

Clarification on corrections to EGUSPHERE-2025-1513

Dear Editor and Reviewers,

During a post-submission workflow check, we identified a time misalignment in the processing of meteorological station observations used for aerodynamic roughness length (z_0) estimation and model evaluation. This issue has now been corrected. After reprocessing the data, we found that the correction causes minor numerical differences in several evaluation metrics and figures, but the conclusions remain unchanged.

Summary of changes:

1. Corrected the time alignment of CMA station observations.
2. Recomputed the z_0 estimates, z_0 gridded dataset and model evaluation metrics.
3. Updated several figures and tables and their corresponding descriptions in both manuscript and supplementary material.

Impacts: The changes slightly affect the quantitative results but do not alter the conclusions that the refined aerodynamic roughness length improves WRF performance over high-roughness regions. A comparison and description of the main figures and tables before and after the correction are provided in the document below.

We sincerely apologize for the oversight and appreciate your understanding.

Kun Yang,
on behalf of all co-authors

Figure and Table Comparisons

1. Before the correction, z_0 values were estimated for 1,805 stations, which increased to 1,837 stations after correction. Consequently, the number of stations shown in Figs. 1 and 2 has increased. Some of the stations show slight numerical variations in z_0 values. The urban-rural classification types remain unchanged, but the counts for some categories have slightly varied.

2. Because the number of z_0 estimates increased, we retrained the random forest model, resulting in updates to Fig. 3.

3. The annual mean z_0 in Fig. 4 differs slightly between the two versions, with absolute differences in most regions being less than 0.2 in $\ln(z_0)$ (Fig. R1), which is considered acceptable.

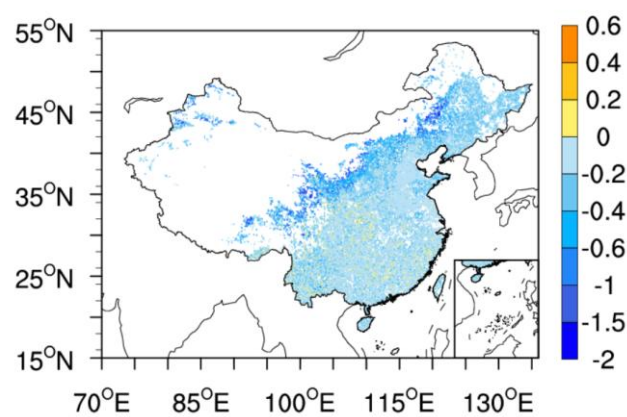


Figure R1. Difference in the annual mean $\ln(z_0)$ before and after the correction, i.e., the corrected $\ln(z_{0_RFR})$ (Fig. 4a) minus the previous one.

4. Figures 5-7 present the evaluation of simulated wind speeds, and the numerical differences are minor. We mainly list Fig. 6 below, which compare model performance using 10 m wind speeds from CMA stations. After the time alignment correction of station observations, the temporal correlation coefficients of wind speed simulations have improved noticeably (Fig. 6d).

