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