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Interactive comment

Interactive comment on "Rainfall erosivity factor in the Czech Republic and its Uncertainty" *by* M. Hanel et al.

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In this manuscript, the authors explored the spatial distribution of the rainfall erosivity index R in Czech Republic. The work is based on data collected from 96 stations at a 10-min time interval for the period 1989–2003. Different interpolation methods have been used in order to evaluate the spatial uncertainty related to each interpolation model. The best results have been obtained by the generalized least-squares (GLS) model. Another source of uncertainty was taken into account considering different equations used to estimate the rainfall kinetic energy (required for calculation of the R-factor). Finally, the effects of record length and spatial coverage have been considered. The authors concluded that if sufficient spatial coverage and covariates are available, reasonable estimates of the R-factor can be obtained even from relatively short records (15–20 years).

The paper seems to me well structured and the statistical analyses satisfactory. I think

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the paper needs exposure at an international level but some details need to be added in this version.

Specific comments In general, I agree with the authors that the rainfall erosivity index is a good indicator of areas subjected to soil erosion. However, I do not believe that using only 14-15 years of measurements it is possible to obtain a good estimate of long-term rainfall erosivity, everywhere. The period covered by the datasets is short and may (or may not) contain outliers which generally affect the mean values. Even if some authors are inclined to remove the outliers from the series (see Janecek et al., 2013), I do not think it is a correct approach because these outliers often are the major contributors (up to 80%) of the total amount of soil eroded from an area (see for example Martinez-Casasnovas et al., 2002; Fang et al., 2013). In this respect, the authors based their long-term analysis on a single dataset (C2TREB01, with 80 years available). As I understand, this station shows a value of R = 669 (MJ ha-1 mm h-1) which falls perfectly around the mean value calculated for the entire region (ca. 640). The same consideration can be extended to the CV value (CV = 21.6 for C2TREB01, considering 15 years, and CV=23.3 for the entire region – see natural variability for 96 stations in Table 2). In other words, this station is indicative of the average conditions of the region and it is not surprising that the bootstrap analysis indicated in section 3.3.1 and appendix b gives no strong differences if periods of different length are considered. It would be interesting to look at another station, with similar length, but showing a higher variability of the rainfall erosivity factor. If the authors have this information, this can be added to improve the paper. If not, please, add some comments that emphasise this uncertainty.

During the last 2-3 decades, an increase in the rainfall erosivity factor is documented in different areas of the world due to climate change (see among the others Fiener et al., 2013; Nearing et al., 2004; Porto et al., 2013; Capra et al., 2015; Zhang et al., 2005). This is documented also by the first author in a previous contribution (see Hanel et al., 2016) for some stations in Czech Republic. I suggest to show a figure with the 80

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values of R (calculated for C2TREB01) vs time (years) in order to see if no increasing trend can be detected during the period 1989-2003. If there is an increasing trend in this period, it means that the 96 values of R are not stationary and this needs some more comments.

The authors said (citing also Goovaerts, 1999; Angulo-Martínez et al., 2009) that using covariates like longitude, latitude and elevation or long-term precipitation it is possible to cover the existing gaps of direct evaluation of R. I want to emphasise here that such correlations are acceptable only where the R values are obtained using indirect methods that involve, for example, rainfall values at daily or monthly scale (see Capra et al., 2015). When short time steps are considered (and R requires time intervals shorter than 30 minutes) these correlations fail (see for example Porto, 2016), unless climatic conditions are uniform over large areas. But, as the authors recognise, R values are very much affected by local conditions and this complicates things. I am sure the authors want to add some more comments here.

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