<u>Reply to comments by Anonymous Referee #1 (RC1)</u>

Our response to the comments by reviewer 1 is provided in bold font.

The manuscript presents a new precipitation dataset that covers most parts of Europe and is based on the OPERA gridded radar dataset. The algorithms for filtering non-meteorological echoes are described and evaluated as well as the adjustment to gauge data. Limitations of the dataset are discussed and ways to improve the climatological precipitation dataset are given.

The manuscript fits in the scope of ESSD, it is well written and clearly structured. The described new European radar climatology is unique, of high interest and importance for the community and allows for a variety of applications and studies. I recommend publishing the manuscript after taking the following (minor) suggestions and comments into account:

We thank the reviewer for recognizing the value of our dataset and of our manuscript. The constructive feedback is appreciated.

• 3, L.83-85: Does that mean, that in case of 10 minute temporal resolution the 10-min file from 10:10 UTC is used for the 10:15 UTC composite?

Yes, we will clarify this by replacing "The measurement frequency of the radars is 5 min or 10 min, and data from the last time stamp are used in the composite product, e.g., the 5-min file from 10:15 UTC for the 10:15 UTC OPERA composite product." by "The measurement frequency of the radars is 5 min or 10 min, and data from the last time stamp are used in the composite product. For instance, the 5-min file from 10:15 UTC and the 10-minute file from 10:10 UTC for the 10:15 UTC OPERA composite product."

• 11, Eq.1: Why is Sw,g set to the value of T (0.25 mm) in case it is lower than T? In line 207 the authors say that 1-h radar-gauge pairs are only used for merging if the gauge precipitation exceeds 0.25 mm. Wouldn't that mean that no factors should be computed in case Sw,g is lower than T?

Indeed, only 1-h radar-gauge pairs are used for merging if the gauge precipitation exceeds 0.25 mm. Sw,g is the distance-weighted interpolation of the gauge precipitation accumulations, i.e., the summation, over all radar-gauge pairs, of the gauge value times its weight, which depends on the distance from a radar grid cell to the radar-gauge pair. Hence, only gauge values larger than 0.25 contribute to Sw,g, and lower gauge values are not used at all in the adjustment. So the value of T (0.25 mm) is not related to the use of gauge values exceeding 0.25 mm, and is only used to prevent outliers in the gauge-adjusted radar accumulations.

• 12, L. 235-241: An example of the adjustment fields for v = 100000 and v = 0 would be beneficial to understand the influence of the mean-field bias and the local spatial adjustment.

This is actually already revealed in Figure 4 (k). We will add to the text (addition in italic font): The effect of the long and short range components is visible in the adjustment factor field, *where the large scale patterns belong to the long range component (v = 100000) and the local patterns (dots) show the influence of the short range component (v = 0) on top of the long range component.*

•20, Fig.8: It might be better to use the same colourbar for OPERA and EURADCLIM. Especially in the upper example the smaller range of precipitation values in the colourbar makes the EURADCLIM product look worse than the OPERA product. Maybe a logarithmic scale can help to compensate the different ranges of precipitation values.

Note that Figure 8 shows instantaneous rainfall rates for OPERA and 1-h or 24-h accumulations for EURADCLIM. Hence, using the exact same colourbar is not possible. But we do agree that the colourbar can be chosen differently, to avoid that EURADCLIM looks worse than the OPERA product, whereas its quality is better. Therefore, we will change the colourbar of the rain rate in Figure 8 (a) and (b). The scale now ends at 140 mm/h instead of 500 mm/h:
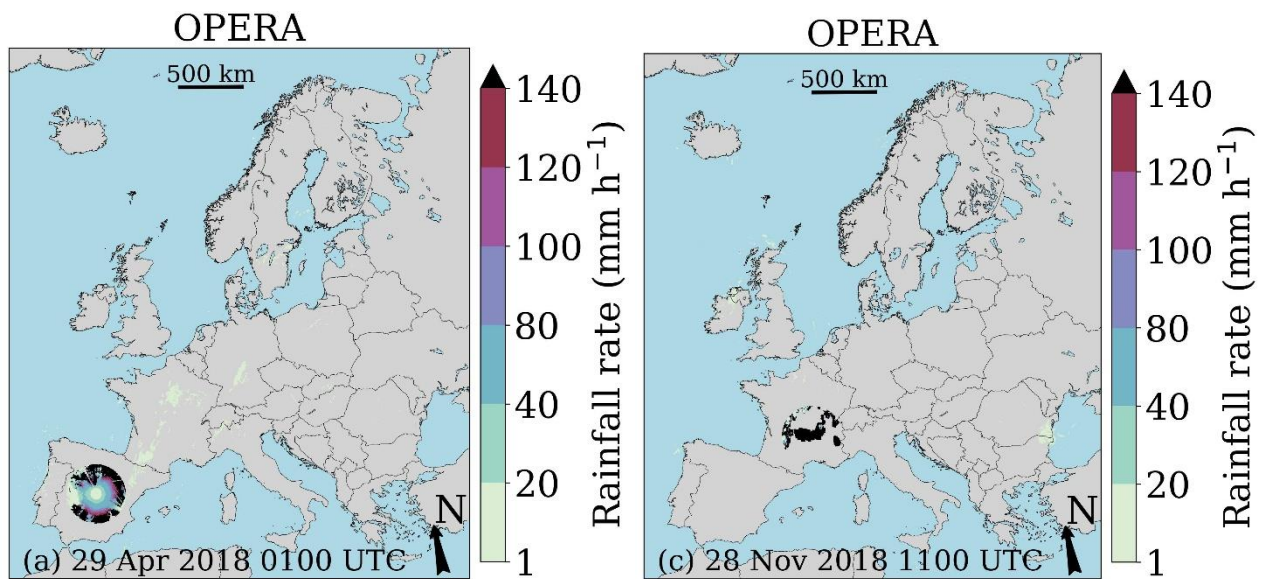
•22, Section 4.4: Have the authors compared their results to the corresponding national radar data sets? How similar are the extreme values in EURADCLIM and the national products?

We did not make such a comparison, although the comparison to ECA&D data already provides such an assessment for rain gauge locations (Table 1). A comparison to national radar datasets is out of the scope of this study, but is definitely an interesting idea. Hence, we will add the following recommendation to the manuscript: "We also recommend to compare the EURADCLIM precipitation accumulations to those from national radar datasets, specifically to assess the performance of EURADCLIM to capture extreme precipitation."