Hydrol. Earth Syst. Sci. Discuss., 9, C6970–C6971, 2013
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Hydrology and Earth System Sciences Discussions

Interactive comment on "Determining spatial variability of dry spells – a Markov based method, applied to the Makanya catchment, Tanzania" *by* B. M. C. Fischer et al.

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The comment was uploaded in the form of a supplement:
http://www.hydrol-earth-syst-sci-discuss.net/9/C6970/2013/hessd-9-C6970-2013-supplement.pdf

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 11707, 2012.

Interactive comment on: Determining spatial variability of dry spells; Markov based method, applied to the Makanya catchment, Tanzania by B. M. C. Fischer, M. L. Mul and H. H. G. Savenije

We would like to thank the anonymous Referee #2 for his/her review and valuable notes to improve the manuscript. In the final version of the manuscript we will correct the issues pointed out by Referee #2 and as we already stated in the comments to Dr. Bazrafshan's we will strengthen the section of the uniqueness of this study. Below we respond to the specific comments made.

Application, Data scarcity & Correction factor for precipitation

We agree with the comment from Reviewer #2 that in order to obtain reliable dry spell maps, high spatially distributed information is required for a long time period. This is not the case for the Makanya catchment, where data availability is problematic by the lack of long term measurements. Therefore we combined spatial scarce but long time series with spatial high resolution short time series of one season. Our approach is downscaling the long term information obtained from the Same data set, to the spatially distributed Makanya data set. There are uncertainties associated with this approach, but this can be applied in other data scarce areas. We mentioned this also in the discussion sections. With the assumption of applying one correction factor for the rain gauge of Same (0.55 [-]) creating a "synthetic" rainfall map, we could show that dry spells have a more complex spatial structure compared to previous studies like Tilya and Mhita (2007). The method gives better spatial information; further research should focus on further refining this correction factor.

Soil moisture

Regarding the comment of Reviewer #2 on the use of one value for soil moisture, we would like to correct the reviewer that we have in fact used three different values of soil moisture at three locations in the Makanya catchment. A fully spatially distributed dry spell map would require spatially distributed information on the soil moisture. As this was not available, we demonstrated the method at three locations with different soil moisture values.

Abstract

Regarding the title of the maps produced in the paper, we agree with the reviewer and will rename the figures and references in the text as "dry spell length map for fixed probabilities of non-exceedance p_{ne} = 80%, 50% and 20%"

1. Introduction

It is correct that the introduction should illustrate the main purpose of this study and as stated previously this will be corrected to underline the uniqueness of this study.

2.4 Probability of dry spell duration

Section 2.4 will be modified from line 2, p.11714 onwards:

De Groen (2002) showed that the probability (*p)* of a maximum dry spell length ($n_{dry,max}$) can be written as a cumulative density function based on transition probabilities p_{01} and p_{11} , n_m (days per month) and number of *n* (days). Assuming that a dry spell is not longer than a the number of a month or season (n_s)de

Fig. 1.

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Interactive Comment