

Interactive comment on “Hydrological response to different time scales of climatological drought: an evaluation of the standardized precipitation index in amountainous mediterranean basin” by S. M. Vicente-Serrano and J. I. López-Moreno

Anonymous Referee #2

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General comments

The topic of the paper presented by Vicente-Serrano and López-Moreno is certainly a useful one. If the SPI has the capability to predict what is happening in different parts of a catchment the SPI can be used in areas where no other data are available (ungauged basins). Also the SPI could be used to monitor and predict droughts at an early stage in different parts of a catchment. It is very interesting to see the seasonal variation in the relation between SPI and river discharge. The overall presentation is well structured and clear, as are the conclusions. However the used data set is very limited, relating to only one catchment and not taking into account soil moisture or groundwater.

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The most important problem with the present study is the approach chosen to study the usefulness of the SPI. Although the interest is in droughts, the whole time series are used to calculate the correlation coefficients. This means that the prediction of wet and average periods has just as much influence on the correlation. However, if we study Figure 5, it is clear that during some of the dry periods, namely those of the 1950's and 1978, the PSI appears to overestimate the droughts. What is the effects of studying the whole time series instead of the dry periods only? Wouldn't it have been more useful to concentrate on the dry periods only?

A second point is that only the (linear) correlation coefficient has been used to compare relations. Maybe could have more information when time series models like Box-Jenkins models, which can also include a lag. These models can also be used to show the uncertainty of the estimated parameters and relations.

Although the authors have quite an extensive literature list, they might benefit from other examples of studies of the usefulness of the SPI index (for example White et al, 2000) and strengthen their conclusions using the results of these studies. It might also be useful to study literature relating to the characteristic timescales in hydrology (e.g. Skøien et al, 2003), especially those relating to drought (Eltahir and Yeh, 1999; Peters et. al., 2005))

In my opinion the remark on using the entire time series instead of only the droughts needs to be addressed before the paper can be accepted for publication.

Specific comments

Section 3.1: The distribution of the stations where precipitation is observed is clearly not random. All stations appear to are at relatively low altitude. What is de possible effect of this on the results? Add height of the stations to Table 1. Wouldn't it have been better to choose an interpolation method based on altitude?

Section 3.2: The discussion supporting the choice of the SPI in line 20 to 25, is possibly

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more appropriate in an earlier stage of the paper, for example in the introduction.

Technical corrections

The paper appears to contain many grammar and style errors. Many sentences are difficult to understand, especially in section 5. Please consult a native speaker or teacher. Some examples of corrections: Page 1225, line 19/20: delete: This value is overcome in the rest of the basin

Page 1226, line 10: 'newly irrigated' Line 23: by means of

Page 1227, line 21: 'have indicated'

Page 1228, line 21: 'as a continuum'

Page 1229, line 13: 'with regard to'

Page 1231: rephrase line 23/24

Page 1232: rephrase line 8/9

Also there are many instances where 'the' is missing.

References: Eltahir, E.A.B. and P. J.-F. Yeh, 1999. On the asymmetric response of aquifer water level to floods and droughts in Illinois. *Wat. Res. Res.*, vol. 35, no. 4, p 1199-1217.

Peters, E., H.A.J. van Lanen, P.J.J.F. Torfs and G. Bier, 2005. Drought in groundwater - drought distribution and performance indicators. *J. of Hydrol.*, Volume 306, Issues 1-4. p 302-317. DOI:10.1016/j.jhydrol.2004.09.014.

Skøien, J.O., G. Blöschl and A.W. Western. 2003. Characteristic space scales and timescales in hydrology. *WRR*, 39(10), 1304, DOI:10.1029/2002wr001736.

White, I., T. Falkland and D. Scott, 1999. Droughts in small coral islands: case study, South Tarawa, Kiribati. IHP-V, Technical documents in hydrology, no 26. 55 p.

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