Responses to the reviewers' comments

Reviewer #1:

This study presents the first high-resolution dataset of low-level atmospheric turbulence parameters in China by combining radar wind profiler and radiosonde observations. It reveals vertical attenuation patterns (e.g., linear decrease of turbulent dissipation rate, ε, with altitude) and seasonal variations (stronger turbulence in spring/summer), providing critical data support for model parameterization. The research design is robust, data sources are reliable, and the methodology demonstrates innovation. The findings hold significant value for understanding boundary layer turbulence dynamics and aviation safety applications. The manuscript is suitable for publication after minor revisions.

Response: We are glad to receive your positive and encouraging comments, which are invaluable in improving the quality of our manuscript. For clarity purpose, here we have listed the reviewer's comments in black plain font, followed by our response in blue italics.

Specific Suggestions and Clarifications Required:

1. Ensure all abbreviations (e.g., Turbulence dissipation rate (ε)) are defined only once at their first mention. Avoid redundant definitions in the Abstract, Introduction, or other sections. Check consistency for other terms.

Response: We sincerely appreciate the reviewer's comment regarding the inappropriate use of abbreviations. In the revised manuscript, all abbreviations have been spelled out upon their first occurrence to avoid redundant definitions in the following sections.

2. Line 123，revise "see Chen et al., 2022b" to "Chen et al., 2022b" (remove "see").

Response: Corrected as suggested.

3. Equation 1, define the variable h (height/altitude). Ensure consistency in height representation: Equation 4 uses z for altitude, while other equations (e.g., Equation 1) should use the same notation.

Response: In the revised manuscript, all instances of altitude rather than height in the equations are consistently denoted by the variable z, with corresponding definitions provided.

4. Equation 2, define T (temperature) and P (pressure) explicitly.

Response: Thanks for pointing this out. The definitions of T (temperature) and P (pressure) are added explicitly in the revised manuscript.

5. Symbol Consistency in Equations 4 and 6: Equation 4 uses φ (phi), while Equation6 uses ψ (psi). Clarify their definitions and ensure consistency in notation.

Response: In the equation 4, φ (phi) has been corrected as α (alpha) which represents the beam zenith angle of the radar beam. In equation 6, the double integration is taken between 0 and π/2 for both spherical coordinates ψ and φ.

6. Equation 6, define ϕ (phi) in the context of the equation.

Response: In Equation 6, the double integration is taken between 0 and π/2 for both spherical coordinates ψ and φ.

7. Equation 8, specify the value of kinematic viscosity (v) and cite relevant references for its calculation.

Response: Thanks for pointing this out. Corrected as suggested. "Where v (units: $m^2 s^{-1}$) is the kinematic viscosity, $v = 2 * 10^{-5}/\rho$, and ρ represents atmospheric density which can be calculated based upon the pressure and temperature profiles measured by radiosonde (Eaton and Nastrom, 1998; Solanki et al., 2022)."

References:

Eaton, F. D. and Nastrom, G. D.: Preliminary estimates of the vertical profiles of inner and outer scales from White Sands Missile Range, New Mexico, VHF radar observations, Radio Sci., 33, 895-903, 10.1029/98rs01254, 1998.

Solanki, R., Guo, J. P., Lv, Y. M., Zhang, J., Wu, J. Y., Tong, B., and Li, J.: Elucidating

the atmospheric boundary layer turbulence by combining UHF radar wind profiler and radiosonde measurements over urban area of Beijing, Urban CLim., 43, 13, 10.1016/j.uclim.2022.101151, 2022.

8. Clarify how N^2 is calculated at times other than 00 and 12 UTC, given its reliance on twice-daily radiosonde data. Explicitly state the temporal resolution of N^2 in the methodology.

Response: Thanks for pointing this out. In this work, N^2 was computed solely based on the 00 and 12 UTC radiosonde observations, as no sounding data were available at other times. Therefore, N^2 has a twice-daily temporal resolution (00 and 12 UTC) throughout each day."