We thank the referees for their comments and suggestions. Our responses (blue text) to the referees' comments are listed below:

Response to Referee 1:

This work is to compare the horizontal winds measurements by a Na Doppler lidar and Meteor Wind Radars nearby. In addition to traditional approach for radar data analysis, the authors utilized the Volume Velocity Processing (VVP) method to derive the radar measured horizontal winds, which generated results that are more consistent with the lidar observations. This is an important investigation demonstrating the robust and reliable VVP approach for meteor radar wind observations. I only have a few technical issues with the manuscript.

1. The author should highlight/emphasize (in the abstract and introduction) the 300 hours utilized in this study is when all instruments (two MWRs and the Na lidar) were all simultaneously operating.

We thank the referee for this comment. We modified the sentence in lines 21-23 in the abstract and added a sentence in lines 74-75 in the introduction in the revised manuscript, that to emphasize that only periods when all instruments were operating simultaneously were used

2. The author should present the measurement uncertainties for both lidar and radar systems, especially the uncertainty limit for data selections in the introduction. I think those blank areas in Figure 3 are due to large measurement uncertainty, and the paper should describe how the criteria is decided.

The blank areas in Figure 3 are due to the data selection criteria applied to each system. For the Na lidar, retrieved zonal wind data with uncertainties greater than 10 m/s were excluded, resulting in blank areas. For the meteor radars, if a 1-hour and 2-km time-height bin contains fewer than six meteor echoes, the zonal wind cannot be estimated, resulting in blank areas in the contours.

Because different lidar and meteor radar systems are not identical, it is difficult to define a general or universal uncertainty limit in the Introduction. As an example, for Na lidar systems, key instrument parameters such as the transmitted laser energy, telescope aperture, and the photoelectric conversion efficiency vary among instruments, leading to different uncertainty characteristics.

For the sodium lidar and meteor radar used in this study, the uncertainties of the retrieved zonal wind and the corresponding evaluation criteria are described in Section 2, "Instruments and Data Sets". Specifically, the Na lidar uncertainties and associated quality criteria are provided in Lines 86–88, while the corresponding information for the meteor radar is given in Lines 99–101 in the revised manuscript.

3. It may be helpful for the readers if the error bars can be added in Figure 4.

We have added the Na lidar's zonal wind uncertainties as error bars in Figure 4 in the revised manuscript. The updated figure is shown below:

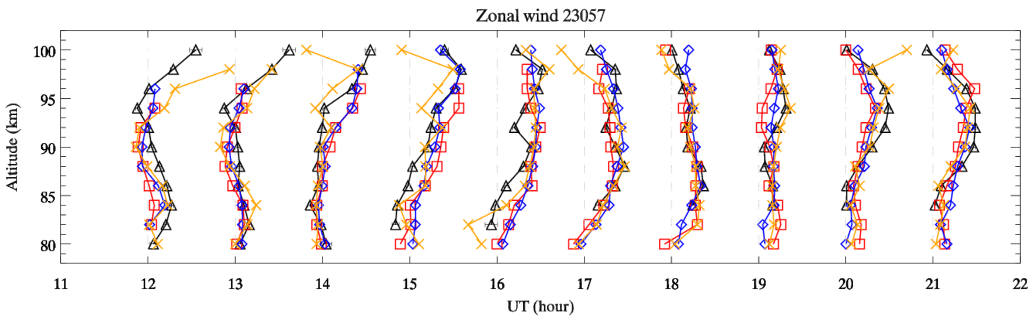

Figure 4. Zonal wind vertical profiles during the night of 26 February 2023. Na lidar, MCMR, CFR, and VVP profiles are marked with black triangles, red squares, blue diamonds, and orange cross, respectively. The black error bars indicate the uncertainties of the Na lidar zonal wind. The horizontal distance between each vertical lines corresponds to 120 m/s.

For the meteor radars, it should be noted that point-by-point uncertainties cannot be directly provided. This is because the wind estimates are derived from a statistical fit to an ensemble of meteor-trail radial-velocity measurements (i.e., many meteor echoes) rather than from individual measurements. Consequently, formal uncertainties for the derived winds cannot be defined in the same manner as for lidar observations.

To assess the uncertainty of meteor-radar wind retrievals, we rely on intercomparison approaches that have been widely used in previous studies. In particular, we have previously compared winds derived from two co-located meteor radars operating independently, which provides an empirical estimate of the uncertainty and robustness of the retrieved wind fields (see Reid et al., 2018; Zeng et al., 2022).

