

Interactive comment on “Numerical simulations of the impact of climate variability and change on semiarid watershed response in central New Mexico” by E. R. Vivoni et al.

Anonymous Referee #2

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General Comments

The paper contains some potentially useful results and develops a novel method via which various climate scenarios may be modelled in order to make decisions about water management in central New Mexico (and other semi arid regions). The limitations of the study are clearly stated and the conclusions drawn are valid. The topic of the study addresses a difficult issue of simulating climatic impacts on watershed response in regions where gauged data is limited. In general the paper is of high quality and is recommended for publication.

Specific comments

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The title of paper is slightly misleading and could be revised to better reflect the research presented. In particular it may be better to replace the word "impact" with "sensitivity". The title implies that the authors will present an analysis of climate variability and change impacts on the watershed response, however the authors actually present a sensitivity analysis of the watershed response to varying climate conditions.

The calibration of the semi-distributed watershed model is based on data from 1949 to 1978. While it is acknowledged that this is due to limited data being available for the basin being studied, this period corresponds to an epoch of predominantly negative Pacific Decadal Oscillation (PDO). Previous research has shown that the PDO influences rainfall in New Mexico on multi-decadal timescales. In particular, the negative phase of the PDO results in dry conditions in New Mexico. This is mainly due to the higher frequency of La Nina events when the PDO is negative. Basing the calibration of the watershed mode on this period may therefore bias the model to replicate dry conditions well; however the model may not perform well under wetter conditions. It is suggested that this be acknowledged in the paper or if possible, calibration results shown for wet and dry years within the calibration period. This may be important if future simulations include 'wetter' climate conditions.

The use of 25 realisations is too low to represent uncertainty associated with the hydrological model response. It is suggested that this be raised to 100 at a minimum.

The months December to February are chosen to represent winter, while July to September is used to represent summer. An explanation of the choice of summer months is required since they do not correspond to the 'typical' summer season (JJA)

Technical corrections

Section 3.2. line 15. "the long-term simulations allow quantifying how precipitation" should read "the long-term simulations aid to quantify how precipitation", or similar.

Section 4, line 24. "this allows gaining insights" should read "this allows insights to be

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