



Supplement of

Machine-learning-based identification of influencing factors and synoptic patterns of foehn on the eastern foothills of the Taihang Mountains, China

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Supplement

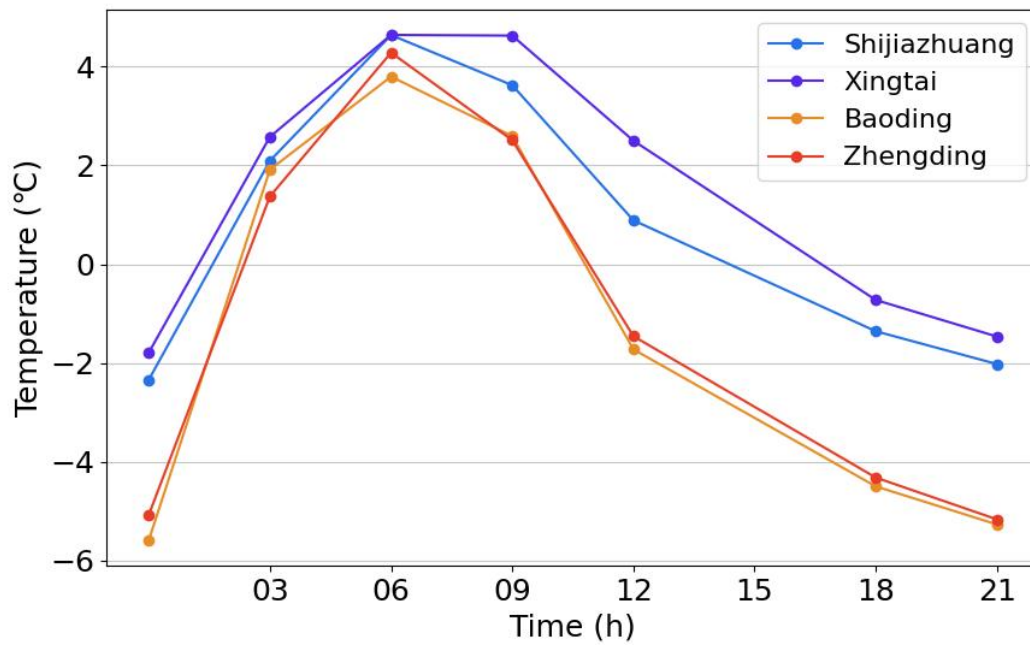


Figure S1: Winter daily-hour average comparison of 2m temperature among the leeward stations.

