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Hydrology and Earth System Sciences Discussions

Interactive comment on "Monitoring and quantifying future climate projections of dryness and wetness extremes: SPI bias" *by* F. Sienz et al.

Anonymous Referee #3

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Review report for "Monitoring and quantifying future climate projections of dryness and wetness extremes: SPI bias" by F. Sienz, O. Bothe and K. Fraedrich

This paper evaluates the adequacy of the Gamma Distribution (GD) to generate series of the Standardised Precipitation Index (SPI) from observed and simulated data of monthly precipitation. The GD is compared with several other distributions, namely Weibull, Burr Type III, Exponentiated Weibull and generalized Gamma. Using the Akaike's information criterion (AIC) as a metric to compare the goodness of fit of the proposed distributions, the authors conclude that the GD is not always appropriate and may lead to severely biased SPI series, with an overestimation of extreme dryness and underestimation of extreme wetness. In several areas of observed and simulated pre-

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cipitation the other distributions present a better fit, particularly when the time scale of the SPI series is less than three months.

In my opinion the manuscript is very well written and address and important topic in hydrology that is of keen interest of the journal readers. The Gamma Distribution is used worldwide as the "default" distribution to derive SPI series and the authors have done an excellent job by showing with different precipitation series that the GD is not always adequate and its misuse may lead to erroneous estimates of SPI series. Although comparing the fit of different probability distributions is not new science, I think the authors have done a significant contribution to the hydroclimatology field when they analyze different series of precipitation (observed, simulated) over large areas and also evaluate the GD fit as a function of the SPI time scale. I have some few minor comments that are listed below.

* Lines 25-26, page 10643. The authors should explain the method they used to detect linear trends in the precipitation series as well as the detrended method. Also, did the authors check the series for step changes? and what about the independence assumption? It would be interesting to see some discussion on that.

* Figure 2. I suggest the authors to define the acronyms of the distributions along the caption of the figure.

* Figure 6. The dotted lines are hard to see. The authors could use thicker lines.

* Section 3.2, Distributions. I am curious if there is any spatial pattern (like clusters) for the selected distributions. For instance, if for a fixed month one chooses for each grid point the distribution with AICD = 0 (the AIC best distribution), is there any spatial pattern in the grid that arises? Are grid points with the same probability distribution close to each other forming clusters or are they scattered across the area? I know that this analysis may be out of the scope of the paper, but would be interesting if the authors could provide some discussion on that.

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Interactive Comment

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 10635, 2011.

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