Reid, I. M., McIntosh, D. L., Murphy, D. J., and Vincent, R. A.: Mesospheric radar wind comparisons at high and middle southern latitudes, Earth Planets Space, 70, 84, https://doi.org/10.1186/s40623-018-0861-1, 2018.

Zeng, J., Yi, W., Xue, X., Reid, I., et al.: Comparison between the Mesospheric Winds Observed by Two Collocated Meteor Radars at Low Latitudes. Remote Sensing, 14, 2354, https://doi.org/10.3390/rs14102354, 2022.

4. In this Discussion, the author does not explain clearly why the VVP winds are more consistent with the Na lidar winds above 90 km. I think it is an important point of discussion, because VVP is used in various radar stations around the globe. The VVP clearly takes advantage of more radar echo signals, but why this only affects winds above 90 km? Is this somehow related to the different dynamics below and above this altitude?

Meteor detection rates are typically highest between ~85 and 95 km, which provides the most robust wind retrievals (including VVP) because the fitted winds are constrained by the largest number of meteor echoes and the widest distribution of viewing angles. Meanwhile, the Na lidar has its highest signal-to-noise ratio where the sodium number density peaks, which is usually near ~92 km. As a result, as shown in Figure 8a, both instruments have their strongest and most reliable sampling in the overlapping altitude region (~86–94 km), leading to the highest correlation there.

We also note that the improved consistency above ~90 km likely reflects not only sampling effects but also dynamical factors. At these altitudes, wave-driven variability (e.g., tides and gravity-wave-induced perturbations) generally becomes stronger, producing larger-amplitude wind fluctuations. Such larger signals are more readily captured by both instruments despite their different sampling strategies and effective resolutions, which can further enhance the apparent agreement. We therefore interpret the better correspondence above ~90 km as resulting from a combination of (i) optimal overlapping sensitivity and sampling and (ii) larger-amplitude dynamics in the upper MLT that are robustly detected by both radar and lidar.

We modified the Discussion at lines 257-268 in the revised manuscript accordingly to clarify these two contributions.

5. Line 137, suggest replacing "structure" with "temporal and vertical variations"

We have replaced “structure” with “temporal and vertical variations” in Line 141 in the revised manuscript.

6. Line 180, suggest replacing "high" with "large"

We have replaced “high” with “large” in line 184 in the revised manuscript.

Response to Referee 2:

This manuscript compares zonal wind measurements from a Na lidar and at the multi-static meteor radar system configured with Mengcheng Meteor Radar and Changfeng remote Receiver near Hefei, China. The meteor radar data used for comparison include Mengcheng Meteor Radar (MCMR), Changfeng remote Receiver (CFR), and wind derived closer to the lidar beam using the Volume Velocity Processing (VVP) method. The results demonstrate that MCMR, CFR and VVP zonal winds show good consistency with lidar zonal winds. Meanwhile VVP zonal winds exhibit better agreement with the lidar above 90 km, both in zonal wind variance and radar-to-lidar zonal wind ratio, suggesting that the VVP method provides a reliable approach for retrieving meteor radar winds and can improve wind estimates in the 90–98 km region.

I have some comments as follows:

1. Line 85-86: better revised to "…The zonal wind uncertainties for resolutions of 1 hour and 2 km range from...". It is better to describe the uncertainties of zonal wind than line-of-sight accuracies in current manuscript.

We agree with the referee that it is more appropriate to describe the uncertainties of the zonal wind rather than the line-of-sight accuracies in the current manuscript. Accordingly, we have modified the sentence to "The zonal wind uncertainties for resolutions of 1 hour and 2 km range from 3.0 m/s at 92 km to 7.5 m/s at 82 km and 102 km." in Lines 86-87 in the revised manuscript.

2. Line 113: "…from Na lidar and hourly meteor counts from meteor radars."

Modified the sentence in Line 117 in the revised manuscript.

3. Line 115: "…profiles of Na density and meteor counts both exhibit Gaussian distributions."

Modified the sentence in Line 119 in the revised manuscript.

4. Line 119: "…The peak altitude of CFR detection is 1 km higher than that of MCMR"

Modified the sentence in Line 123 in the revised manuscript.

5. Line 136-137: “Figure 3 demonstrates the zonal wind observations from (a) Na lidar, (b) MCMR, (c) CFR, and (d) VVP between 12:00 and 21:00 UT on February 26, 2023 which exhibit good consistency in overall structure.”

Modified the sentence in Lines 140-141 in the revised manuscript.

6. Line 161-162: “These histograms generally exhibit Gaussian distributions.”

Modified the sentence in Lines 165-166 in the revised manuscript.