

Review of “On the Nationwide Variability of Low-Level Jets Prior to Warm-season Nocturnal Rainfall in China Revealed by Radar Wind Profilers” (author: Ning Li, Jianping Guo, Xiaoran Guo, Tianmeng Chen, Zhen Zhang, Na Tang, Yifei Wang, Honglong Yang, and Yongguang Zheng)

Overview:

RWPs are advanced equipment capable of capturing wind profile evolution on minute scale. This equipment offers valuable information and potential precursors for nowcasting rainfall and convection occurrence. It is particularly crucial for region like China that has established nationwide RWP network. For this purpose, this work employed 31 RWP stations across China, and explored their minute-scale information before nocturnal rainfall production, with emphasis on the indication by RWP-detected LLJ traits. Unique dynamic features leading to rainfall were revealed across distinct regions and phases across China. The differences in LLJ-involved heavy rainfall and non-heavy rainfall events were further examined from both dynamic and thermodynamic viewpoints. Overall, the findings are meaningful for advancing our knowledge on the LLJ-related activities and their interaction with other factors preceding rainfall production in different regimes. The manuscript is generally well-written. In my opinion, this paper is acceptable after some minor revisions.

Minor comments:

1. Abstract: The “multiscale responses” is ambiguous here.
2. Throughout the manuscript: Several sentences in the manuscript contain grammatical mistakes, such as those beginning with “While” and “And” (L217–218, L235–238, L253–255, L298–299, and elsewhere). There is also misuse of hyphen (-) and long dash (–), especially those between the months (April–October), years (2023–2024).
3. L50: Suggest to revise “The heavy rains linked to LLJs” as “The LLJs-associated heavy rain”.
4. L88: Can you provide some examples for “mesoscale systems”? On the other hand, this term seems not parallel with “terrain effects” and “gravity waves” logically.
5. L149: Suggest to revise “Miscellaneous” as “Multi-source”.
6. L156: Can you provide some reference for the quality control procedure of ground-based data?
7. L182: Revise symbol: comma to period.
8. L185–190: I am not so sure about the rationality and accuracy of HR definition here, given HR has its common-used definition in routine operation.
9. L194: Add space before 10 m s⁻¹. The authors are encouraged to provide reference for the choice of this LLJ magnitude.
10. L203: should be “an LLJ-associated rainfall event”?
11. L211: The contribution rate is “50.9%” in Fig. 2g, rather than “51.6%”.
12. L212–215: Please provide literature for this speculation.

13. L215–216: “52.5%” and “47.5%” is the relative contribution rate of frequency, but not the frequency of nocturnal rainfall or daytime rainfall. Please clarify the frequency at national scale that is quite confusing in current statement.
14. L222: “displayed” -> “displays”.
15. L223–226: I think the more intense nocturnal rainfall should be attributed to the absolute magnitude of nocturnal LLJs. It seems unreasonable to relate this intense rainfall with the enhancement of nocturnal LLJs relative to daytime LLJs.
16. Figure 2: It seems (a)–(f) here are unnecessary to be shown since they are not cited in the text. It would be better to add relevant description for these subplots, or delete them.
17. Figure 3d–h: Why only four directions for LLJs, but not eight directions?
18. L247: Please consider deleting “Therefore”. There is no causal relationship between the two sentences.
19. L251–253: The statement of “nearly 45.0%” cannot be well supported by the pie charts in Fig. 6.
20. Figure 7: Do the blue line denote the accumulated LLJ frequency over 0–3 km latitude?
21. L289: Consider deleting “However”.
22. Figure 8c: The maximum wind speeds are lower than 10 m/s. I wonder how they satisfy the LLJ definition in section 2.
23. L322–324: The double LLJs in Du and Chen (2019) are at nearly 950 hPa (BLJ) and 700 hPa (SLLJ). How the bimodal peaks here correspond to their double LLJs?
24. L335: It should be “under 1.7 km”?
25. L360: The choice of 1 hour instead of 2 hours used before should be further explained.
26. L363: “MFC” stands for?
27. L365–387: The authors are encouraged to add more specific citation of Fig. 10 and Fig. 11 for these statements, for the convenience of reader.
28. L390–391: The physical meanings of “LLJ index” and “VWS” here are unclear, especially “LLJ index”. Please try to clarify these terms.
29. L403: weaker increases in surface θ_e ?
30. L279–318, L365–447: The presentation of the results across different regimes appear to be burdensome for readers. Please consider reorganizing these texts to highlight the similarities and differences among the regimes.