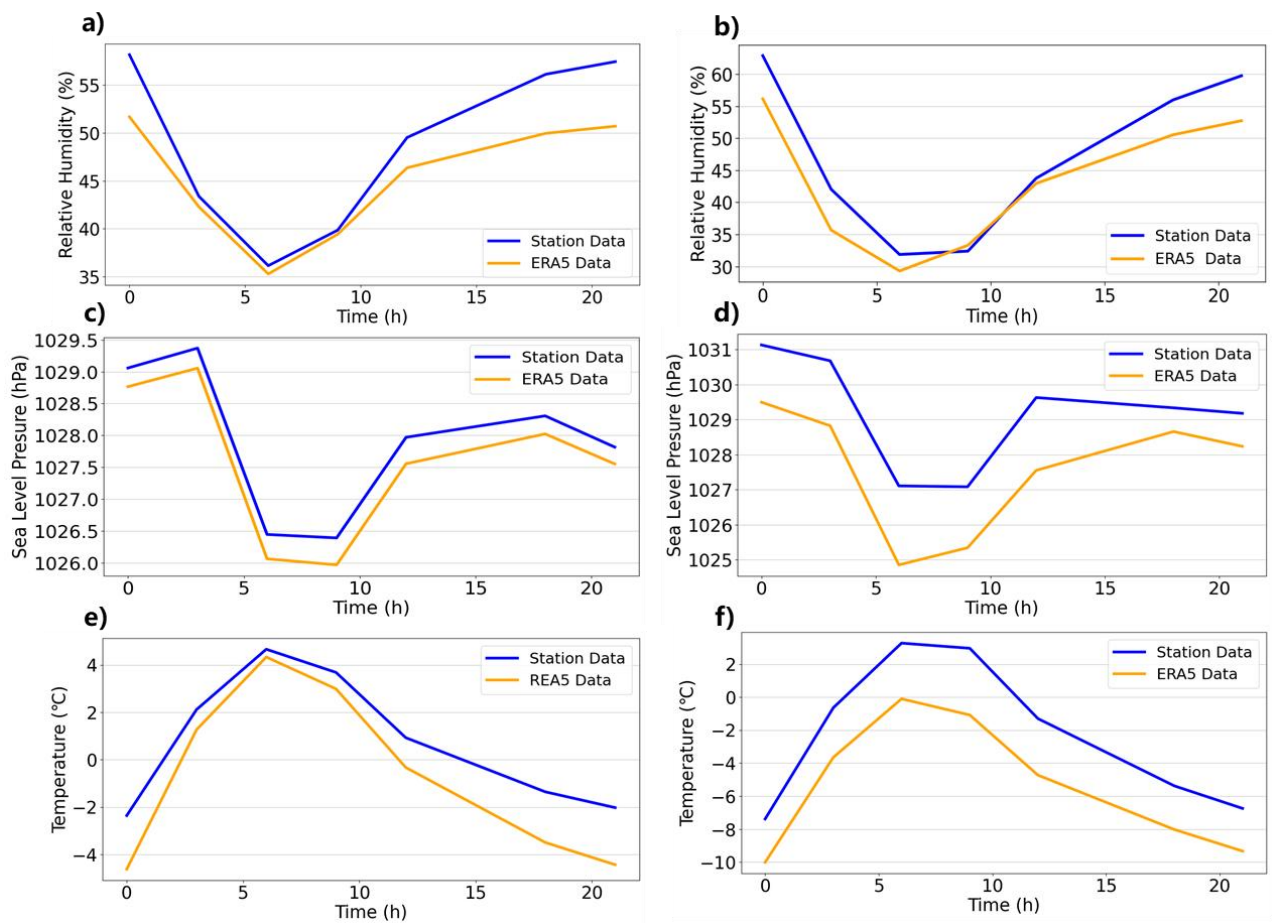


Figure S2: Winter daily-hour average comparison of station data and ERA5 data. (a-b) Ground relative humidity. (c-d) Sea level pressure. (e-f) 2m temperature. The left column shows data for Shijiazhuang, and the right is for Taiyuan.

