

We thank Geoff Pegram for his positive review. It helped us clarifying some additional details and confirming some of our conclusions. Below we present the answers to each question point by point.

6836, 4: 512x512 kilometer?

Well spotted. We will specify that the domain size is given in kilometers.

6837, 2: does the compositing algorithm select from the lowest CAPPI, at what level, and what about the bright band? I think more detail is required.

The used CAPPI is at 1500 m.a.s.l. The correction for the bright band and for the vertical profile of reflectivity is only taken into account in a more advanced quantitative precipitation estimation (QPE) product. Unfortunately, this new product is not yet used as input in STEPS because it only works on single radars at the moment (there is no composite yet).

6841, 24: 'a series of blocks' of what size?

The block size is 60x60 grid points (see page 6842, line 2). The block size was adapted to obtain a robust optical flow estimation of the large precipitation scales, which is expected to increase the predictability of the Lagrangian extrapolation at longer lead times.

6842, 10: 'previous' in place of 'last'

Corrected.

Same page, 17 - 19: The sentence 'Since ... radars.' Needs rewording

The original STEPS implementation (Bowler et al., 2006) was designed to blend the radar extrapolation nowcasts with the output of NWP models. The domain covered by the radars is smaller than the rectangular domain of the NWP model and small amounts of stochastic noise are generated by default also outside of the radar composite. This setting was not adapted for radar-based nowcasts without NWP blending and needed some adaptation. We will give more details in text to explain this issue.

6843, 6: 'that' in place of 'the one'

Corrected.

6845, 6: 'field vectors based on the observations and then' in place of 'field vectors and'

Corrected as proposed.

Same page: It would help the reader if the last sentence (omitting the word 'More') i.e 'Details about the forecast verification setup and scores are given in Appendix A.' was placed after 'scores.' in line 10
Good suggestion. We will move the sentence.

Same page, 25: comment - It is not clear to me what the figures show - is Fig 2(a) showing the average of 30 min accums over 35 hours? Please revise the text as it is muddling. Aha - I get the explanation in line 17 on the next page

We will try explain this concept at the beginning so that the reader does not have to wait for the explanation.

6847, 5: 'Contrary to expectation' in place of 'Contrarily to the expectations'

Corrected.

Same page [lines 8, 12, 25] and elsewhere, the use of the word 'comprised' is not good grammar in this

context - in many cases it can be omitted.
We will use a more appropriate term or remove it.

6848 last sentence. That makes sense, so the model is good, but please check my remark below on the passage on page 6853, lines 4 & 5.

The observation that the skill of nowcasting systems is higher along the path of a thunderstorm compared to its edges should not depend on small biases that appear at low rainfall intensities (see answer below).

6849, 14: 'likely' in place of 'sufficient' ?
Much better alternative.

6850, 7-9: this last sentence is a result which makes good sense
Thank you for agreeing with our statement.

Same page, 20: remove 'the' before 'highest'
Corrected.

6851, 13: 'grows' in place of 'augments'
Corrected.

Same page, 16: 'lowest cascade level' I thought that the highest spatial frequencies were in the top level of the multiplicative cascade ...?

Good point. The terminology may be misleading but it was already used in the previous STEPS papers. We will specify that the top levels are the lowest frequencies (levels 0-1-2) and the bottom levels are the highest frequencies (levels 6-7-8).

And 21: 'comprised' again - please remove
Ok.

6852, 2: ' .. of the two stratiform cases' please add 'as might be expected'
Added.

Same page, 17: a comment. Overall, what is the summarised take-home message of this complex and compact paragraph? In my opinion, it is a bit abrupt and needs another sentence or two, drawing conclusions, before the overall 'Conclusions'

The take-home message is that there is not much predictability in the small precipitation scales beyond 2 hours lead time. Therefore, a maximum lead time of 2 hours in STEPS-BE is a good choice. Extending this lead time would require blending the radar-extrapolation nowcast with the output of NWP models to gain some predictability. It is a good idea to add a small paragraph discussing these points.

6853, 4-5: 'an improvement to generate stochastic noise only within the advected radar composite'. Please remind me - is the noise variance linked to the reflectivity - i.e. is a constant noise added to the log of reflectivity? If not, the low rainfall values will be penalised. In fact, the low rainfall values will be biased upward and spoil the error scores ...

The noise is not added to the log of reflectivity (dBZ) but is added to the log of rainfall intensity (dBR). The noise is thus multiplicative when working in original units of rainfall intensity (R). We did not detect strong biases at low rainfall rates, although the small and light rainfall cells have tendency to

gradually dissipate, which has more to do with the numerical diffusion of the highest frequencies during the advection of the levels at the bottom of the cascade (e.g. levels 6-7-8).

6854, 16: 'Fi is the forecast rainfall accumulation' is this over the whole field? It seems from Figure 4 this is done per pixel, so needs a mention.

We will remove the word "accumulation" to avoid confusion. Fi is the forecast rainfall at a single pixel and the summation is performed over time using the rules for the online computation of the statistics.

6858, eq (8): why not just square the first bracket under the square root sign?

Thanks for the suggestion.

6859, 13: 'is not enough dispersive to' should read 'is not dispersive enough to'

Corrected.