

Point-by-point letter – 2nd revision

Title: "Seasonal and diurnal performance of daily forecasts with WRF V3.8.1 over the United Arab Emirates"

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Suggestions for revision or reasons for rejection (will be published if the paper is accepted for final publication)

Summary: I am satisfied with the authors' responses to my comments from the initial review. Overall, the revised manuscript is greatly improved, though there remains a smattering of mostly typo-level issues to fix, and one bigger discrepancy between Figure 6 and Table 5 that must be resolved. Upon correction of those issues, the manuscript should be ready for publication. I look forward to seeing it in print in final form, and I congratulate the authors on assembling this interesting paper.

Recommendation: Minor Revision.

Major Comments:

1. Lines 318–320 (the final sentence of the paragraph) and Table 5 agree with each other, but these do not agree with Figure 6. In Figure 6, the highest dewpoints in each season are

observed at the marine stations, which makes physical sense. Correspondingly, in each season, the dewpoint depression (air temperature minus dewpoint temperature) is smallest (i.e., the relative humidity is highest) for the marine stations. This also makes physical sense. The dewpoint depressions that I can roughly calculate from Fig. 6 are substantially different from what is listed in Table 5. For example, for summer in Table 5, the mean dewpoint depression for UAE, Mountain, Marine, and Desert are 21.1°C, 17.3°C, 18.2°C, and 16.6°C, respectively. From eyeballing the mean values in Fig. 6, I calculate approximate values of 18.5°C, 20.0°C, 11.5°C, and 23.0°C, respectively. Those are pretty different from each other, and tell a different story! It appears that either Fig. 6 or Table 5 is in error as they report contradictory values, but Fig. 6 makes more physical sense to me than Table 5 or lines 318–320. Upon resolving this discrepancy, please revise the text in lines 318–320 accordingly.

You are indeed correct. There is an error in the table values from data copying. This has been amended now and corresponds with Figure 6. Thank you for catching this error.

The text from L318-320 has now been adjusted slightly to:

“In all seasons, the marine region is closer to saturation than in the other regions ($T-2m$ minus $TD-2m$ range is 8.3 to 11°C); however, this contrast is reduced in the cooler seasons as the mountain and desert regions become more humid.”

Minor Comments and Typos:

1. There are still several instances of “WRF-NOAH-MP” leftover throughout the revised manuscript that were not cleaned up from the original manuscript (lines 15, 70, 78). Please change these to “WRF with Noah-MP” or something similar.

These have been replaced exactly as you suggest throughout the manuscript.

2. Change “NOAH-MP” to “Noah-MP” throughout the manuscript. This is how it is spelled and capitalized by the developers of the scheme, including in the title of Niu et al. (2011), the primary reference for Noah-MP LSM.

Done.

3. Line 17: Change “10m” to “10-m”.

Done.

4. Line 20: Add commas before and after “however”.

Done.

5. Line 21: I suggest (but do not insist on) changing “lowest” to “smallest.” Smallest bias describes magnitude, while lowest bias can imply position on the number line (either less positive or more negative), which is the opposite of what you intend.

Done.

6. Line 22: Add a comma after “overestimated”.

Done.

7. Lines 45, 48, 309, 410, 419: Add a comma after “e.g.”.

Done.

8. Line 49: Delete “in particular”.

Done.

9. Line 50: Change the dash (-) to an em dash (—).

Done.

10. Line 75: Change “16, 14, and 18 stations” to “17, 15, and 16 stations” to align with Sec. 2.5.1.4, Fig. 1a, and Table 3.

Done.

11. Line 79: Uncapitalize both “Materials” and “Methods”.

Done.

12. Line 80: Add a comma after “configuration”.

Done.

13. Line 100: Change “heat-low” to “low”. Heat lows (thermal lows) are a summertime phenomenon, and do not occur in January in the Northern Hemisphere mid-latitudes.

Done.

14. Line 102: Change “heat-low” to “heat low”, and delete “appear”.

Done.

15. Line 120: WRF was already defined and references provided for it back in Sec. 1, so doing so in both places is unnecessary.

Citation here removed.

16. Line 138: For completeness, define RRTMG.

‘RRTMG’ changed here to ‘Rapid Radiative Transfer Model (RRTMG)’

17. Line 140: For completeness, define MYNN.

‘the MYNN’ changed to ‘the Mellor Yamada 2.5 Level scheme (MYNN)’

18. Lines 150 & 158: Change “resolution” to “grid spacing”.

Done.

19. Line 158 & Fig. 4 caption: Change "30 arc second" to "30-arcsecond".

Done.

20. Line 169: Un-bold "Here, we used". Also, there should only be one set of parentheses around the (Danielson and Gesch, 2011) reference.

Done.

21. Line 175: Change the period after "that time" to a semicolon.

Done.

22. Line 178: Change "in a NWP mode" to "in NWP mode".

Done.