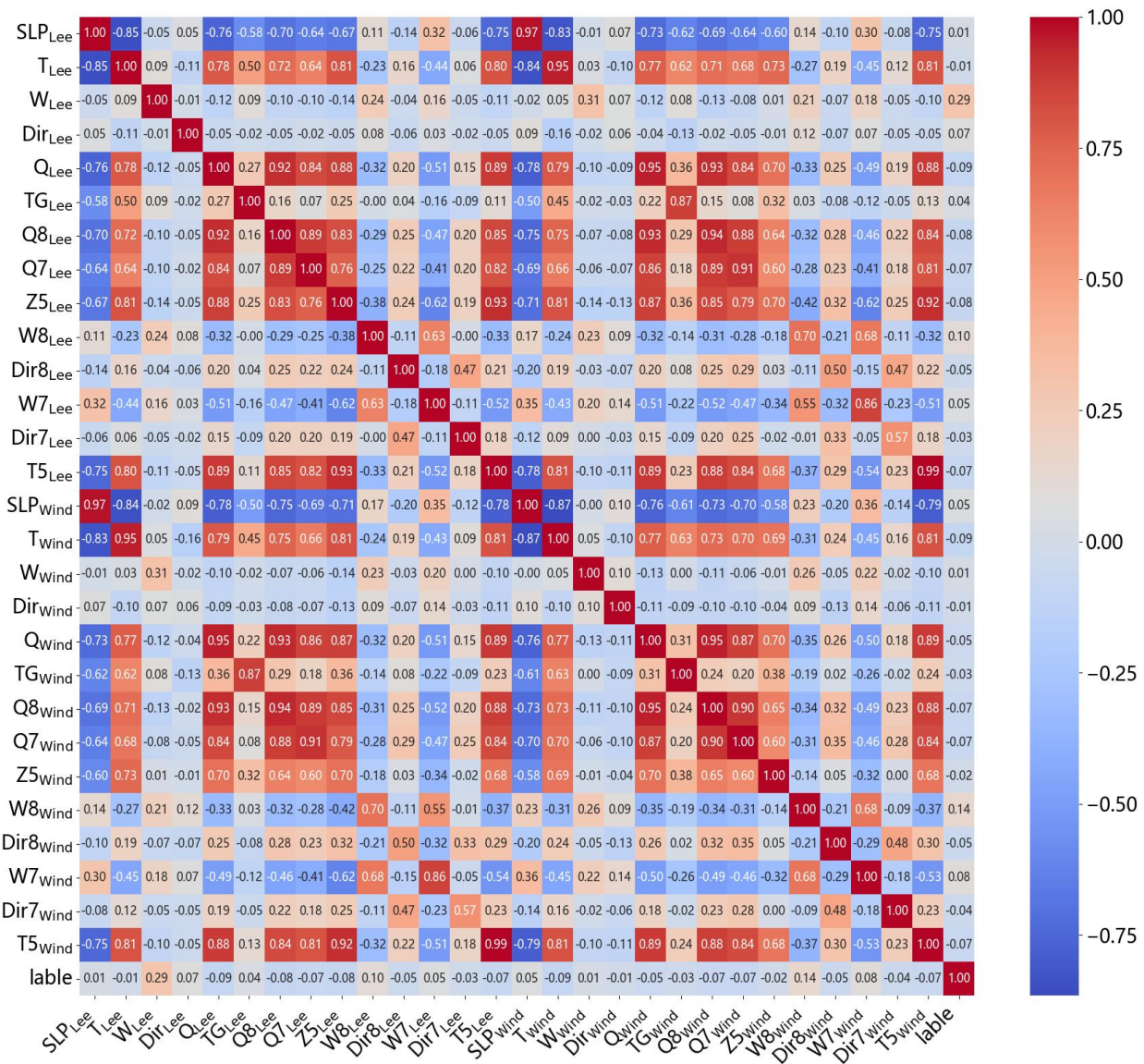


Figure S3: The Pearson correlation coefficient matrix of each factor.

