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Hydrology and Earth System Sciences
Discussions

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

Anonymous Referee #2

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General comments: This paper makes an important contribution to the scientific literature by providing estimates of coefficients of sinusoidal cycles in precipitation isotopic composition at global scale. These estimates are useful for analyses of water transit time and water source attribution in hydrological, biological, and geological studies. Regression models are presented that will allow users characterize precipitation isotope cycles at points or as raster grids.

Specific comments: P 2: additional information on previous geostatistical analyses (Bowen et al. 2014) and products, such as IsoMAP (http://isomap.org), should be included in the Introduction. Please explain how this study improves on previous work (eg., IsoMAP).

P 3 L 3-7: The data set used to develop the regressions is large and potentially very

useful to other users; however, a link to the data is not readily apparent. The authors indicate there is a compiled data set; however, I was unable to identify a link in the cited reference (Jasechko et al. 2016)(the Methods section of that paper indicates they compiled approximately 63K data points). Readers will not be able to reproduce the analysis in this paper without access to the precipitation isotope sample data. It is essential to provide a clear link to the raw data set (with appropriate citations for data sources).

P 4 L 19: the list of potential explanatory variables is reasonable; however, distance to nearest ocean ignores the influence of prevailing wind direction. While perhaps beyond the scope of this paper, it might be possible to include in future analyses. In the meantime, this source of error could be discussed in the Discussion section.

P 4 L 24-25: Model parameterization does not appear to follow accepted statistical best practices. In stepwise multiple regression, selection of model parameters usually is based on minimizing the Akaike information criterion (AIC) (Akaike 1981) or Bayesian information criterion (BIC), rather than maximizing R2, which could lead to model overparameterization. Colinearity does not appear to have been considered quanitatively, but should be; it often is tested using the variance inflation factor (VIF) (Hair et al. 2005).

P 7 L 4: define LC-excess.

P 8 L 10-15: One of the main contributions of this paper is the presentation of models for amplitude, phase, and offset. This allows readers to estimate these cycle characteristics at other sites and/or create raster grids (as the authors have done). This is worth mentioning explicitly in the Discussion.

P 9 L 3-4: cannot locate Supporting Information 2.

Table 1: consider including p-values.

References: Akaike, Hirotugu. 1981. "Likelihood of a model and information criteria."

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