

## ***Interactive comment on “Does discharge time source correspond to its geographic source in hydrograph separations? Toward identification of dominant runoff processes in a 300 square kilometer watershed” by Y. Yokoo***

**Anonymous Referee #2**

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### GENERAL COMMENTS:

This study compares the performance of a time source separation method (numerical filter) and a geographic source separation method (end-member mixing analysis – EMMA) for hydrograph separation in a large-size watershed (Kuroiwa monitoring station on the Abukuma River) in Japan. Analyzing hourly data, the study reports that both the methods generally perform well in hydrograph separation and are able to characterize dominant runoff processes based on observed discharge data alone. However, the

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study also finds that agreement between the two methods is much stronger for surface and interflow estimates when compared to that for baseflow estimate. An attempt is also made to offer some important interpretations on watershed dominant processes.

Overall, the study is both important and interesting. Hydrograph separation and the role of dominant processes have been important areas of research. The analysis is balanced (between two approaches) and the results and discussion are interesting. Therefore, in my opinion, the study is a significant contribution to research in watershed processes and deserves publication. However, there is still some scope for improvement (see below for specific comments). In view of these, I recommend acceptance of the manuscript for publication subject to minor revisions.

### SPECIFIC COMMENTS:

1. The organization of the manuscript is a bit confusing. As presented now, it is not clear if the focus is more on the methods or on the watershed. The general presentation seems to suggest that it is the former (as it should), but Section 2 seems to suggest otherwise. This deficiency needs to be addressed. In doing this, having separate sections for Methods (say, Section 2) and Data (say, Section 3) would also be helpful.
2. The manuscript attributes the less-than-desired performance of EMMA in estimating baseflows to its potential limitations when applied to a large-size watershed, such as the Kuroiwa monitoring station, which has a watershed area of about 3000 sq. km. Unfortunately, however, the discussion is rather thin, and needs to be expanded. In this regard, it is also relevant to ask about the role of temporal scale. Is the hourly scale too fine for a 3000 sq. km. watershed? Would the results considerably change if a coarser temporal scale is studied (e.g. daily)?
3. The manuscript indeed presents a good literature review, citing a number of publications relevant to hydrograph separation and dominant processes. However, the manuscript can also benefit from some other studies, especially in the context of data-based approaches, an approach adopted here. I suggest that the author look

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into the following publications, among others: (a) Carl, P., and H. Behrendt (2008), Regularity-based functional streamflow disaggregation: 1. Comprehensive foundation, *Water Resour. Res.*, 44, W02420, doi:10.1029/2004WR003724. (b) Carl, P., K. Gerlinger, F. F. Hattermann, V. Krysanova, C. Schilling, and H. Behrendt (2008), Regularity-based functional streamflow disaggregation: 2. Extended demonstration, *Water Resour. Res.*, 44, W03426, doi:10.1029/2006WR005056.

4. The manuscript is generally written well. However, some minor editing errors still remain. I mention just a few here, as examples: (a) Title: "... 3000 square kilometer" [Not '300'] (b) Page 10933, Line 27: McNamara et al. (1997) [Not 'McNamura;' Also check in other places] (c) Page 10934, Line 6: "... is well supported by mixing .." [Remove 'by that'] (d) Page 10939, Line 7: Klaus and McDonnell (2013) [Not 'Klause;' Also check in other places]

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