

Interactive comment on “Scale invariance of daily runoff time series in agricultural watersheds” by X. Zhou et al.

X. Zhou et al.

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The main objective of present study was to investigate scaling behavior of runoff time series in agricultural watersheds. Four agricultural watersheds and their 31 sub-watersheds with various sizes were selected in this study. The scaling properties were examined by the fractal dimension estimated using the shifted box-counting method and by Hurst exponents estimated using rescaled range (R/S) analysis. Parallel studies of runoff, especially its scaling behavior, in agricultural watersheds have not been attempted.

Thanks to the valuable comments and insights of two reviewers, the influence of seasonal cycle on scaling investigation was taken into consideration in the revised manuscript. Authors totally agree with the comments of the reviewers that the deterministic components should be separated prior to exploring the scaling structure in time

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series.

After deseasonalization, the transformed runoff series were used for shifted box counting and R/S analysis. The results showed that two scaling regions were also observed for the deseasonalized runoff series and the break point again occurred at about 9 ~ 12 months. Such multiple scaling behavior was also observed in rainfall time series (Olsson et al., 1992, 1993). The R/S plots of deseasonalized series also exhibited a scaling break point for the runoff within three watersheds (Little river watershed, Little Mill Creek watershed, and Sleepers River watershed), but no break point for the Reynolds River watershed. While the original runoff time series did not display long-term dependence, the deseasonalized series showed a long-term dependence, with typical H values of 0.7.

We are trying to apply the multifractal scaling methods on these runoff time series, and also the scaling of the stream network and other morphological properties in these watersheds.

We are grateful to reviewer for their very valuable comments and excellent references.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 1757, 2005.

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