Hydrology and Earth System Sciences Discussions

Interactive comment on "Circulation pattern based parameterization of a multiplicative random cascade for disaggregation of daily rainfall under nonstationary climatic conditions" *by* D. Lisniak et al.

Anonymous Referee #2

Received and published: 7 November 2012

In this study, a method is presented to condition the parameters of the multiplicative random cascade method using objectively classified circulation patterns to disaggregate daily to hourly rainfall data. The purposed parameterization accounts for different rainfall intensities and temporal resolution, in particular position, time scale and volume of rainfall. It is argued that by coupling the model parameters with the climate signal, the variability in the scaling properties for different time periods can be accounted for. Moreover, the applied method is correctly compared with two other non-conditioned

methods, a rainfall generator and a multiplicative random cascade method. The paper is well written and the presentation has a cohesive structure. However, there are some remarks:

Firstly, as noted in P10129, it is clear how the use of the frequency of occurrence of specific circulation patterns on a daily scale can be a beneficial aspect of linking the climate signal to rainfall records. However, it is not clear why this consideration can be beneficial to disaggregation methods from daily to hourly data. This is supported in Fig.5, Fig.6 (and Fig.7), where the cumulative distribution functions of hourly rainfall amounts of observed and synthetic data (MRCs methods: MRC-CP and MRC and rainfall generator) are presented for the parameterization and validation periods. In my opinion the results do not suggest that the MRC-CP method provides any obvious improvement, especially in the validation period, supporting the argument that the authors make in P10134 over the selected method of circulation patterns classification and principally over the combination of different pressure systems in a given day and their connection to local precipitation. Having this in mind, the authors must elaborate more on their starting hypothesis that (and how) circulation patterns would be useful in a discrete scale such as the hourly scale, considering the physical meaning. The authors can consider adding in Fig.7 the simulated rainfall amounts of the rainfall generator for the period 1979-1989, supporting thus the reasoning that the non-conditioned MRC method can be used as a valid method for temporal rain disaggregation.

Secondly, the authors must elaborate on convincing on the issue of stationarity in the validation and parameterization periods since the climate conditions addressed are under nonstationarity (P10128 and P10129). It is argued that stationarity holds but the same time they state that the slope of the scaling behaviour between the parameterization and validation periods differs.

At last, same technical remarks:

The number and order of the figures should match their first citation in the text.

P10118 L24: Remove "so that".

P10119 L16: Remove "very".

P10120 L4-10: The sentence referring to: "Circulation pattern based …regression techniques" should go with P10117L20 and not in the paragraph of the purpose of the paper.

P10120 L22: change "hourly data has" to "hourly data have".

P10120 L23: change "the data was" to "the data were".

P10126 L1: Change "he" to "the".

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 10115, 2012.

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