Stockinger et al. presents a study to evaluate the temporal variability of young water fraction (Fyw) based on 189 sine curve fits of 1-year subsets of a 4.5-year rainwater and streamwater 18-O isotope dataset. The Fyw, developed by Kirchner 2016, has become a powerful descriptor of streamwater flow path as the substitute for mean transit time. It is important to test the how Fyw change with different timing and sampling time coverage of water isotopes. The results showed "high" temporal variability of Fyw but no seasonality of Fyw based on the criterion defined by the author. The variability due to sampling time chosen is very useful for the isotope hydrology community. This study sheds new light on the development and application of Fyw, which is interesting and suitable for HESS. I find this paper is generally well-written but not strong enough. One of my concern is that how and why the 2% difference was defined as significant for the three hypotheses? This threshold value is introduced in the paper but not clearly explained. The discussion section lacks the discussion of the importance of the results. It would be a stronger paper if the author can explain the cause of the Fyw timevariability, which is ambiguous in the current form. Other specific comments on this paper are listed below.

We thank reviewer #3 for the helpful comments.

We will replace the 2% difference:
Based on other reviewer comments, we now estimated the uncertainty of Fyw by Gauß error propagation (preliminary Figure R1). Fyw of all data (the single sine wave fit) had an uncertainty of ±4%. We will use this new data-driven value instead of the ±2% for re-evaluating our hypotheses:

