

## ***Interactive comment on “Hydrograph separation: an impartial parametrization for an imperfect method” by Antoine Pelletier and Vazken Andréassian***

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General comments:

The authors present a new method for hydrograph separation. As the title suggests, the method is not perfect but in my opinion it is a big step forward in the estimation of baseflow. Referring to the discussion on the HESSD web-page, even though a separation of baseflow from total flow is impossible, baseflow remains an important characteristics of river flow. The novelty of the approach introduced by the authors consists in relating the baseflow model parameters to catchment hydrogeological conditions. This is done by looking for a correlation between baseflow values and the time response

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of a river basin expressed as a cumulative effective rainfall. In other words, the BFI model parameter, basin storage, is defined as that which gives the largest correlation between baseflow time series and cumulative effective rainfall. The underlying hypothesis is that those catchments which have larger baseflow indices due to recharge from the groundwater storage will have longer time responses. Based on the results from the 1664 French catchments, the authors provide evidence of a relationship between the geological characteristics of a catchment and the BFI values. Even though this hypothesis is interesting and gives consistent baseflow values, it is imperfect due to the lack of a clearly defined optimisation criterion. That suggests that maybe some more work towards the improvement of that criterion is required. The other point is the assumption of a linear relationship between total flow and groundwater recharge. It is a strong assumption and maybe some more discussion should be given on the catchment conditions when it can be fulfilled and when it is not likely to be kept.

Specific comments:

Pages 6 and 7: The notation is rather confusing -the authors mix the discrete notation with continuous.

Equation for Q at page 7, line 15 is not needed and is rather confusing, as I presume that ‘tau’ in that equation is not the same as ‘tau’ on page 8?

Page 7 lines below equation for Q –the explanation of the integration scheme is not very clear

Page 10, Algorithm 1: there is a mistake in the  $R_i$  substitution (should be  $\beta \cdot Q_i$ ) following eq. 1

Page 17: lines 21-23 – this is important information and could be more elaborated on and made clearer.

Page 20, Fig. 10, left panel axis should be corrected (BFI instead of Beta).

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