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Hydrology and Earth System Sciences Discussions

Interactive comment on "Characteristics and drivers of baseflow response in 183 Australian catchments" *by* A. I. J. M. van Dijk

Anonymous Referee #2

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In this paper, the author performs a comprehensive study of the various methodologies available relating to the calculation of baseflow, including recession analysis, baseflow separation with recursive filters, analysis of different types of response, linear and non-linear approximation and finally the influence of different factors in the calculated recession parameters.

The paper is scientifically interesting and the proposed methodology can provide a useful insight into baseflow behavior. There are, however, some important weaknesses that the author should tackle before publication of the paper. The analyzed watershed covers a great extension of south-eastern Australia which has been the topic of other baseflow studies (Chapman, 2003; Chiew and McMahon; 1993). More references to

these works should be added.

Even if the hydrological approach (different to a hydrogeological study) doesn't need an exhaustive analysis of the aquifer system, this study, similar to the conclusions derived with which groundwater systems are involved (extractions/recharge, existence of perched aquifers,. . .), still require a basic set of hydrogeological data to validate and provide an understanding of the results in terms of the baseflow coming from the groundwater system.

In this sense, the author assumes the origin of the baseflow is the groundwater system (page 5813, lines 9-10). However, these contributions can vary in a wide range of sources, such as unsaturated soil, snowmelt or lakes drainage, which at times may be greater than groundwater contributions (Hewlett and Hibbert, 1963; Tallaksen, 1995). The subterranean origin of baseflow must be justified as well as the influence of the other contributions.

In Page 5813, lines 16-17 the author proposes the utilization of the recursive filter described by Wittenberg (1999). Why this choice? Have other filters been considered?, such as those based on recession studies or BFI (e.g. Chapman y Maxwell, 1996; Boughton, Chapman and Maxwell, 1996; Eckhardt, 2005).

Throughout the paper, major revisions in the descriptions of the equations and units are required. Page 5814, line 12, the β parameter is dimensionless being β =1 when the linear model is assumed. For the recession coefficient k_BF the dimensions are (Lˆ(-3+3β)·Tˆ(-β)), in case of lineal model (Tˆ(-1)). In this study, is dt=1 day?

My specific comments include:

Page 5814, lines 18-21, is the study of E. Kwantes a local study which justifies Tqf=10? In this case, which parameters has been studied for this assumption (soil characteristics, watershed area,. . .). Have other approximations been considered, e.g. Linsley et al., (1958)?

Page 5839, Figure 1 can be improved. I suggest changing this figure by extending the study site and adding additional information (geology, aquifers. . .) with a small sub-figure to detail the position of the study area within Australia.

Page 5843, change “reservoir coefficient” by recession coefficient.

Page 5844, the figure shows different parameters, each with different units (dˆ(-1)), (mmˆ(-3+3β)·dˆ(-β)) and (-) which should be described within the caption.

Page 5845 BFI is dimensionless.

Page 5846-5847 the units in Figure 8a (k_BF) and 9a (BFI) should be included.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5811, 2009.