Response to the Editor and Referee 1 (second revision)

Manuscript: egusphere-2026-4222 **Title:** Evaluating the performance of a numerical weather prediction model for precipitation and temperature in Luxembourg and the Greater Region: insights from WRF and WRFDA 3D-VAR

Dear Dr Giannaros,

We thank you and Referee 1 for the second evaluation of our manuscript. All points have been addressed as described below. Comments are quoted in *italics*; page and line numbers refer to the revised manuscript.

Referee 1

L18P1

> *"Flash floods can results in" should read "Flash floods can result in".*

Corrected (p. 1, l. 20).

L139P7

> *The NOAA ISD citation appears twice in a row. Please remove the duplicate.*

Duplicate removed (p. 7, l. 140).

L143P7

> *The text mentions 124 obs\{}_gts files, Table 3 uses 122 analysis cycles, and L673P40 uses 121 verification times. Please explain these counts in one place so readers can reconcile them.*

A short paragraph now explains all three counts in one place (p. 7, ll. 145 to 150): 124 observation files cover the study window, 122 analysis cycles completed in all seven configurations, and 121 forecast valid times are common to all seven configurations.

L203P9

> *Saying that the pre-processing threshold "is unrecoverable" and referring to "the present revision" reads like a response to reviewers. Please reword this for the manuscript, or reapply a documented threshold.*

Reworded as manuscript text (p. 9, ll. 205 to 215).

L347P15

> *The Wilcoxon test pairs all 264 stations, but 59 of them share grid cells and receive identical model values (L317P13). Please run the test on the 234 grid cells, or justify using stations.*

The test has been rerun on the 234 grid cells (method p. 15, ll. 350 to 360). The change in mean error remains significant for every configuration ($n = 234$, $p < 10^{-33}$; p. 29, l. 465).

L374P16

> *The lapse-rate sensitivity test (5.5–6.5 K km^{-1}) is mentioned, but its outcome is never reported. Please add a sentence or a table entry with the result.*

The outcome is now reported (p. 16, ll. 380 to 390): across this range the mean error changes by at most 0.015 K and the mean absolute and root mean square errors by at most 0.005 K, so no conclusion is affected.

Editor

(i) Headings of Sections 5.4 and 6.2

Revised as follows (Results subsections are renumbered because of the merge in point ii):

First revision	Second revision
5.4 What the assimilation does in observation space	5.3 Diagnostics in observation space
6.2 Why the achievable increment is limited	6.2 Factors limiting the impact of assimilation

(ii) Merging Section 5.2 into Section 6.1

Done. Section 5.2 has been removed and its content merged into Sect. 6.1 (pp. 44 and 45), with repeated statements removed.

(iii) Consistency and readability

The manuscript has been checked throughout. The enumeration in Sect. 6.1 now reads "Five differences" and runs First to Fifth (pp. 44 and 45), and the same defect in Sect. 6.2 has been corrected (four points, First to Fourth; pp. 46 and 47). Other inconsistencies found in the text have been corrected and the wording improved for readability.

Figure 2 map credit

The data sources of the map are now credited in the caption of Figure 2 (p. 18), and likewise for Figure 1 (p. 3).

We hope that the revised manuscript is now suitable for publication in NHESS.

Yours sincerely, Haseeb ur Rehman, on behalf of all authors