Geoscientific
Model Development
Discussions

Interactive comment on "Seasonal and diurnal performance of daily forecasts with WRF-NOAHMP V3.8.1 over the United Arab Emirates" *by* Oliver Branch et al.

Anonymous Referee #2

Received and published: 30 November 2020

The manuscript "Seasonal and diurnal performance of daily forecasts with WRF-NOAHMP V3.8.1 over the United Arab Emirates" by Branch et al. presents the verification of high resolution ($\Delta x = \Delta y \sim 3$km) daily forecasts (T+6h – T+30h), produced by a regional numerical weather prediction model (WRFv3.8.1) over the United Arab Emirates, at seasonal and diurnal time scales. The simulations performed according to well-established methods (daily re-initialization with operational analysis data, relative sufficient spin-up time, soil moisture treatment, high quality soil, land and topography data, inclusion of re-analysis AOD data) and have been evaluated utilizing robust statistical metrics. The manuscript is well structured, the materials and methods are referenced accordingly, the results are presented in a comprehensive way and the

summary outlines the findings of the study and elaborates possible limitations. However, some adjustments and minor revision are required prior to publication. Overall, I would recommend publication subject to the general and specific comments below.

General comments:

1. In Figure 1b, the authors present the latitude-longitude values of the four model corner grid cells. The authors should clarify whether the model domain is on regular lat-lon projection or not.

2. Although it is mentioned later in the manuscript, the authors are encouraged to add a short explanation in sub-section 2.2, why the December of 2014 was excluded from their analysis.

3. In Table 1, where the physical suite is presented, the authors should add in parentheses the corresponding namelist options for clarity.

4. Regarding the treatment of soil moisture from one initialization to the next (L183-189), the authors should elaborate more on the employed method (e.g. which time stamp was considered as valid between two consecutive initializations). From the way it is written, the simulated soil moisture from the WRF-NOAMP replaces the corresponding field in the initial condition file at initialization time (18UTC), rather than the soil moisture from the operation analyses. If the latter is true, what about the lateral conditions?

5. In subsection 2.5.2, the authors should clarify if the closest to observation model grid point was considered for the verification, or other approach (e.g. the 4-point weighted mean) was used.

6. Figure 7 is cited before Figure 6

7. In Figures 2 and 3, the shaded contours corresponding to geopotential heights at 500hPa isobaric level, according to the legend and Figures' captions. However, their values are relative low and their range corresponds to a lower isobaric level (perhaps at

700-750hPa). The authors should check for any inconsistencies between each figure legend/caption and the corresponding contours.

8. In Figure 6, the y-axes in T-2m and TD-2m panels should share a common range in their values, in order the saturation conditions to be more comparable across different seasons.

9. In Table 5, the number of UAE data points (from all 48 stations; 3rd column) are equal to the data points on each sub-region. How is this possible, since a subset of the available stations are utilized in each region? The authors should clarify the latter.

10. The authors should elaborate if the biases in UV-10m speed are introduced also due to differences in height between observed and simulated values. In other words, how certain are the authors that the observed wind speed values are at 10 m above ground level?

11. In order to point further the tremendous effort on performing the simulations, the authors should consider to add some information about the wall-clock time of each re-initialization, the number of cores and some hardware specifications.

12. As a general comment, the authors should also considered the uncertainty of the observations themselves (Prein and Gobiet. 2017).

Specific comments:

L40: Citation Coppola et al., 2018 should now Coppola et al., 2020. Please revise.

L47-48: Please rephrase.

L80: Add "and" after "(2.4).

L179-180: Please rephrase.

L311: Please change "Figure 6a-6h" to Figure "5a-5h".

L341: Please in which Figure this sentence refers.

C3

References

Prein, Andreas F., and Andreas Gobiet. "Impacts of Uncertainties in European Gridded Precipitation Observations on Regional Climate Analysis." International Journal of Climatology 37, no. 1 (January 2017): 305–27. https://doi.org/10.1002/joc.4706.