**Review comments on “Performance of WRF Large-Eddy-Simulations in summertime CBL characteristics over the Taklimakan Desert: A Real Test Case” (**ACTA-E-2018-0001)

**General comments**

Characteristics of the convective boundary layer (CBL) over desert(s) are not well defined due to lacking of observational data and high resolution numerical simulations. It definitely represents one of the research interests for the atmospheric boundary layer meteorology, weather, and climate. In this manuscript, the authors attempted to present the performance of WRF/LES on simulating the CBL structures and their evolution over the Taklimakan Desert during the summer daytime. They presented how the simulated vertical profiles of potential temperature and specific humidity were sensitive to the ingest frequency of lateral boundary conditions, and how the on simulated vertical profiles changed with surface heat fluxes. It is not surprised that the WRF/LES simulations with hourly update of lateral boundary conditions ingest showed better agreement with the observations (see Figure 4.b). The findings obtained from these two group sensitivity studies are not new at all. As indicated by the manuscript title, the study is supposed to focus on the performance of WRF/Chem. No enough meaningful evaluation results are provided in the manuscript to support the objective indicated by the manuscript title. The manuscript structure isn’t well designed. Scientific questions are not clearly defined and insightful analyses are lacking. No significant results were obtained from this study. Extensive grammar errors make the manuscript very difficult to read. Therefore, the manuscript is suggested to reject given the current status.

Major comments

1. Observation-simulation comparisons (e.g., time series and vertical profiles) and statistical evaluations of the model simulation (considered as a base case) should be presented before the sensitivity studies (sections 3.1 and 3.2).
2. How are the lateral boundary conditions of the innermost domain updated during the simulations? Is it not updated every integration time step? It is not useful to present sensitivity studies on impact of updated frequency of lateral boundary layer conditions on the WRF/LES results.
3. Why the vertical profiles of specific humidity (Figure 5) are very different from those of potential temperature (Figure 4) within the CBL. Is this the real case? What are the main reasons causing such type of vertical distribution?
4. Why is the maximum observed surface sensible heat flux less than 250 W·m-2? This is not consistent with the boundary layer height (up to 5000 m). Is it possible to observe such low sensible heat flux over the desert?
5. It is required to calculate statistical parameters for the model evaluation.
6. L206-207: How the more frequently LBCs may cause the cold advection?
7. The authors pointed out that the soil moisture was over-estimated by the model and initial soil moisture is higher than the observations (see L242-243, L248-250). If this is the case, the sensible could be under-predicted. However, the simulation results show the over-prediction of sensible heat flux by the model (see L218-220).
8. As pointed out by the authors that the surface heat flux is the main driving force to the boundary layer growth. The model captured the boundary layer height quite well (see the control case in Figure 4.d) even the surface heat flux is significantly over-predicted by the model (see Figure 6).
9. Entrainment process could play an important role in the CBL development over the Desert. However, it hasn’t discussed by the authors.
10. There are too many grammar errors throughout the manuscript. It is difficult to list all the errors here.