

***Interactive comment on “Comparison between radar and rain gauges data at different distances from radar and correlation existing between the rainfall values in the adjacent pixels” by S. Sebastianelli et al.***

**Anonymous Referee #1**

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**1. Summary**

The advent of rainfall radar makes possible to estimate rainfall accurately at better time and space resolutions, and this is why we have been told many successful stories in radar hydrology. It is well recognised that the goodness of radar-derived rainfall estimates is strongly related to the distance from radar. The rainfall estimate error is expected to be small near radar. This manuscript presents a study to explore this range dependent error by radar raingauge comparison. However, the authors

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did not manage to produce a quality research paper from an interesting topic. I consider the material described in manuscript hess-2010-180 is poorly written and not innovative enough in "statistical hydrology" to be published in the HESSD special issue "Advances in statistical hydrology". I detail my comments below.

## 2. Main comments

### 2.1. Poor writing

My first impression of this manuscript is extremely low quality of presentation, from the title to the last reference. The authors did not write this manuscript carefully enough and made numerous grammatical mistakes (see my minor comments in Section 3). I am sorry to say that the authors are shown very irresponsible to leave proofreading to editors, reviewers and readers.

#### - *Title*

I seldom make a comment on an article title, but this manuscript is an exception. The long but confound title "Comparison between radar and rain gauges data at different distances from radar and correlation existing between the rainfall values in the adjacent pixels" does not clearly convey the main objective of this manuscript at all.

#### - *Abstract*

This abstract is more like a short version of Introduction. The authors ascertain that "Rainfall intensity data ... far from radar are less correlated ..." the first sentence. In fact, the characteristics of this range-dependent error of radar rainfall estimates should be answered as a conclusion in the manuscript. Main results are missing in this abstract.

#### - *Introduction*

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Introduction is not organised logically. The development of content in Introduction does not follow the main topic closely. If “The objective of this work is to characterize these errors (radar errors?) as a function of the distance” (L12-L13 P5172), I suggest the authors remove the description about the difference between radar and raingauge (L1-L22 P5173). I also recommend the authors re-organise Introduction in the foLLowing order:

- the importance of precipitation (L22-L25 P5172);
- the advantage of radar (L22-L29 P5173);
- introducing the range-dependent error (L1-L5 P5174);
- the sources of this radar error; review of qualifying this error;
- the contribution of this study;
- the overall manuscript structure.

### - *Main body*

Sections 3 and 4 are not closely related to the "range dependent error" and should be removed too. Moreover, it is possible to explain the radar error by the beam blocking effect. However, one example is sufficient to demonstrate the authors' idea. Figures 11 -15 divert readers' attention.

### - *Conclusion*

Similar to the abstract, the authors did not describe any results/conclusions clearly in Conclusion. Moreover, the statement in Conclusion (L7-L9 P5194) simply means the authors did not achieve their objective presented in Introduction (L12-L13 P5172).

- (L12-L13 P5172) "The objective of this work is to characterize these errors (radar error) as a function of the distance."

- (L7-L9 P5194) "As shown by the results in Sect. 6, it is not possible to characterize discrepancies between measurements of the two instruments only as a function of distance from radar site."

## 2.2 Lack of statistical innovation

- If the authors wish to characterize the radar rainfall estimate error as a function of the distance from radar, why did the authors carry out comparisons between the rainfall radar estimates from two adjacent pixels? An error is the difference the estimated and "true" values. The correlations between the rainfall radar estimates from two adjacent pixels combine the effect of radar error and true rainfall pattern. Therefore, these comparisons cannot verify the radar error structure and should be removed in the later version. Even if the authors believe in there is somewhat scientific value in these comparisons, why did the authors perform three methods to compare? Any statistical reasoning to support that?

- The authors did not consider the effect of zero values, and this makes the study simply biased. The Pearson's correlation coefficient may not be the best choice for this study. The authors should spend more efforts on choosing/creating a better correlation for the presence of zero values. This could be an innovation in statistical hydrology.

- The authors tried to verify that "Rainfall intensity data ... far from radar are less correlated ...". However, Figures 4-6 show that this is not true. The correlation of the rainfall estimates from two adjacent pixels is roughly an increasing function of the distance from radar, where such distance is less than 40 km.

- The authors ascertained "By observing the Fig. 7 we can note that the Pearson correlation coefficient decreases when increasing the distance from radar, as shown by the black regression lines..."(L19-L21 P5190). This is not statistically sound, unless the authors would perform a hypothesis test.

## 3. Minor comments

### 3.1. Long sentences

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The authors did not manage to make long sentences clear.

- (L14-L17 P5172) "For this aim is possible to compare the rainfall data obtained by rain gauges at different distances from radar with rainfall radar data at the same distances, verifying the correlation existing between the rainfall values in the adjacent pixels and how the difference between radar and rain gauges data changes."

Very confusing, at least a subject is missing.

- (L7-L16 P5716) "In this work ... decreases the relation coefficient value."

What a long sentence! Absolutely confusing.

### 3.2. Verb tenses

The authors also have difficulties in using verb tenses, for example

- (L3 P5174) "... the way it *sample* ..." should be "*samples*";
- (L5 P5174) "error which *increase* ..." should be "*increases*";
- (L29P5175) "they *are* also evaluated ..." should be "they *have* also evaluated ...";
- and many more in Section 6.

### 3.3. Consistency

The authors did not keep using consistent words.

- (L13 P5172) "... characterize these errors" and (L6 P5174) "quantifying this error". This inconsistency causes the confusion about the objective of this study. Did the authors consider one error or more than one error
- (L2 P5172) "at far distances" and (L8 P5172) "at far distance".
- (L2 P5172) "from radar" and (L3 P5178) "from the radar". The same problem happens on "near radar" and "near the radar".

- (L9 P5175) “raingauge” and (L23 P5175) “rain gauges”.
- (L29 P5188) “Fig” and (L2 P5188) “Figure”.
- (L14 P5175) “Pearson’s coefficient” and (L24 P5175) “Pearson coefficient”.
- The format of reference is not consistent either.

### 3.4. Others

- - (L13 P5189) “As a consequence” should be “In consequence”.
- - (L19 P5191) “in roman area” and (L17 P5190) “in the roman area” should be “in the Roman area”.
- - (L15 P5177) “ration” should be “ratio”.
- - (L17 P5196) “radar-rain gauge” should be “radar-raingauge”.

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