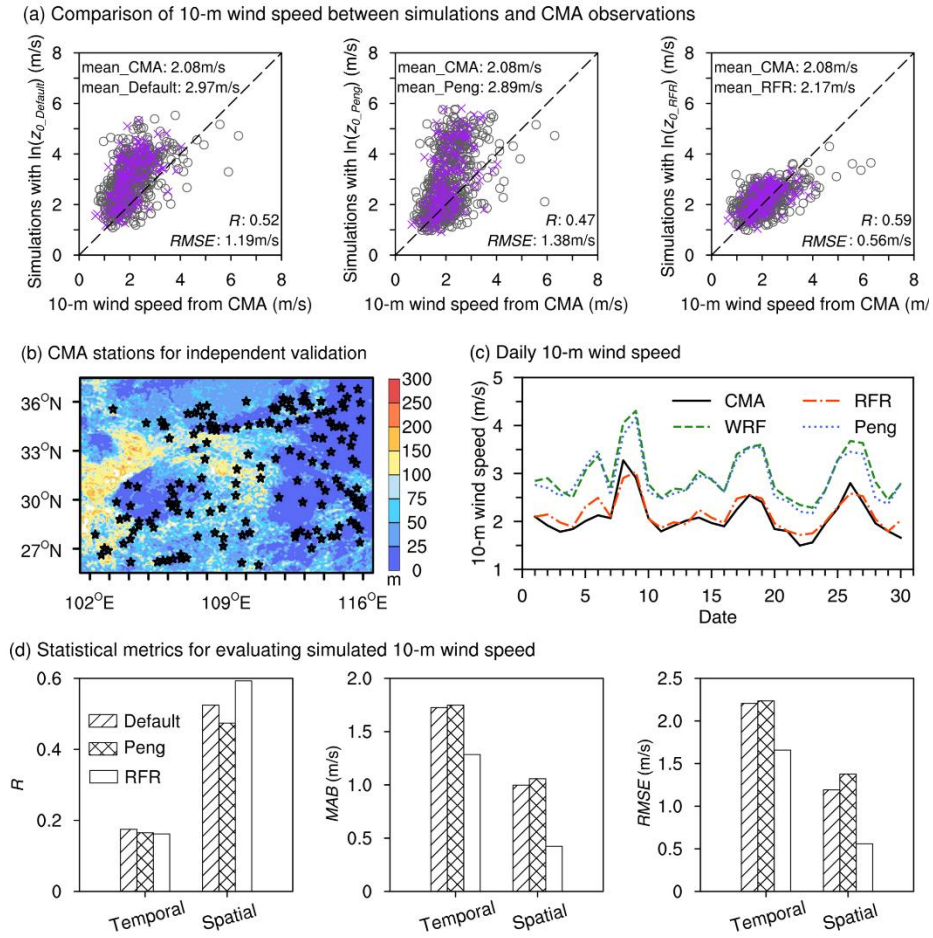


Figure 6 (previous). (a) Comparisons of mean 10-m wind speed in April between the simulations using $z_{0_Default}$, z_{0_Peng} , and z_{0_RFR} versus observations from CMA stations. All points (grey circles and purple crosses) represent the 753 CMA stations within the d02 domain available for comparison, while the purple crosses represent the 155 stations utilized for independent validation, which were not used in training the z_{0_RFR} model. The corresponding wind speed means, R , and $RMSE$ of all stations are also indicated. (b) Distribution of the 155 independent CMA stations (black stars). Colored shaded areas represent TSD . (c) Comparison of daily mean 10-m wind speed between simulations and observations from 753 CMA stations. (d) Statistical metrics comparing simulated and observed 10-m wind speeds, including temporal and spatial R , MAB , and $RMSE$.

