

Interactive comment on “Investigation of dominant hydrological processes in a tropical catchment in a monsoonal climate via the downward approach” by L. Montanari et al.

Anonymous Referee #3

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General comments

The work presented by L.Montanari, M.Silvapalan and A.Montanari investigates the hydrological behaviour of a data-limited tropical catchment located in a vast region of Australia, for which little hydrological information is available. The analysis is performed through the downward approach by means of a conceptual rainfall-runoff model which is progressively 'adjusted' to reproduce the dominant mechanisms that are responsible of the rainfall-runoff transformation.

The authors clearly state in the Introduction the scope of their analysis, which is also well formulated in the title, and explain why they used the downward approach to investigate the hydrology of the Seventeen Mile Creek.

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The description of the case study reveals the low quality of the meteorological input at disposal. Consequently the authors are forced to develop a data-driven downward approach which is well described in its steps of increased complexity. From this point of view, they demonstrate that the downward approach could represent an improved methodology 'for making inferences about the hydrological behaviour in ungauged catchments, on the basis of available knowledge and understanding available at the local and regional scales (pag. 161, lines 14-17)'. However I do not agree when the authors write in the conclusions (pag. 177, from line 21) ' .. can be used to extrapolate the runoff behaviour to other similar ungauged basins'. Namely the authors have developed the downward approach on the basis of the rainfall, evapotranspiration and runoff data and have not shown how it can be extrapolated to other catchments.

Specific comments

Pag. 163, line 15: it is not clear how the analysis 'may contribute to our efforts at a rational classification of catchments for regional hydrological studies and predictions'. The work shows that the downward approach is a useful tool for the specific catchment in consideration of the available information, but it is not demonstrate that the procedure could be generalised to other case studies. Please provide a comment in the conclusions.

Pag 165, line 12: please specify if the value for the mean and the standard deviation of the annual rainfall totals are acceptable for catchments located in tropical regions.

Pag 165/166: I would add a Table showing the means and the standard deviations of the longer observed daily potential evapotranspiration data from the three stations Mango Farm, Wooliana and Douglas and the Katherine Aviation Museum and specifying for which period the recorded data are available. This would provide a better insight in the description of the meteorological input used for the simulation and would justify the mean and the standard deviation of the computed annual potential evapotranspiration series.

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Pag 166, from line 7: the authors firstly mention that the preliminary analysis of the rainfall-runoff regime is performed to get initial indications about the hydrological behaviour of the Seventeen Mile Creak catchment. Then they write that this first experiment permit to identify the optimal structure of the hydrological model. The second sentence contrasts with the first one.

Pag. 170, lines 6-8: please specify how the model performance are satisfactory at the annual and monthly time scales.

Pag. 170, line 10: give more information about the procedure you followed to set the up four bucket model, which is the central part of the applied downward approach, and the most interesting for the reader who would like to use the same procedure.

Pag 171, line 7: the use of the word predictions is not correct, since here the validation of the model is intended.

Pag. 176 Conclusions The authors have clearly mentioned in the description of the study catchment the problem of the poor quality of the recorded rainfall series. However no indication of this aspect is given in the conclusions. In addition I think that the results of the analysis are necessarily conditioned by the incompleteness of the precipitation and could be extrapolate to other catchment with some limitations. Please give some comments.

Pag. 17, line 24: give more details about the development of monitoring schemes starting from the analysis you have carried out.

Technical corrections

Pag. 173 Line 23: the total runoff of 140 mm refers to year 1977 and not to year 1978

Pag. 176 Line 6: change 'increase runoff generation' with 'increase of runoff generation'

Pag. 189 Fig. 5: the unit of measure is missing in the Y-axis of the three charts. I would

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add the indication of the wet and dry season in the charts

Pag, 200 Fig. 16: the observed values of annual runoff look like dots more than stars.

Fig 9,10,12,13,16: Q and P are not defined.

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