

Responses to Editor's comments

First of all, the authors would like to appreciate Editor and the two anonymous referees for generously providing us insightful comments on this paper. After a careful reviewing process, the two respectful anonymous referees did not directly recommend rejection of this paper but advise the authors to revise the manuscript. So far the responses to Referee #1's comments have been uploaded in the interactive discussion; the responses to Referee #2's comments are still in progress and will be uploaded as soon as possible. In the following, the authors would like to respond to the issues raised in Editor's comments. The authors do hope that Editor can approve of our clarifications justifying four points in Editor's supplementary detailed comments and give us clear guidance so as to improve the manuscript for publication in HESS.

1. It is an application of a combination of well-known models and methodologies.

Response: Thank you for this comment. This paper aims at assessing the impact of climate change on drought risk in a water resources system in southern Taiwan. Therefore, (i) a computational tool for impact assessment of water supply and (ii) a suitable performance index for drought risk assessment have to be developed.

- (1) In this paper, an integrated computational tool (comprising the weather generator, hydrological model and simulation model of reservoir operation) has been developed for impact assessment of water supply. Although it combines well-known models and methodologies that have been published and widely used elsewhere, this kind of model integration was tested to be the most suitable approach in the study area.
- (2) As the referees point out, the other contribution of this work is to address an important and interesting topic: evaluating a number of drought indexes for drought risk assessments of water resources systems under climate change by use of a case study in southern Taiwan.

2. Climate change impacts based on a combination of climatic model forecasts is not offering anything new to the hydrological community and is very speculative as different models have quite different outcomes.

Response: (1) This comment is valuable and valid. Although a combination of climatic model forecasts is not offering anything new to the hydrological community and is very speculative as different models have quite different outcomes, using a combination of climatic model forecasts for assessing climate change impacts is still widely adopted by other researchers all around the world. For letting readers know why authors chose the seven GCMs for the study area, the reasons are described in detail in Section 2 “Study area and data set” of the manuscript.

(2) The authors firmly believe that there is at least an essential and new point to the hydrological community, that is, evaluating a number of drought indexes for drought risk assessments of water resources systems under climate change. The reason is as follows. The composite drought indexes, e.g. drought risk index (DRI) and sustainability index (SUI), in the published papers were used to perform risk analysis and quantify sustainability of water resources systems, respectively, for the current situations (not for the future situations). Different from the published papers, this paper evaluated their indexes and proposed a most suitable index for drought risk assessments of water resources systems under climate change.

3. The authors developed nothing new, besides the linear combination of a number of stress indicators, which is hardly an innovation.

Response: (1) Although the authors applied a combination of well-known models and methodologies that has been published and widely used elsewhere, it addresses an important and worthy-of-exploration topic: evaluating a number of drought indexes for drought risk assessments of water resources systems under climate change. Moreover, as the reviewers mentioned, the paper addresses relevant scientific questions within the scope of HESS.

(2) As mentioned in the previous section, there is an essential and new point interesting to the hydrological community in this work, that is, evaluating a number of drought indexes for drought risk assessments of water resources systems under climate change. This new point has not been investigated by the previously published papers yet.

4. The authors published most of this material before in 2004 in reviewed proceedings.

Response: (1) The published paper entitled "The influence of climate change on meteorological drought characteristic in Taiwan" (Yu *et al.* 2004) aimed at detecting the homogeneity and the change points in the long-term historical rainfall records by using Cumulative Deviations, Mann-Whitney-Pettitt test, and Kruskal-Wallis test at thirty-one raingauges with at least 80-year records all over Taiwan. A significant change point was found existent near 1960's. Drought characteristic in the two rainfall samples was found that the drought frequency and duration have an increasing tendency in central and southern Taiwan after 1960. But northern Taiwan has a decreasing tendency.

(2) In view of previous results with meteorological drought characteristic, drought frequency and duration in southern Taiwan have an increasing tendency in the past eight decades. There is uncertainty as to whether the increasing tendency will continue or not in the future, hence our paper submitted to HESS adopted the outputs from seven general circulation models for assessing the impact of climate change on drought risk in a water resources system in southern Taiwan. The authors did not publish most of this material in the previous study (Yu *et al.* 2004).

5. I recommend to write the equations (2) and (3) in regular and compatible units and to include the time step in (4). The units of hydrological fluxes (particularly rainfall and evaporation) are in L/T and not in L. The units in the graphs showing these fluxes need to be corrected accordingly.

Response: Many thanks for this valuable comment. The units suggested by Editor will be properly replaced accordingly in the final revised manuscript.