Review for: The operational 3DEnVar data assimilation scheme for the Meteo-France convective scale model AROME-France,

by Pierre Brousseau, Valerie Vogt, Etienne Arbogast, Maud Martet, Guillaume Thomas, Loik Berre

General vote: I recommend accepting the manuscript after technical corrections.

General comments:

The Manuscript presents the work carried out to define the operational configuration of a new data assimilation scheme for the convective-scale model AROME at Meteo-France. This includes a number of sensitivity tests as well as the description of the operational configuration. It is shown that the new scheme based on 3DEnVar, using flow-dependent ensemble-based instead of climatological background error covariances, outperforms the old operational 3DVar scheme both in terms of statistical scores and for different kinds of individual severe weather events.

While the manuscript does not directly address a better understanding of natural hazards, it does provide a significant contribution for an improved operational prediction of such hazards. 3DEnVar is a state-of-the-art method also used at other centres for both global and regional data assimilation, and the sensitivity experiments provide relevant information and valuable insight in its application at the convective scale.

Generally, the work has good scientific originality, high relevance and quality, and the manuscript is well-written, well-referenced, and well-structured.

The authors have responded to and accounted for the reviewers comments on the first version of the manuscript very well and adapted it accordingly. I do not have any specific comments any more, only a few minor purely technical ones.

Minor specific comments: None

Technical comments:

Line 28: I think it is worthwhile to explain the term “background” somewhere (here, or in section 2.1)

Line 28: replace “If the use” by “While the use”.

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

Line 135: which kind of obs “from various instruments on polar orbiting …”?

Line 187: replace “21” by “MI21” and start sentence with a new ‘bullet point’.

Line 245: “25 km as in MI21” contradict with line 207 (40 km); maybe replace “as in” by “similar to”

Line 269: “regularly”

Figure 4 caption: maybe replace “corresponding lines” by “corresponding rows”

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”

Figure 6 caption: replace “lines” by “rows”

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)

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

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

Line 560: “with a length scale varying regularly along the vertical”