

Major comments:

1. Too many expressions are used to describe the planetary boundary layer (PBL) in this manuscript, including boundary layer, boundary, CBLH. The PBL can be basically divided into convective boundary layer, neutral boundary layer and stable boundary layer, according the atmospheric static conditions. Therefore, one of my greatest concern is the topic of this work is the evolution of CBL height based on the measurments from MMCR. To my knowledge, the determination of CBL needs the temperature profiles. But I can not see any such profiles in the retrieval process of CBL height.
2. My second concern lies with the physical basis for the PBL height retrieval from MMCR. As the authors stated in the Introduction section, “there are few reports on the use of vertical velocity obtained from Doppler cloud radar for the CBL investigations.” To the best of my knowledge, the cloud-topped PBL is extremely complex due to the complicated turbulence-convection interaction, and the entrainment/detrainment process near the cloud edges. Nevertheless, the MMCR can not efficiently obtain any information (e.g., the vertical velocity) in the absence of cloud, which exactly corresponds to the cloud-topped PBL. Even though the authors say that there exists a weak echo layer near the surface, this could be due to the clutters. If not, the PBL top is well above the near surface layer. Then I pose a question “what is the physical basis for the CBLH and how reliable?”

If the authors can not well addressed this concern, I recommend rejecting consideration of this work for publication at ACP.

Specific comments:

Lines50-51: it is totally wrong to state that “In the afternoon, \*\*\*turbulent activity is is weakened”. Conversely, in the absence of cloud or synoptic-scale weather system, the turbulence tends to reach the maximum, due to the strongest sensible heat flux in the afternoon.

Lines 51-52: Except for the existence of aerosol particles in the residual layer, most of them are present in the nocturnal stable PBL.

Line 68: What is the “the boundary top”? is it different from the atmospheric boundary layer top? If not, why not use the same term throughouth the whole manuscript?

Lines 76-77: “The radiosonde data have a widely geographical distribution and long-term accumulation” should be rephrased.

Line 78: “boundary layer” refers to “planetary boundary layer height ()”?? if so, what are the difference between PBLH and CBLH?

Line 92-96: Too long sentence for “Wind profile radar can ... turbulence (Liu et al., 2020...” and thus I suggest to rephrase it.

Line 109: I do not understand the meaning of “Plunge”.

Line 114: “capability” -> “incapability”

Line 121: Is there a rapid decline stage of CBL in the afternoon?? If so, some necessary references are needed to be provided here.

Line 123: Please elaborate on the definition of “historic effect” .

Language: There are too many grammar errors or inappropriate expression throughout the whole manuscript. I can not continue the reviewing processes if the authors did not seek help from a native English editor or colleague.