

Interactive comment on “Three parameter based Streamflow elasticity model: Application to MOPEX basins in USA at Annual and Seasonal Scale” by G. Konalapa and A. K. Mishra

Anonymous Referee #2

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This manuscript presented a three parameter streamflow elasticity model to relate streamflow change with changes in precipitation, potential evapotranspiration, and storage. It is an interesting attempt. However, some improvements are required, and the comments and suggestions are given as below. Therefore, I recommend a major revision.

Major comments:

1. The authors used equation (4) to evaluate the impact on streamflow from precipitation, potential evapotranspiration, and storage change. In this equation, the authors estimated storage change as $(DSt - DS)/DS$. I don't think that it is a good choice. According to the definition of this manuscript, DS is the long-term average of storage

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change, and it means that DS generally approaches zero in many basins (if there is no storage change). Therefore, it will lead to infinity for the third term on the right side of equation (4). In addition, the sign of storage change elasticity depends on the sign of DS. Consequently, we can't judge whether increasing storage leads to decreasing streamflow according to positive storage change elasticity. In that case, I suggest using storage replacing DS, or using storage change replacing " $(DSt - DS)/DS$ ".

2. The structure of this manuscript. In Section 3, the first paragraph represents how to obtain the results. It is better to remove it into Section Methodology. Similarly, first paragraph of Section 3.5 should be removed. In P.4, the sentences from line 9-21 review the researches on the elasticity, and it is better to remove them into the Section Introduction.

3. Figure 8 shows that the potential evapotranspiration elasticity is larger than 0 in some basins and less than 0 in the other basins. It indicates that increasing potential evapotranspiration leads to increasing streamflow in some basins but leads to decreasing streamflow in the other basins. On the causes for the opposite impacts on streamflow, more explanations and discussions are required.

4. Figure 9 shows that the storage change elasticity is larger than 0 for many basins in spring and summer. It means that declining storage will lead to a decreasing streamflow in those basins. At the same time, the storage change elasticity is less than 0 for other basins in spring and summer, which means declining storage resulting in increasing streamflow. The underlying mechanisms of the phenomenon should be explained and discussed.

Minor comments:

1. On the meanings of AIC and BIC, more explanations are required, i.e. why "the preferred model is the one in which the AIC value would be minimum."

2. P.2, line 5-6, Wand and Wang (2011) should be Yang and Yang (2011).

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3. P.3, line 8, please check the reference Jiali et al., 2014.
4. Figure 1, the unit of the legend is missing.
5. P.2, line 19, P.7, line6, and so on, “lesser” should be “less”.

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