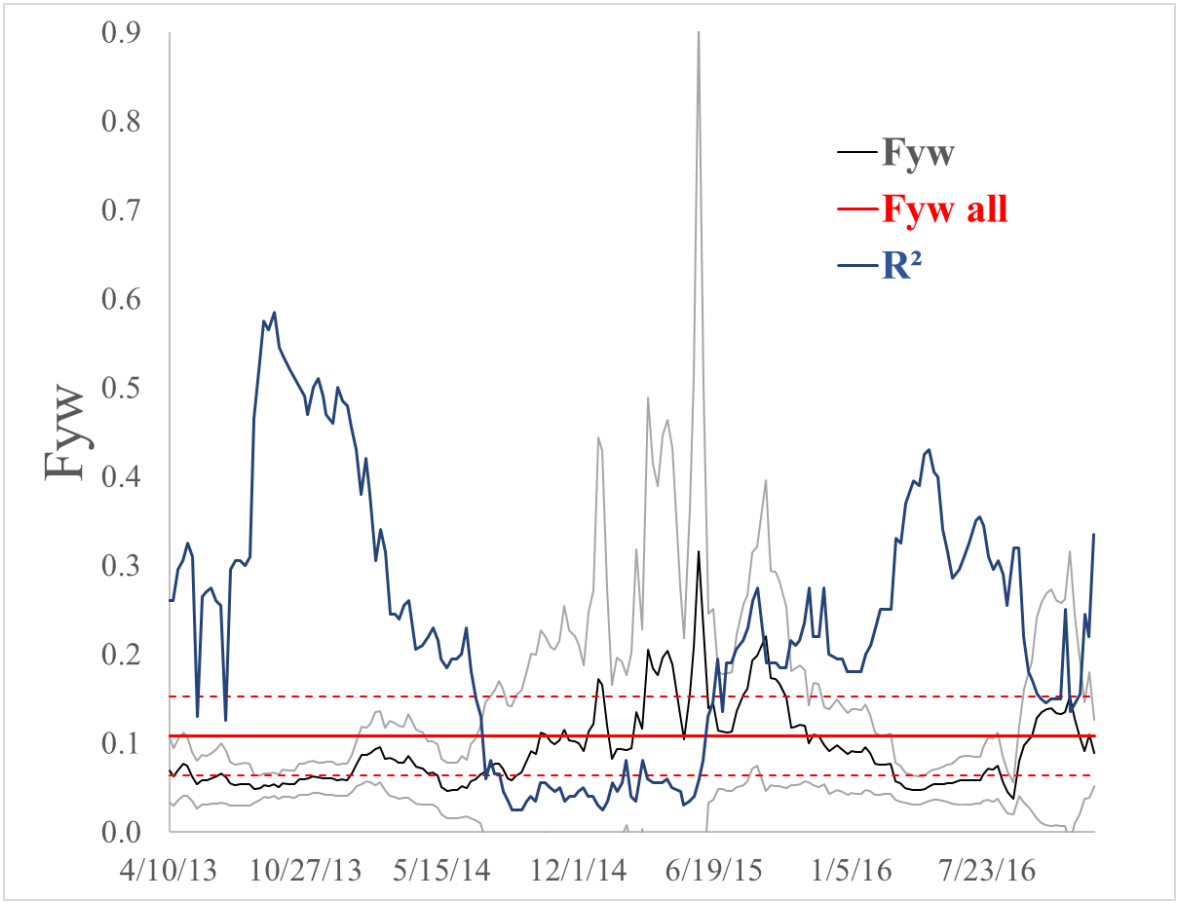

Figure R1. 189 Fyw results (black) and uncertainty (grey) compared to Fyw for all data (red, solid line) and respective uncertainty (red, dashed line). Additionally plotted is the adjusted R^2 (blue).

The following can be said from this result:

a) with a drop in R^2 below approx. 0.2 the uncertainty increases drastically. This, together with the strongly fluctuating Fyw results (page 11, lines 6-8), indicates that in the Wüstebach an R^2 of at least

0.2 should be reached. We highly recommend conducting similar studies in different catchments to test whether different R^2 threshold values exist in other catchments.
b) Fyw of all data ("Fyw all" in Figure R1) had an uncertainty of appr. ±4%. We will use this new data-driven value instead of the ±2% for re-evaluating our hypotheses.

The importance of our results will be emphasized in the discussion:
We will first add the new Fyw uncertainties and discuss these. Additionally, an extended analysis of hydro-meteorological data that points to special climatic conditions during summer 2015 will be added. These special conditions might have influenced Fyw and its uncertainty (analysis not yet finalized). The finished analysis may lead to sampling recommendations for other studies.

Previous studies (e.g., Lutz et al., 2018; von Freyberg et al., 2018) showed that Fyw reacts to changes in e.g., precipitation and discharge. Thus, it is safe to assume that other catchments also have a time-varying Fyw. Applying our method would yield information about the Fyw behavior and its uncertainty which is important before applying the method to a catchment and especially when comparing results of different catchments. We will emphasize this in the discussion.

P3-L27: change "8" to Eight

We will do this.

P5-L14: Add "reciprocal of" or similar phrase before "24 hours…" since frequency (f) should be 1/T.

We will rephrase this "i.e., if CP(t) and CS(t) are calculated in hourly time steps then the frequency f is 1/8766; once per 24 x 365.25 hours)."

Figure 1: It would be nice to add latitude and longitude to the map. An alternative way is giving the latitude and longitude of the sampling location in the text. Square brackets with "-" can be removed, it may be misread as minus.

Latitude and longitude were added. We will remove [-] were applicable.

Figure 4a: Which line represent the R2?

The red and orange lines are R^2 (orange = R^2 of TF and Q, red = mean). We will change the legend entries to "Mean R^2", "TF R^2" and "Q R^2" to clarify.

Figure 7, 8, and 9: The hypotheses should be explained in the captions.

We will add explanations.

References

Lutz, S. R., Krieg, R., Müller, C., Zink, M., Knöller, K., Samaniego, L., and Merz, R.: Spatial patterns of water age: Using young water fractions to improve the characterization of transit times in contrasting catchments. Water Resources Research,54, 4767–4784.https://doi.org/10.1029/2017WR022216, 2018.

von Freyberg, J., Allen, S. T., Seeger, S., Weiler, M., and Kirchner, J. W.: Sensitivity of young water fractions to hydro-climatic forcing and landscape properties across 22 Swiss catchments. Hydrol.Earth Syst. Sci., 22, 3841–3861, https://doi.org/10.5194/hess-22-3841-2018, 2018.