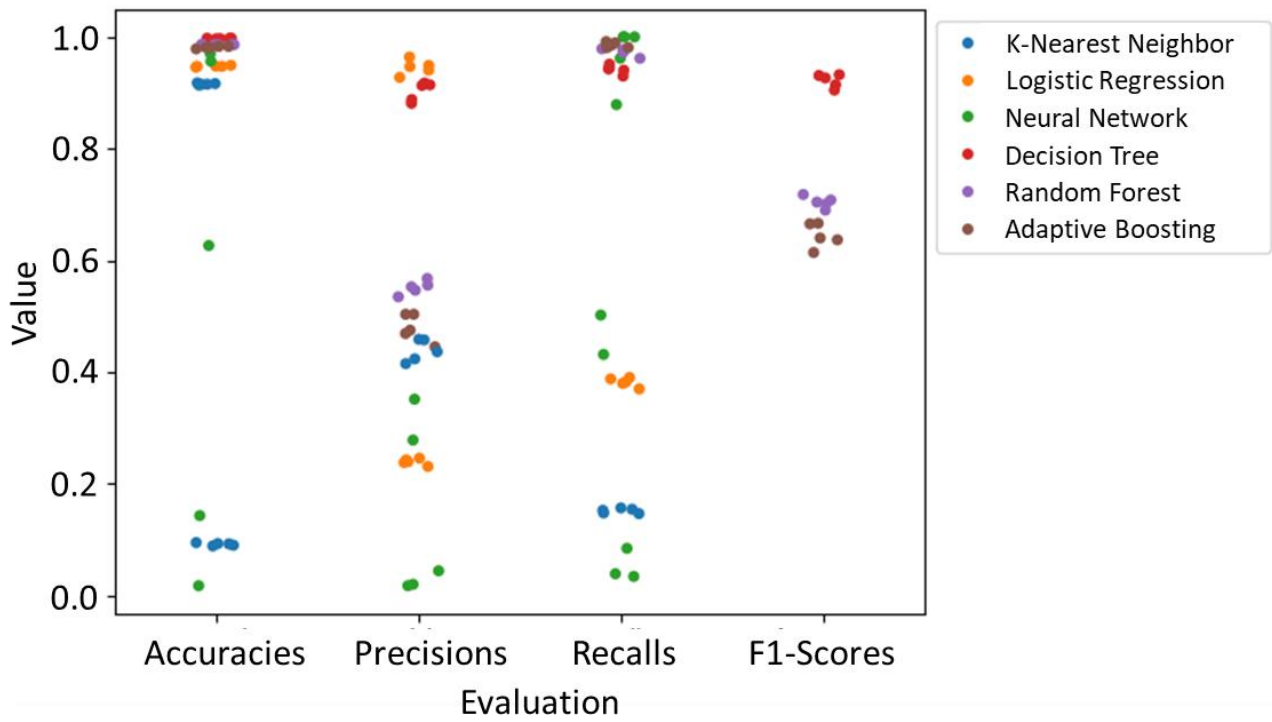


Figure S4: Scatter plots of each model's evaluation indicators. Each dot represents the result of one training session in k-fold cross-validation, and different colors represent different models.

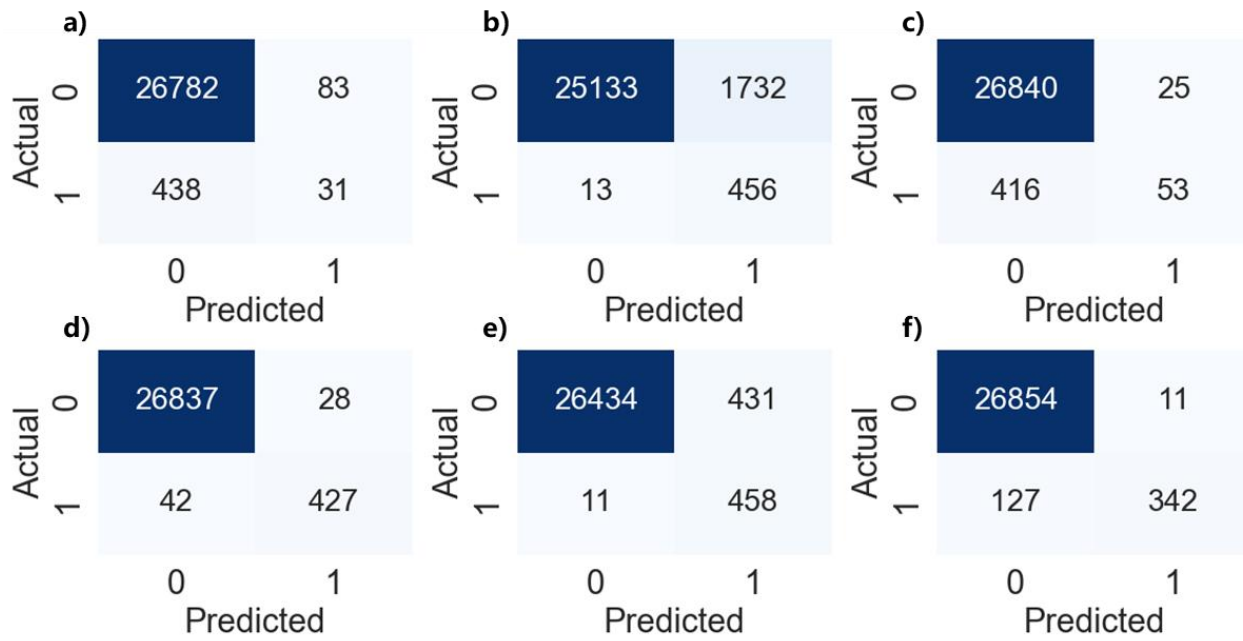


Figure S5: The confusion matrices of each model. (a-f) are K-Nearest Neighbor, Logistic Regression, Neural Network, Decision Tree, Random Forest and Adaptive Boosting respectively.

