

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

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We would like to thank Pr. Keith BEVEN for reading our manuscript and for his short comment. It will help us to state more explicitly our intentions with the new hydrograph separation method presented in the manuscript.

C1

### **Prohibition does not work**

Pr. Beven's review on hydrograph separation() recommends not to use any of the presented methods, with a short statement: "Don't". We understand that hydrograph separation is anything else but a good hydrological modelling approach; in particular, it is not supposed to have any predictive capacity. However, the interwar period in the USA has shown that prohibition does not work, for alcohol but also for hydrograph separation. We think that telling hydrologists not to use this age-old simple hydrograph processing technique will not prevent them to use subjective and partial graphical or empirical methods, and therefore, there is an interest in developing an unarbitrary, impartial and repeatable parametrization of a simple conceptual method.

### **Do we all agree on what baseflow is?**

The definition of baseflow itself is a problem. As underlined in Pr. Beven's comment, any process-based definition of baseflow leads to a slippery slope: a quick response to a rainfall event is not necessarily composed of recent water and it can even be mostly old-water, mobilised from sub-surface and ground(). It is the difference between celerity – or phase speed – which is the propagation speed of the perturbation caused by the rainfall event, and velocity – or group speed – which is the speed of the molecules of water themselves(). The baseflow that we would like to identify with the method presented in the manuscript is composed of slowly responding components of streamflow, i.e. perturbations propagated with a low celerity and much dispersion, which can be composed of recent or old water. We will improve the definition of baseflow given in the manuscript, to detach ourselves from the simplistic process-based interpretation of hydrograph separation.

C2

## Events are not relevant

The discussion about the age of water and the distinction between velocity and celerity is relevant at the scale of a single event; for instance, to study the precise components and their dynamics of an individual flood peak, the method presented in the manuscript has almost no interest. It is intended to analyse long time series of streamflow, to identify the components that bear long-term memory of past hydroclimatic events. For the sake of simplicity, total streamflow is divided into only two components: the quick one and the slow one. The computation of BFI yields a global indicator to highlight *baseflow-dominated()* catchments and in our national analysis, it is quite well correlated to the geological context: aquifer-driven catchments have the highest BFIs. This purpose of the method will be explained more explicitly in the revised version of the manuscript.

## References

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