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Hydrology and Earth System Sciences Discussions

Interactive comment on "Trends in rainfall erosivity in NE Spain at annual, seasonal and daily scales, 1955–2006" *by* M. Angulo-Martínez and S. Beguería

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Answers to Reviewer 2

Reviewer: *Questions concerning time trend analysis: Linear regression of rainfall erosivity and time could not be sometimes the optimum method to quantify trends. I would propose, with the aim of comparing results and improving trend accuracy, the method based on the computation of all possible pairs of finite differences, being then assigned the median of these differences to the most probable trend (Kendall-tau procedure; Zhang et al., 2004, Journal of Climate, 17, 1945-1952). After applying the Mann-*

Kendall test, the authors assume significant local trends at 0.05 confidence level. Local trends could be then classified into positive (significant), negative (significant) and, whatever their signs, not significant. I would propose a Monte Carlo test of field significance, based on randomly rearrangement of erosivity series and computation of their trends. A high enough number of random rearrangements could quantify, for instance at the 95% confidence level, the statistical significance of a set of empiric positive (negative) significant trends. In this way, the whole Ebro valley, or an area within it, could be associated with statistically verified regional trends on erosivity processes.

Authors: We have repeated our analysis based in more robust tools than OLS regression, as suggested by the reviewer. We have used a block bootstrap approach to the Mann-Kendall test for monotonic trends, which is much more robust than regression when the basic assumptions (normality, independence, etc) are not met. We have described this approach in the methods section of the revised manuscript. The results obtained with this method do not differ substantially with the previous ones, however.

(Note: We have still used OLS regression upon time for computing per-decade changes in erosivity and number of events, since this was intended for representation purposes and not as a strict test.)

Reviewer: *Questions concerning connections of erosivity with NAO, MO and WeMO indices. –The role played by atmospheric teleconnection indices on erosivity should be discussed and explained with more detail. The three indices are cited in page 5 (lines 12-14) and some arguments are briefly cited in the last paragraph of Discussion. What do thin and thick lines represent in Figure 9? Cross-correlation between erosivity and NAO, MO and WeMO series would be very illustrative.*

Authors: The relationship between rainfall erosivity and teleconnection patterns is is indeed a very interesting question. We have thus included a correlation analysis between the indices and erosivity / number of events per quintile at the annual and the seasonal scales. The results are very revealing since the NAO is clearly pointed as

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the main contributor to the decreasing trends in rainfall erosivity over the IP, especially in autumn and winter. This new analysis and results have incorporated to the revised manuscript.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 6285, 2012.