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Interactive comment on "Global sinusoidal seasonality in precipitation isotopes" by Scott T. Allen et al.

Anonymous Referee #3

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The authors present an incredibly useful predictive statistical model of the global patterns of d18O and d2H in precipitation. The methods are adequate and sound and the results are clearly described and presented in tables and figures. In my opinion, the manuscript can be accepted in its present form. I leave the following three comments only to encourage the authors to expand the discussion if they agree it would improve the paper.

The authors' objective to produce the predictive model was clearly motivated by a need in the hydrological community for isotopic input data to calculate young water fractions and unravel storage selection behavior of watersheds using stable isotope data. The observed patterns in explanatory variables are only lightly discussed in terms of atmospheric circulation patterns or origins of atmospheric water vapor.

There are a number of studies that have used atmospheric air mass trajectory analyses to study the variability of isotopes in precipitation. I understand this is well outside the scope of this manuscript - and possibly out of reach computationally. It might be worth mentioning air mass trajectory analysis as a possible path for improving the predictions of stable isotopes in precipitation.

On page 4, the authors describe the decision to use the "robust-fitted" seasonal parameters (as opposed to the "amount-weighted" parameters) for further analysis because they capture the variations during drier seasons better. I wonder if the "amount-weighted" offset would provide a better estimate which is less biased by light (summer) precipitation events and if there is a significant difference between the two estimates.