23. Line 188: Delete "e.g.,".

Done.

24. Line 206: Change "2m" and "10m" to "2 m" and "10 m" (add spaces).

Done.

25. Lines 207 & 221: Correct the date formats to, for example, 30 November 2015. Most of the rest of the dates were changed to this format, but there were a couple stragglers that got missed.

Done.

26. Line 231: Change "3" to "three".

Done.

27. Line 248: For MET, add a reference to Brown et al. (2021, <https://doi.org/10.1175/BAMS-D-19-0093.1>).

Done.

28. Lines 255–268: I suggest deleting the parenthetical statement on line 255 (and replacing it with a colon), and making the introduction of these three metrics a bulleted list.

Done.

29. Line 269: Add a comma after “day”.

Done.

30. Line 286: Change “(negative indicate La Niña events)” to “(negative ONI indicates La Niña events)”.

Done.

31. Line 292: Add a comma after “pressure”.

Done.

32. Line 294: Change “than apparent” to “than is apparent”.

Done.

33. Line 295: Change “don’t” to “do not”.

Done.

34. Lines 300 & 308: Delete “for instance”.

Done.

35. Line 330: The section heading should be on a separate line.

Done.

36. Lines 408–409: Change “This is because the method of calculation of transfer coefficients/fluxes are executed in NOAH-MP, the PBL scheme, and the surface layer scheme (SLS) depends on the land surface type.” to “This is because, depending on the land surface

type, the calculations of transfer coefficients/fluxes are made in Noah-MP, the PBL scheme, or the surface layer scheme (SLS).”

Done.

37. Line 433: Change “For while” to “While”.

Done.

38. Line 434: Add a comma after “diurnal”, and after “differences”.

39. Line 435: Change “scientifically interesting, and importantly may reveal” to “scientifically interesting. Importantly, this assessment may reveal”. (The original sentence is a run-on sentence with far too many clauses connected by “and”.)

Agreed. This has now been rephrased to:

‘While assessment of diagnostics for the whole UAE region remains useful, it can obscure regional, diurnal, and seasonal differences, and also compensating biases. These are all scientifically interesting factors. Importantly, they might reveal information on model performance with respect to specific processes and land surface types, and how they are simulated.’

40. Line 449: Change “A caveat generally” to “A general caveat”.

Done.

41. Line 451: Change “on” to “in”.

Done.

42. Line 453: Add a comma after “moisture”.

Done.

43. Line 466: Delete the comma after “UAE”.

Done.

44. Fig. 1a: KSA is likely not a commonly known acronym. I suggest replacing it with Saudi Arabia.

Done.

45. Fig. 1 caption: Change "200 m a.s.l." to "200 m ASL".

Done.

46. Fig. 2 caption: Change "Figure" to "Figure", and superscript the -1 in "m s⁻¹".

Done.

47. Fig. 4 caption: Change "~1 km" to "~1-km", "21 class" to "21-class", and "2 local datasets" to "two local datasets".

Done.

48. Fig. 5 caption: Change "observation vs forecast" to "forecast vs. observation".

Done.

49. Fig. 6: In addition to resolving the discrepancy in Major Point 1, I have the following suggestions for improving the readability of Figure 6:

a. Have grid lines at consistent intervals. The intermittent and inconsistent grid lines on all three panels currently make it hard to read. I suggest major grid lines (solid light gray, perhaps) every 5°C and every 1 m/s, and minor grid lines (dashed light gray, perhaps) every 1°C and every 0.2 m/s.

This figure has been replaced and already has different lines for every 5°C as for 1°C, and different lines for 1 m/s and 0.2 m/s. The high resolution tiff figures are clearer than those pasted into the manuscript.

b. The major tick marks need to be clearly labeled, and these tick marks for panels a and b should be multiples of 5 (e.g., 0, 5, 10, 15, etc.), rather than 2, 7, 12, 17, etc. In Fig. 6b right now, it does not appear the tick mark labels are aligned with the major tick marks, either, which also makes it quite difficult to read the figure accurately or confidently.

Thank you for this suggestion. However, the authors are satisfied with the scales as they are. Furthermore, this change was not requested in the previous review.

50. Table 5: It is not clear to me what “time steps for each period” is. Also, why does it vary so much in autumn between the different regions?

To clarify this, in the caption for Table 5, ‘time steps for each period’ has now been replaced by ‘time steps for each season’. The table values were modified already (related to a previous comment) and the values look quite reasonable.

Notes to editor:

Figures 1 has been replaced with ‘KSA’ replaced with ‘Saudi Arabia’.

Figure 6 has been replaced due to an axis being slightly misaligned.

Table 5 has been replaced due to the aforementioned errors.

All text is consistent with these changes.

Finally, the authors thank the reviewers and editor. We trust that these suggestions have greatly improved the manuscript and that it is now ready for publication in GMD.