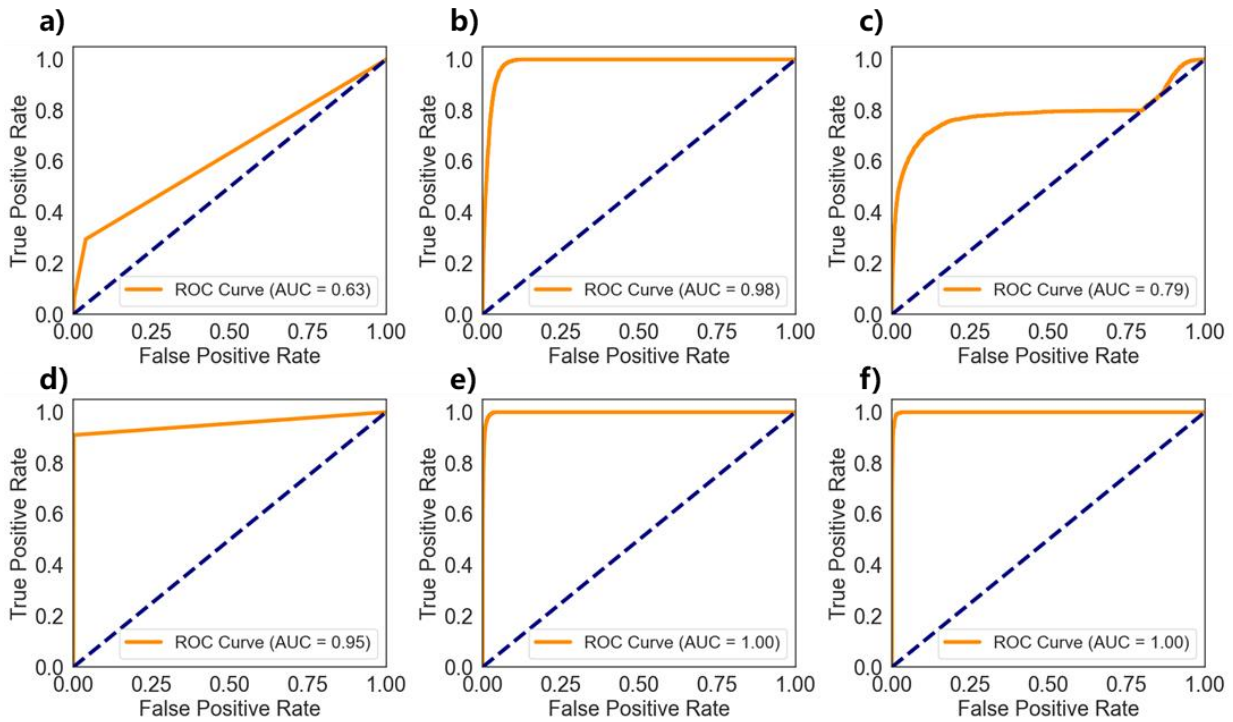


Figure S6: The ROC curves and AUC of each model. (a-f) are K-Nearest Neighbor, Logistic Regression, Neural Network, Decision Tree, Random Forest and Adaptive Boosting respectively.

