

## ***Interactive comment on “Spatial and Temporal Variability in Baseflow in the Mattole River Headwaters, California, USA” by N. Queener and A. P. Stubblefield***

**Anonymous Referee #1**

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### General comments

This manuscript presents an exercise made for analyzing the relationships between several catchment descriptors and baseflow rates a set of small headwater catchments. The subject is of interest to the current subjects of catchment hydrological processes, the manuscript is adequately written and presented, the data are original and the outcomes are basically supported by the data analyses. Nevertheless, the statistical design of the exercise is notably weak, because the authors analyze the role of over 60 catchment descriptors on just 3 baseflow variables without sufficiently taking into account the redundancy among most of the descriptors. Furthermore, most of the baseflow variables were obtained using linear regressions without estimating the

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uncertainty associated to these interpolation methods. Some of the outcomes are consistent and of value in the light of the recent findings in the subject, but some others appear to be due to the correlation among diverse catchment descriptors, so statistical correlations do not necessarily mean causal relationships. Before interpreting the results, the authors should show a correlation table between the catchment descriptors and use the Principal Component Analysis made for mapping these descriptors. The interpretation of the causal relationships must be done taking into account more the factorial axes than the separate variables. This means that most of the results and discussion sections must be rewritten accordingly.

### Specific and technical comments

- Page 2 line 21 and elsewhere: Smakhatin should be Smakhtin
- Page 3 line 7: a recently published work made using large scale data shows that high gradient catchments have less young streamflow (Jasechko, S., Kirchner, J.W., Welker, J.M. and McDonnell, J.J., 2016. Substantial proportion of global streamflow less than three months old. Nature Geoscience, 9: 126-123.)
- Page 4 line 23: mm are typically used instead of cm.
- Page 4 lines 27-29: Genus should be fully stated along with species.
- Page 5 line 1: some more information on the age of the rocks as well on their degree of tectonic and metamorphic modifications would be of value taking into account the subject of the paper.
- page 6 lines 9-11: the two sentences may be deleted.
- page 6, lines 11-18: the uncertainty associated to these interpolation methods should be analyzed.
- page 7, lines 3-7: If climatic data for the catchments are derived from their topographic characteristics, both the original and derived variables should not be equally analyzed

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for their role on baseflows. Subsequently, cause-effect relationships should be used instead of statistical ones.

-page 7, line 32: explain how these cooler and humid episodes affected the recession flows.

- page 10, lines 12-16. Canopy density seems to be strongly correlated to topographic gradient, so this may not be a causal relationship.

- page 16, lines 21 to 28: these are not properly conclusions, because this subject was not analyzed before. Please, move the paragraph to the discussion section with a new header such as '4.5. Implications', or change the name of this section into 'concluding remarks'. Line 21: "unit/area baseflow yield"

Table 1: "the extent of dry reach surveys" is not shown in the table

Figure 1: state the names of the States in the inset

Figure 2: This graph is not necessary given the written explanations. Instead, a map of the catchment variables would be necessary. The fraction of the correlation explained by the axes should be stated in the caption.

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