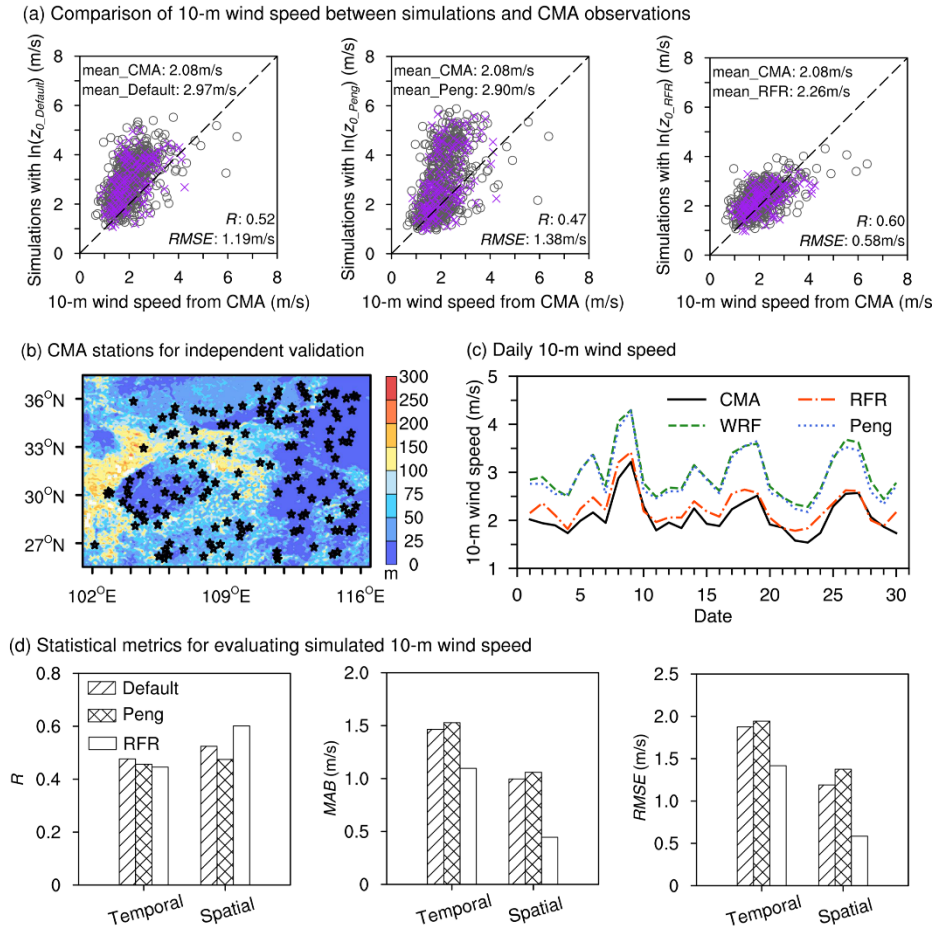


Figure 6 (correction). (a) Comparisons of mean 10-m wind speed in April between the simulations using $z_{0_Default}$, z_{0_Peng} , and z_{0_RFR} versus observations from CMA stations. All points (grey circles and purple crosses) represent the 753 CMA stations within the d02 domain available for comparison, while the purple crosses represent the 148 stations utilized for independent validation, which were not used in training the z_{0_RFR} model. The corresponding wind speed means, R , and $RMSE$ of all stations are also indicated. (b) Distribution of the 148 independent CMA stations (black stars). Colored shaded areas represent TSD . (c) Comparison of daily mean 10-m wind speed between simulations and observations from 753 CMA stations. (d) Statistical metrics comparing simulated and observed 10-m wind speeds, including temporal and spatial R , MAB , and $RMSE$.

5. In Table 1, the mean wind speeds before and after correction differ only slightly. However, since the percentage reduction in wind speed error is sensitive to small changes, the corresponding values show a noticeable decrease. Nevertheless, the improvement in wind speed due to the updated z_0 remains highly significant."

Table 1 (previous). Mean 10-m wind speed at 753 CMA stations and mean 100-m wind speed at 50 anemometer towers from simulations and observations. Simulations were performed using $z_{0_Default}$, z_{0_Peng} , and z_{0_RFR} . Also shown is the percentage reduction in wind speed error (PRE) achieved by z_{0_RFR} relative to $z_{0_Default}$ and z_{0_Peng} .

	$z_{0_Default}$	z_{0_Peng}	z_{0_RFR}	Observations
Mean 10-m wind speed (m/s)	2.97	2.89	2.17	2.08

<i>PRE</i> in 10-m wind speed (%)	89.9%	88.9%	-	-
Mean 100-m wind speed (m/s)	7.10	7.27	6.38	6.26
<i>PRE</i> in 100-m wind speed (%)	85.7%	88.1%	-	-

Table 1 (correction). Mean 10-m wind speed at 753 CMA stations and mean 100-m wind speed at 50 anemometer towers from simulations and observations. Simulations were performed using $z_{0_Default}$, z_{0_Peng} , and z_{0_RFR} . Also shown is the percentage reduction in wind speed error (*PRE*) achieved by z_{0_RFR} relative to $z_{0_Default}$ and z_{0_Peng} .

	$z_{0_Default}$	z_{0_Peng}	z_{0_RFR}	Observations
Mean 10-m wind speed (m/s)	2.97	2.90	2.26	2.08
<i>PRE</i> in 10-m wind speed (%)	79.8%	78.0%	-	-
Mean 100-m wind speed (m/s)	7.09	7.29	6.50	6.26
<i>PRE</i> in 100-m wind speed (%)	71.1%	76.7%	-	-