Response to the reviewers of the paper "The operational 3DEnVar data assimilation scheme for the Meteo-France convective scale AROME-France"

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The authors would like to thank Christoph Schraff for the careful reading of the manuscript and his very constructive comments improving the manuscript quality. A point-by-point answer follows and the manuscript has been modified accordingly (red text in the track-changes file).

1 Technical comments

1. **Line 28: I think it is worthwhile to explain the term "background" somewhere here, or in section 2.1)**

   The definition of the term "background" has been added line 16 :

   "Using the same principles as for lower resolution NWP systems, this DA system combines regional observations with a previous high resolution model forecast (the background) to produce a 3D analysis at the model resolution."

2. **Line 28: replace "If the use" by "While the use".**

   Done

3. **Line 76: replacing "full" by "full (i. e. non-hybrid)" makes it more easily understandable what is meant here by "full"**

   Done

4. **Line 135: which kind of obs "from various instruments on polar orbiting . . . "?**

   Arome-France DA system assimilates brightness temperatures from various instruments on polar orbiting and geostationary satellites. This information has been added line 135 :

   "Both assimilate a wide range of observation types, including radar reflectivities through retrievals of humidity profiles, radial winds from Doppler weather radars over Europe, brightness temperatures from various instruments on polar orbiting and geostationary satellites as well as ground-based GNSS atmospheric path delays in addition to conventional observations."

5. **Line 187: replace "21" by "MI21" and start sentence with a new 'bullet point'.**

   Done

6. **Line 245: "25 km as in MI21" contradict with line 207 (40 km); maybe replace "as in" by "similar to"**

   Done

7. **Line 269: "regularly"**

   Done

8. **Figure 4 caption: maybe replace "corresponding lines" by "corresponding rows"**

   Done

9. **Line 385: 'more adapted' than what? Maybe replace "more adapted to verification at convective scale" by "better suited for verification at convective scale than deterministic verification at grid resolution"**

   Done

10. **Figure 6 caption: replace "lines" by "rows"**

    Done

10. **Line 422: "estimate the Frequency Bias (not shown) and the HSS presented in Fig. 9" (without 'not shown' one is looking for the frequency bias in Fig. 9 in vain)**

    Done

11. **Lines 473, 478: it should read: "(Fig 11.b, c)" and "on Fig 11.d, e"**

    Done

12. **Figure 13 caption: if I understand correctly, it is not always "16 forecasts hourly initialized", but 15 forecasts (08 Sept, 25 Sept, 3 Oct) (?)**

    The reviewer is right : for these three events, the hour of the first forecast was wrong. The number of the hourly forecasts is always 16 and the first hours have been corrected accordingly for the 08 Sept, 25 Sept, 3 Oct

    "Same legend as Fig. 12.a) but for HPE observed and simulated on different areas for a) and b) from the 08 Sep. 2021 at 18 UTC to the 09 Sep. 2021 at 06 UTC by the 16 forecasts hourly initialized from the 08 September 03 UTC (h-16) to the 08 Sep. 18 UTC (h), for c) the 14 Sep. 2021 from 06 UTC to 12 UTC by the 16 forecasts hourly initialized from the 13 Sep. 2021 at 15 UTC (h-16) to the 14 Sep. 2021 at 06 UTC (h), for d) from the 25 Sep. 2021 at 12 UTC to the 26 Sep. 2021 at 12 UTC by the 16 forecasts hourly initialized from the 24 Sep. 2021 at 21 UTC (h-16) to the 25 Sep. 2021 at 12 UTC (h), for e) from the 3 Oct. 2021 at 00 UTC to the 4 Oct. 2021 at 00 UTC by the 16 forecasts hourly initialized from the 2 Oct. 2021 at 10 UTC (h-16) to the 3 Oct. 2021 at 00 UTC (h), and for f) from the 4 Oct. 2021 at 06 UTC to the 5 Oct. 2021 at 06 UTC by the 16 forecasts hourly initialized from the 3 Oct. 2021 at 15 UTC (h-16) to the 4 Oct. 2021 at 06 UTC (h)."

13. **Line 560: "with a length scale varying regularly along the vertical"**

    Done