Dear Editor,

Thank you very much for your suggestions. We have revised our manuscript accordingly. Please see our point-by-point response as follows.

1) **I did not find your response to Rev. 1's 2nd major comment about the reason for the good performance of EMV vectors completely clear or convincing. Also, I could not find a related explanation in the text at lines 168-170. Could you please clarify your response and update the text of the manuscript if necessary? If your explanation is tentative or speculative, please say so.**

We apologize for the unclear explanation about the good performance of EMV.
Our results suggest that using the EMV as the pseudomember is very effective when the ensemble size is small. With the small ensemble size, the ensemble space spanned by the ensemble perturbations cannot capture the background error well, and the corrections for the background mean are less optimal. We speculate that this limitation is more evident for the large-scale error due to using a small localization with a small ensemble size. As a result, the structure of the ensemble mean projects on the background error. Figure 4 shows that, the orthogonal EMV projects more onto the forecast error residual at most analysis times, compared to the orthogonal IESV1. Therefore, the orthogonal EMV is more useful to increase the ensemble space to reduce the analysis errors (a better performance). With a large ensemble size and a large localization (Table 1), the large-scale error in the background mean state is much reduced, and the structure of the mean state is less effective in being used as the pseudomember.

The explanations are provided at lines 121-124 and 160-166.

2) **I suggest you drop "Results" from subtitles 3.1 and 3.2, given Section 3 is entitled Results**

Thank you for your suggestions. We have revised our manuscript accordingly.