

## ***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***

### **Anonymous Referee #1**

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Review of: Trends in rainfall erosivity in NE Spain at annual, seasonal and daily scales, 1955–2006 In general I think that this is a well done study and worthy of publication. I have only two major comments on the paper.

1. Global context. The results of this paper stand in contrast to studies in other parts of the world that have shown an increase in rainfall intensities in the past few decades. There should be some discussion of this paper and its reported results relative to a broader geographical context. For example see Groisman et al's 2005 manuscript “Trends in Intense Precipitation in the Climate Record”

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2. I would like to suggest that the authors improve their statements regarding the interactions between rainfall erosivity and soil erosion. Specifically:

A) Abstract: The authors write: “The impact of raindrops on the soil surface—rain-splash—represents a major mechanism of particle detachment and modifies the surficial properties of the soil. If the surface is not flat rainsplash generates a preferential transport of soil particles in the downslope direction, constituting a soil erosion process. Both processes are included in rainfall erosivity or the ability of precipitation to erode soil. Despite its importance very few studies addressed the climatology of rainfall erosivity.” This introductory statement is really not explanatory, and is in fact somewhat misleading, regarding the concept of rainfall erosivity. Direct rainsplash erosion is only a small, and I would argue, nearly insignificant, aspect of erosivity. This is not the optimum way to introduce the topic and the reader to the subject. Yes, the processes described are a small part of what rainfall erosivity might encompass, but it gives a quite limited conceptualization of the topic. Erosivity is basically the power or ability of rainfall to cause soil erosion as a function of excess (non-infiltrated) rainfall. It includes interrill erosion (some may call it splash and sheet erosion), of which rainsplash in a mechanistic sense has been shown to be only a small component. Interrill erosion is actually most often transport limited, not splash limited. But erosivity also includes a lot of other factors and implied processes. This is important because as the authors point out rainfall intensity is very important to erosion and erosivity. The major effect of intensity on erosion is not rainsplash per se. It would be a rare situation where splash is a limiting factor.

B) Introduction: “. . .and involves mainly two mechanisms: i) rain splash—the detachment and movement of soil particles due to raindrops kinetic energy—and ii) runoff erosion—soil particles transport by the shear stress exerted by surface runoff.” Again, I disagree with this generalization of the erosion process. Kinetic energy of raindrops cause particles of soil to be detached from the soil surface. In most cases there is quite a lot more soil being splashed around than transported downslope. We know that from

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numerous laboratory experiments (e.g. Bradford et al). Splash does enhance transport by thin sheet flow, but the splash itself is NOT the primary driver of soil particles downslope. With regard to runoff erosion transport is important, but in cases where erosion rates are high it is the detaching and transporting action of runoff, particularly in rills, that is acting to cause the erosion.

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