Interactive comment on "Quality-based generation of weather radar Cartesian products" by K. Ośródka and J. Szturc

Anonymous Referee #1

The manuscript describes the generation of quality index fields for Cartesian products such as echo top, VIL, max reflectivity and a convective precipitation product applying the quality information from a polar field (reflectivity) to a Cartesian product. The idea is novel and can be applied in particular for operational radar networks. As such, the topic is relevant and interesting for a large community. The manuscript, however, needs major revisions in terms of clarity. It is hard to read and difficult to understand. In large parts, it just needs more explanations and discussion. The authors claim that the algorithm is novel since it uses the information from the polar coordinate system and apply those to the Cartesian. However, the authors fail to show (in section 6) that their approach is better than traditional approaches using the QI reflectivity information from Cartesian grid to determine QI fields for radar products. In summary, I would

recommend that the paper should be accepted with major revisions. Major comments: Developing QI fields from radar data has been a wide topic of research. While the authors refer to some of the studies in the introduction, it might be interesting to the reader to summarize some of the QI field algorithm. For instance, there is a wide scope of literature about how various error fields are added or multiplied with setting different weights. The authors are not the first to deal with the polar-Cartesian conversion problem, so a little bit more background information would be helpful to the reader and also underline the uniqueness of this work.

The purpose of section 4 is confusing. These products (echo top, VIL, MAX, Convection) are standard products that have been explained in many research publications and books. I assume that the authors want to explain the parameters before they explain the QI algorithm in section 5. However, when reading section 4, I am not sure if the authors present 'new' parameters or if they just want to explain the parameters. I would suggest merging sections 4 and 5 (in particular Fig. 6) and that the authors focus on the QI part. Section 4 can also be moved to an appendix since there is really nothing now about those parameters.

Section 5 is also confusing. Where are QI_source and QI_scope defined? How do Eqs 4 and 5 fit into the overall QI field? I assume that QI from Eqs 4 and 5 = QI_source but this needs to be better explained in section 5.

Section 6: Figures 5 and 6 need more discussion. I am not convinced the QI algorithm actually works well. I am also confused about the Fig. 5c, is that QI derived from Eqs. 4 and 5? Is that on polar coordinates? It also seems that Fig. 5c is the QI field for Fig. 5a and not for the corrected data. However, I assume when calculating all QI fields that the authors use the corrected data. Is Fig. 5c even relevant for the QI products shown in Fig. 6.

In the introduction, the authors highlight the importance of using the radar information from the polar coordinate system. However, they lack to show that their approach

is better than traditional approaches using QI information from Cartesian reflectivity fields.

Minor comments:

Throughout the paper: - Please spell out acronyms like COST, BALTRAD, EUMETNET OPERA etc. - Make sure the word "data" is followed by plural.

Page 11712, Lines 4-7: Clarify this sentence.

Page 11712, Line 24: Clarify "related problems".

Page 11713, Line 18: Most readers might not be familiar with the RADVOL-QC package. Is this software available to a broader community? Maybe some information about who is using it might also be helpful. Some of the information is given in section 2.3 so either refer to section 2.3 here or provide some information.

Page 11714, Lines 6-7: Change kilometre to kilometer; Change 360 azimuths to of 360deg in azimuth.

Page 11714, line 16: What are those "other definitions"? Why do those definitions are better/different than 0 to 1?

Page 11715, lines 21-22: "estimation of the data quality". First the authors should point out that the data control is done on polar coordinates – I assume. Second is QI field generated for each error source or/and an accumulative QI fields.

Page 11716, Lines 16-19: Each PPI is at a certain height, so the interpolation is to (x, y, z). Please clarify that.

Page 11716: Lines 23-26: Clarify that inside means close to the radar and outside means farther away from the radar. Maybe near-field and far-field would be a better description. When I first read it, I was confused about inside vs outside.

Page 11717: Equation 1 – where does that empirical function come from? What are

the numbers 9500, 1.3, 1.6, 39000?

Page 11718, Lines 5-8: In this equation, all error sources are weighted equally. What is the justification for that?

Figure 2: Can you show the differences?

Figure 3c-d: the terms hmax, hmin, hlowest, hhighest are used multiple times with different meanings. Please change to nomenclature to avoid confusion. In figure caption, change (a and d) to (c and d) and please explain what the differences are between c and d.

Figure 5: please provide scales for distance and azimuth. Please enlarge the figure.

Figure 6: Breaking up the figure into two figures allows for enlarging the figure. As it is now,

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