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

**M. Hanel et al.**

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We thank very much for the constructive comments which helped to improve the manuscript. The point-by-point response is included below, the modified version of the manuscript is attached.

**Find below the main points to be corrected:**

**1. Measurement Unit: R-factor is further expressed in MJ ha1 cm h1 (equivalent to kJ mm m2 h1), which is the unit most often used in the Czech Republic. However, here you address your result to the International public and you should adapt it to the most used measurement unit (please replace cm with mm and multiply by 10).**



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We agree, that using Czech conventional unit might be confusing for international audience. The units were changed as requested in the new version of the manuscript (including main text, tables and figures).

**2. Comparison with other datasets: You estimated the mean R-factor in Czech Republic around 640 MJ mm ha-1 h-1 yr-1 using 10-minutes data. The Mean R-factor in Czech Republic at 30 minutes is 524 MJ mm ha-1 h-1 yr-1 according to the rainfall erosivity map of Europe. If you take into account the calibration factor used by Panagos et al (2016) for transferring data between 10-minutes and 30-minutes is 0.8205 then both datasets (Czech republic, European) have the same Mean (640 * 0.8205 = 525). Taking into account that for the European application another dataset has been used, both results are similar. Congratulations for the results.**

Thank you for this point. This infromation is now included in the main text.

**3. Length of time-series and short period of stations (Paragraph P2L3-13): You need to restructure this paragraph somehow. Panagos et al (2015) have used the best available high temporal resolution data at European scale and according to Table 1 in their publications the mean length period is more than 17.5 years (half of the countries had records more than 20 years). Only countries with low erosivity (Finland, Estonia, Latvia, Romania) had records covering short periods. Angulo-Martinez (2009) estimated the R-factor in Ebro based on 10 years data. So, you cannot compare the data availability in Europe (or in one country or at regional level) with the 1 station made available by Verstraeten(2006). Moreover, your estimates are based on 14 years data.**

Our intention was not to assert that Panagos et al. (2015) or Angulo-Martínez et al. (2009) used insufficient data for R-factor assessment, rather we tried to point out, that although the best available high temporal resolution records in some regions might be considerably shorter than the length recommended by guidelines, the R-factor often

needs to be estimated at these locations using the available data. The second point was, that in the case when only short records are available, it is possible to reduce the uncertainty by regional analysis or/and by employing appropriate covariates into the analysis. To make these points clear, the paragraph has been modified.

**4. Whole section 3.2: You need to restructure this section by giving a short description of each model used (IDW, GLS, OK, RK. Etc) and avoid the whole part on Fixed and stochastic component. Those 2 parts seems like technical note from the geostatistical books. References will be enough while you have simply to describe the models used in your case. 5. Figures should be self-explained. So In Figure 3, the reader cannot understand what GLS, SK, etc is. Please put the explanations in the caption.**

We agree, that it is not necesary to include details that can be found in statistical books, therefore the whole section 3.2 was rewritten a substantially shortened.

**Some additional adjustments requested:**

**P1, L17: Soil erosion by water is a widespread problem throughout Europe (Van der Knijff et al., 2000). Citation to the paper of 2000. There is a more recent and accurate development of soil erosion map in Europe (2015) and you should update this citation with the new one.**

The sentence was updated.

**L2P28: Replace datastes with datasets.**

This was corrected.

**In the introduction, I would also expect one sentence (plus necessary citations) regarding other recently developed rainfall erosivity datasets at national scale. There are new R-factor datasets for Italy, Greece, Brazil, Chile, China, Australia, New Zealand etc.**

This was added.

**P3 L8-9: The trends in rainfall erosivity were studied by Hanel et al. (2015), who found significant a positive trend (= 4% per decade) in 51-year records for 11 stations (more than a half of the considered stations). Trend on what? And compared to what? Increase or decrease?**

The information was clarified.

**Please replace sub-title: 2.3 Spatial Data with Precipitation maps or Precipitation Spatial datasets. Spatial data can be everyting.**

The section was renamed to “Gridded precipitation data”.

**P7L24: REML stands for??? Please explain**

The abreviation REML - restricted maximum likelihood - is explained in a new section 3.2.

**Figure 1: please delete the word The map and rephrase the caption**

The caption was modified.

**P15 : Last paragraph: The ranges you presented are quite wide. I doubt that with 80-year data records the range can be +-15%.**

The surprisingly large width of the confidence interval for the Rfactor estimate based on 80 years of data relates to large variation of annual rainfall erosivity, which is due to its non-linear relation to rain intensity and depth. Note for instance, that for the same station and 10 year record the width of the confidence interval for 10 min annual maxima and rainfall total is 70% and 40% that for rainfall erosivity, respectively. This difference only slightly decreases for longer averaging periods. Assuming that decrease in width of the confidence interval with number of years is proportional to corresponding standard deviation and assuming independence between years, the width of the confidence interval should be inversely proportional to the square root of the number of

years. For the confidence interval around the estimated Rfactor this leads to drop from $\pm$ 40% to $\pm$ 14% ($40/\sqrt{8}$), which matches our estimate well. Note, that in the case of dependence between years, the standard deviation (and thus the confidence interval) is expected to be larger.

We added a short note on this.

**Conclusions: what is the areal-average. Please correct it.**

The sentence was modified.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/hess-2016-158/hess-2016-158-AC1-supplement.pdf

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