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Hydrology and Earth System Sciences Discussions

Interactive comment on "Impacts of inhomogeneous landscapes in oasis interior on the oasis self-maintaining mechanism by integrating numerical model with satellite data" *by* X. Meng et al.

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Interactive comment on "Impacts of inhomogeneous landscapes in oasis interior on the oasis self-maintaining mechanism by integrating numerical model with satellite data" by X. Meng et al.

Anonymous Referee #3

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This paper used a mesoscale model to investigate the inhomogeneous landscapes impact on the thermal-dynamics over an oasis region in northeastern China. Some of the co-authors have studied land-atmosphere interaction in arid and semiarid regions for many years, and are experienced in understanding the atmospheric dynamics of oasis-desert system. However, current paper is suffered from insufficient analysis and rigorous proofreading. Substantial improvement is needed before its publication.

1. Spinup for the land surface model. Since the authors only integrate the model for one day, initial conditions should be critical to the analysis. There is no special treatment for the initialization of the model in the paper. While integrating MM5 for spinup may be time consuming and resulting additional uncertainty, spinning up the offline NOAH land surface model for two landscapes is helpful to obtain realistic initial soil moisture and temperature. Different vegetation type and soil texture should contribute to different spatial pattern of soil moisture from two experiments, though the atmospheric forcings might be relatively homogeneous at local scales.

Answer: Spin-up has been considered in the revised manuscript. According to similar works on the oasis-desert simulations, spin-up is set to 30 hours. Please see details in Page 9, Line 17-19.

2. Domain averaged water and energy budget analysis. The authors did some thermal-dynamics analysis for the landscape sensitivity, how about the energy and water budget averaged over the domain (Yuan et al., JGR, 2008JD010180)? Some statistics might be helpful to quantify the sensitivity.

Answer: Time series of oasis and desert averaged energy (sensible and latent heat flux), 2m air temperature and specific humidity are compared in the analysis to present the energy budget and the "cold" and "wet" island. Please see Fig.5, 6, 7 and the statistics in Table 2 and 3. The documents are in Section 4.2.1 and 4.2.2.

3. Sensitivity to physical schemes. The author made one-day case study, perhaps due to limit availability of field campaign data. I suggest the authors use different physical

schemes (e.g., PBL) to conduct additional sensitivity experiment to augment current paper.

Answer: Four simulations were performed in the revised manuscript to test the sensitivity. For the physical schemes, we consulted other similar works which have been proved to be suitable for the simulation of the oasis-desert circulations.

4. Validation. Though the authors did some validation in previous paper, it is helpful to utilize all available observation to support the analysis in current paper. Observation can be incorporate into many plots in the paper.

Answer: Observations have been used in the revised manuscript for validation of the model results. Please see Section 4.1.

5. Proofreading is quite necessary, though the authors have published many papers. Answer: We have made a detail proofreading. Please see the revised manuscript.

6. A map of China that indicates the location of Jinta Oasis is needed in Figure 1.

Answer: A map of China has been added; please see Fig.1.

7. Since soil moisture is one important aspect of heterogeneity in this study, incorporating the initial soil moisture map into Figure 2 is helpful.

Answer: Soil moisture maps of the simulations have been added, please see Fig.3.

8. As a more quantitative analysis of thermal-dynamics than Figure 5, how about generating the diurnal evolution of vertical profiles of pseudoequivalent potential temperature averaged over the domain?

Answer: As is shown in Fig. 6 and 7, the “wet-cold” island is most evident in the daytime, especially at noon. So, we focus on the analysis around 13:00 Beijing Time, when the oasis effect is the strongest.

9. P1988, L5. Is the convergence over the corridor due to buffer zone issue?

Answer: Yes, the energy exchanges exist over this region due to the mixture of vegetation and desert, leading to the turbulences and resulting in the convergence.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/9/C3269/2012/hessd-9-C3269-2012-supplement.pdf

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