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Hydrology and Earth System Sciences Discussions

Interactive comment on "Drought risk assessments of water resources systems under climate change: a case study in Southern Taiwan" *by* T. C. Yang et al.

Anonymous Referee #1

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1. Does the paper address relevant scientific questions within the scope of HESS? Yes- the issue is very important and worthy of exploration. 2. Does the paper present novel concepts, ideas, tools, or data? Probably no. The general approach is being adopted elsewhere and the individual model components are standard procedures. 3. Are substantial conclusions reached? Yes – comments are made about the likelihood of drought frequency and severity of droughts in southern Taiwan. This is important as Tsengwen is the largest reservoir in Taiwan. 4. Are the scientific methods and assumptions valid and clearly outlined? Overall yes, but no specific checking was carried out to ensure that the models adopted worked correctly for the given application. For

example, it was accepted that daily rainfall stochastic data generation model worked for the given situation, but my experience would suggest that it is important to check that the sum of the daily values preserved the monthly and the annual characteristic. The same applies to the daily temperature data. 5. Are the results sufficient to support the interpretations and conclusions? Yes. Overall, the conclusions follow from the analyses. 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? No – more details are required as noted below. 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes, I believe so. 8. Does the title clearly reflect the contents of the paper? Yes, the title is appropriate. 9. Does the abstract provide a concise and complete summary? Yes, the abstract deals with all components of the analyses. 10. Is the overall presentation well structured and clear? Yes, the paper is well structured and the methodology overall is clear. 11. Is the language fluent and precise? No. Clearly English is not the first language of the authors. There is a lot of editing required before the paper would be suitable for HESS. 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? No. There are no units used in the paper. This is an omission. 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Yes – see my comments below. 14. Are the number and quality of references appropriate? Yes. 15. Is the amount and quality of supplementary material appropriate? Not applicable. My general comment. The paper is well structured but the English expression requires attention, both in terms of sentence structure and word selection. Many sentences could be shortened. My specific comments are as follows: Page 12397, L25: Mishra & Singh, 2010 not in Reference List. Page 12399, Ls 4 & 7: There needs to be consistency in units m3 and tons. (In hydrology, m3 is preferred.) Section 3.1: The authors use the Richardson (1981) weather generator. I have checked Richardson's paper and he did not adequately test the generated annual time series to ensure the annual rainfalls preserved the annual statistics. This is important as drought characteristics in surface water reservoir systems are generally more de-

pendent on the long-term (annual) features of a time series than the short-term (daily) ones. Furthermore, the authors refer to their own work (Yu et al., 2002) in adopting the Weibull distribution , but again no assessments are reported in the Yu et al. (2002) paper that consider cumulative days up to annual totals. This omission is typical of many rainfall generators published since the earlier work at Stanford University in the 1960s. Historically, stochastic rainfall generation models perform very well at the daily time-step but are somewhat wanting at longer periods. Before this paper is acceptable adequate testing should be carried to ensure the daily generated rainfalls preserve the monthly and annual time series characteristics of mean, standard deviation, skewness and autocorrelation. Page 12402, Line16: How is evaporation loss defined? In terms of Equation (4) evaporation loss from the reservoir is actual evaporation. Hamon's evaporation equation is a potential evapotranspiration . Also Hamon's equation is based on daylight hour information. How was this dealt with? Equation 18: McMahon et al (2006) (J. Hydrology 324, pp. 359-) suggested that vulnerability is an approximate complement of resilience. Should not this issue be considered before one uses Equation 18? Table 1: For readers like myself who do not have a detailed knowledge of the GCM characteristics, T and L need to be defined in some recognisable way. Page 12410, Line 12: The authors refer to Tables 2 and 3 but give no clue how they dealt with the percentage change differences in Table 2, which are totally contradictory, as well as the major differences in Table 3. The paper should include a comment regarding these major discrepancies before one progresses to using the information in such an important analysis. Figure 9 to 11: What is the basis of the strategy for ensemble lines in Figures 9 to 11. I note that Figure 12 is not referred to.

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