

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

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Anonymous Referee #1 Received and published: 7 June 2018 Comments on the manuscript hess-2018-213 “Design Water Demand of Irrigation for a Large Region Using a High-dimensional Gaussian Copula” by Xinjun Tu, Yiliang Du, Vijay P Singh, Xiaohong Chen, Kairong Lin, Haiou Wu General comment The authors developed an eight-dimensional joint distribution of sub-regional precipitations using Gaussian copula, and proposed a design procedure for water demand of irrigation of a large region and provided three design methods, i.e. equalized frequency, typical year and most-likely weight function, to compare water demands of irrigation in the entire

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region and its sub-regions. The paper attempts to seek a new method to better design water demand of irrigation of sub-regions for a given CDFs in a large region. The design procedure using the most-likely weight based on a newly-developed high-dimensional joint distribution and the linkage between regional and sub-regional frequencies of precipitation are impressive and are of novelty. The conclusions were appropriately supported by analyses results. Besides, this paper was well organized. All in all, I would like to recommend accepting this manuscript after minor revisions. Specific comments P1.L15: The sentence “The Kendall frequency was better than the conventional joint frequency to analyze the linkage between the frequency of the entire region and the joint frequency of sub-regions.” is not clear. The object of probability distribution is of precipitation or water demand of irrigation? Response: We greatly thank the reviewer for the comment and revised the statement. The probability distribution refers to that of precipitation. (see Page 1, Lines 15-16 in the revised manuscript). P8.L2-4: This sentence is confusing. Please kindly explain it in detail about the using of those methods. Response: We greatly thank the reviewer for the comment and revised the sentence (see Page 8, Lines 5-6 in the revised manuscript). P10.L17: The expression should be more refined. e.g., the coefficients varied from pairs of sub-regions. Response: We greatly thank the reviewer for the comment and revised it (see Page 10, Line 20 in the revised manuscript). P10. L24: what purpose did the authors illustrate the maximum of 8-dimensional joint CDFs for? Please kindly give more details, or not, I suppose it should be considered to delete. Response: We greatly thank the reviewer for the comment and revised the sentence. We would like to present the maximum in order to point out the limit of the conventional joint CDFs. Using the Kendall frequency can break through the limit (see Page 10, Lines 27-32 and Page 11, Lines 1-2 in the revised manuscript). P10. L29: the pronouns (the latter and the former) are a little bit ambiguous. They represented conventional joint CDF and the Kendall CDF, relatively, or dual axes and Hessian axes relatively? Apart from that, please kindly explain what aspects were the latter more suitable than the former? Response: We greatly thank the reviewer for the comment and revised the statement

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(see Page 11, Lines 1-2 in the revised manuscript). P20: The contents illustrated in Figures 3 and 4 are similar. Kindly recommend deleting one of them. Response: We greatly thank the reviewer for the comment and deleted Figure 3. Figures 4-14 in the original manuscript were revised to Figures 3-13 in the revised manuscript, respectively.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-213/hess-2018-213-AC1-supplement.pdf>

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