Response to Reviewer #1:

Using long-term observations at the U.S. Department of Energy's Atmospheric Radiation Measurement Program's Southern Great Plains site, this study developed a first-ever lidar-based method (DTDS) to automatically identify coupled and decoupled low clouds over land. The coupled states determined by the DTDS method compared considerably well with that derived from radiosondes. In the meantime, with the ability to provide high-quality retrievals of the PBLH under cloudy conditions, the proposed DTDS method also helps address a long-lasting problem in the PBLH retrieved from lidar. In general, the manuscript is written pretty well with the evidence presented by the authors supports their conclusions. I only have a few minor comments below that I would like to see addressed before the manuscript is accepted for publication.

Response: We appreciate the reviewer's positive and helpful comments on our work. All of the comments and concerns raised by the referee have been carefully considered and incorporated into the revised manuscript. Our detailed responses to the reviewer's questions and comments are listed below.

Minor comments:

1. *Line 107-108: The radiosonde data provides the PBLHs retrieved from four different algorithms. Is there any specific reason why you only select the PBLH retrieved by the method of Liu and Liang (2010)? Based on my personal experiences, the PBLH retrieved from different algorithms can vary a lot from each other for some cases.*

Response: Thanks for raising this point. In section 2.1, we added a discussion for different algorithms for retrieving PBLH from the radiosonde.

"There are several methods to determine PBLH from RS-measured temperature, pressure, and humidity profiles. These methods include, among others, the parcel method (Holzworth, 1964), the gradient methods (Stull, 1988; Seidel et al., 2010), and the Richardson number method (Vogelezang and Holtslag, 1996). After examining the previous methods, Liu and Liang. (2010) proposed a different approach to determine PBLH that is valid under different thermodynamic conditions. The robust performance was demonstrated over the SGP site and in other major field campaign sites around the world (Liu and Liang, 2010). Thus, we adopted this method to calculate PBLH from RS data in this study."

Reference:

Holzworth, G. C., (1964). Estimates of mean maximum mixing depths in the contiguous United States, Mon. Weather Rev., 92, 235–242, https://doi.org/10.1175/1520-0493(1964)092<0235:eommmd>2.3.co;2.

Seidel, D. J., Ao, C. O., & Li, K. (2010). Estimating climatological planetary boundary layer heights from radiosonde observations: Comparison of methods and uncertainty analysis. Journal of Geophysical Research: Atmospheres, 115(D16).

Vogelezang, D. H. P., & Holtslag, A. A. (1996). Evaluation and model impacts of alternative boundary-layer height formulations. Boundary-Layer Meteorology, 81(3), 245-269.

2. *Figure 2. It would be nice if the information of the data sources for each variable are also included in the figure caption. For example, the PBLH is derived from the RS profiles using the method of Liu and Liang (2010), the cloud layer is obtained from the CLDTYPE/ARSCL data, etc.*

Response: Following your comment, we added the data sources for all the variables used in the figure captions.

3. *Line 354: change "a relatively low biases" to " a relatively low bias"*

Response: Revised as suggested.

4. *Line 432-435: Get confused about this part. Do you mean that the correlation coefficient between the DTDS-derived PBLH and RS-derived PBLH under cloudy conditions is much higher compared with that under clear-sky cases? Why is this kind of comparison important here?*

Response: The comparison in performance between cloudy conditions and clear sky is not highly relevant to the main scope of this study. Thus, we deleted this sentence.

5. *Please keep your reference formating consistent throughout the manuscript, for instance, Ek and Holtslag (2004) vs. Zheng & Rosenfeld, (2015).*

Response: Per the comment, we thoroughly checked the manuscript and revised the format of reference.