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Hydrology and Earth System Sciences Discussions

Interactive comment on "Multivariate design via Copulas" *by* G. Salvadori et al.

Anonymous Referee #2

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General comments: As mentioned by the authors that calculating return periods and design quantiles in a multivariate framework is a difficult problem in hydrology and water-resources engineering, which is caused by ambiguous definition of natural total order. The authors present a theoretical framework defining the multivariate return period using copulas to advance this issue. The idea is useful and derivation is sound in science. However, the computing procedure may not be easily followed by practitioners without deep mathematical background.

Specific comments: 1. Page 5525, lines 3-4, It is not clear what is the "natural total order in multi-dimensional Euclidean space". 2. Page 5533, lines 15-20, It is suggested to add a diagram to illustrate the sub-critical region, the critical layer, and the super-critical region for a lower dimension case (d=2 or 3). 3. Page 5556, Fig.4, It is better to denote which region belongs to the sub-critical and the super-critical regions in Fig.4

in additional to showing only the critical layer. 4. Page 5556, Fig.4, It is suggested to mark the design realizations obtained by the component-wise excess design realization proposed in section 5.1 (page 5542) and the most-likely design realization proposed in section 5.2 (page 5544) on the Figure 4. 5. Page 5557-5558, Figs .5-6, It is not clear how to remapped the critical layer shown in Figure 4 into Figures 5 and 6.

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