



Interactive comment on “Streamflow estimation at partially gaged sites using multiple dependence conditions via vine copulas” by Kuk-Hyun Ahn

Anonymous Referee #2

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Summary

This work presents a copula-based approach to estimate streamflow at partially gaged stations. The author describes the theoretical framework and tests the new methodology on a simulation study and a case study of gages located within the Yadkin-Pee Dee River Basin in the eastern United States. Besides, the author carries out a throughout comparison between the new approach and other available methods for infilling.

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Main Points

The paper is well written and informative, and it is of great interest to the general audience of the HESS journal. I have two main points to discuss with the author.

1. The author compares the Vine-copula approach with 1) a bivariate copula model and 2) another type of vine copula approach based on a different choice of covariates. From the results presented in the paper, I am under the impression that the bivariate copula model performs reasonably well. What is the computational burden of using a Vine copula structure instead of the simpler bivariate copula model? Could the author add a few lines on the computational aspects of the newly introduced method?
2. Looking at the results of Figure 8, I notice that the *FDC-highestrho* and *DVine* approaches seem to be very close in terms of their performance. This result makes it a bit unclear to me the role and contribution of the pair-wise dependences (e.g., Gumbel versus Clayton) in the methodology. Perhaps a neglected aspect of the analysis is the robustness of the results under misspecifications of the chosen pair-wise copulas with the same pair-wise Kendall's tau assumptions. I would appreciate it if the author could elaborate on this point.

Minor points

Line 101: I do not understand the meaning of the word “efficient” in this context.

Line 118: Citing the most recent book by Joe “Dependence modeling with copulas” (2014) would be more appropriate.

Line 123: I do not understand this sentence.

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Line 246: "Penalized" instead of "panelized".

Line 905: Improve the readability of the figure (the plot labels cover the matrix).

Line 929: Specify how to interpret the scores in the figure caption (i.e., the higher the score, the better). The same comment applies to the other figures.

Line 990: Improve the readability of the figure (there is some text outside the circles).