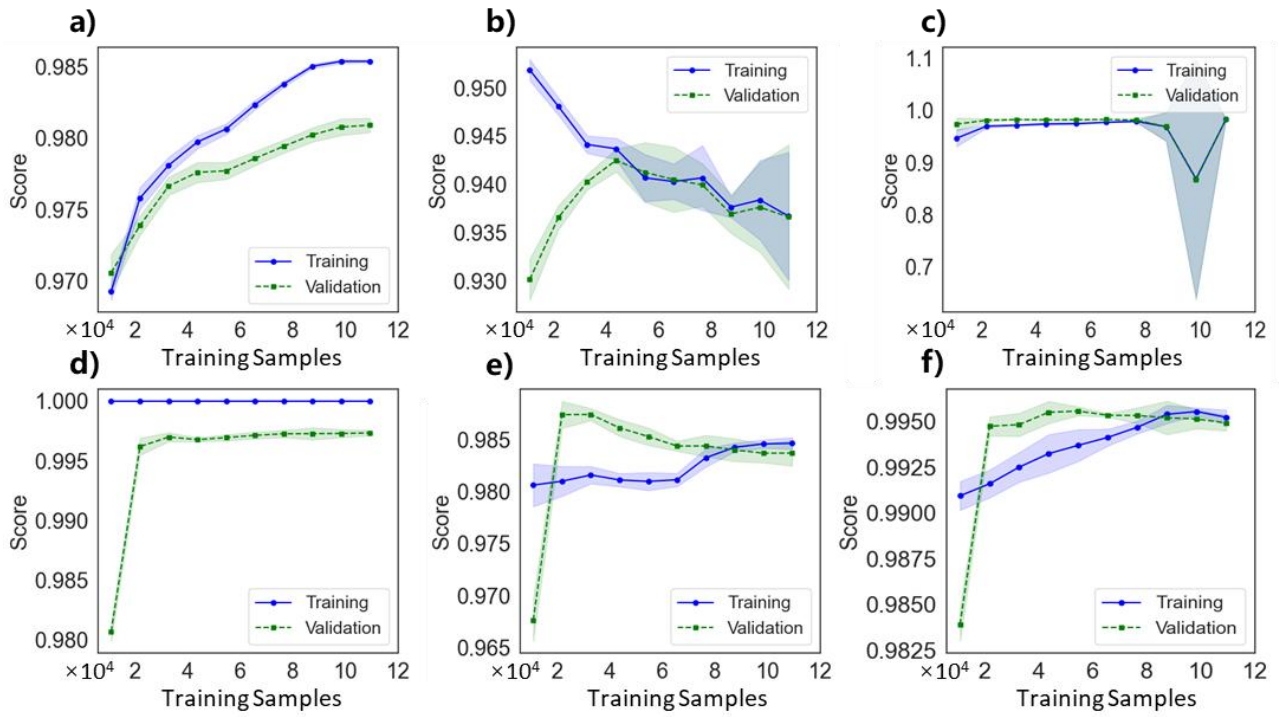


Figure S7: The learning curves of each model. (a-f) are K-Nearest Neighbor, Logistic Regression, Neural Network, Decision Tree, Random Forest and Adaptive Boosting respectively

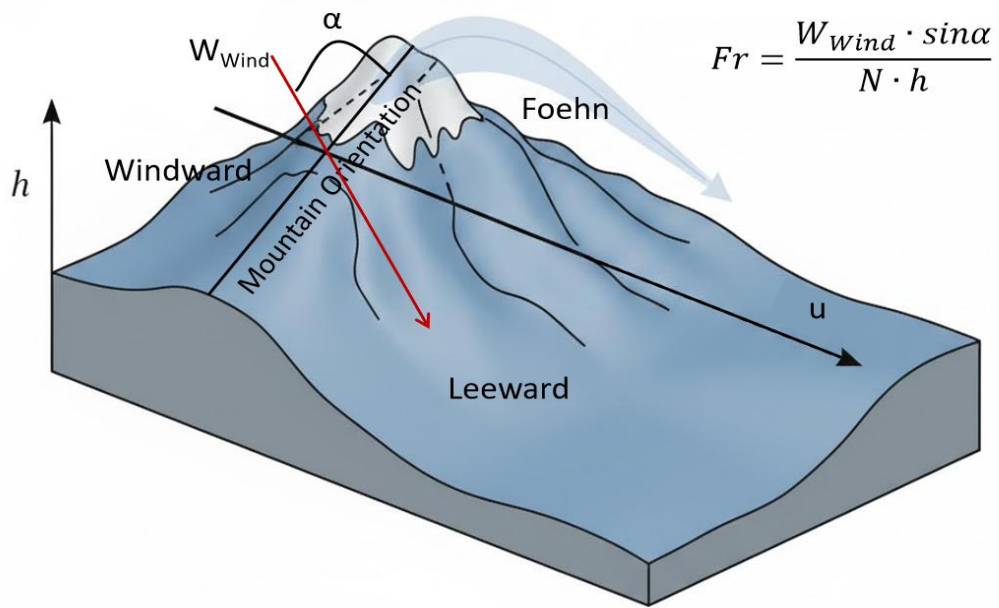


Figure S8: Schematic diagram illustrating the Froude number in relation to wind direction when the influence of small-scale terrain on wind direction is neglected. Fr is the Froude number; u is the velocity of the flow normal to the topographic barrier; N is the Brunt Väisälä frequency; h is the height of the topographic barrier; and α is the angle between W_{Wind} and the mountain orientation.

Table S1: The threshold values and contributions of factors during the occurrence of foehn on the eastern foothills of the Taihang Mountains.

Factors	All year	Winter	Summer	Contribution
W_{Lee}		>3 m/s		Winter>Summer
T_{Wind}	<3°C	<-6°C	<9°C	Winter<Summer
T_{Lee}	\	\	\	Mainly based on the windward station.
Q_{Wind}	>0.1g/kg	>0.07g/kg	>0.75g/kg	(It mainly has an inhibitory effect, and the inhibitory effect is not significant after reaching the threshold.) Winter>Summer
Q_{Lee}	\	\	\	Mainly based on the windward station.
Dir_{Lee}	203° -324° (41%), where 237° -294° contributes most.			\