

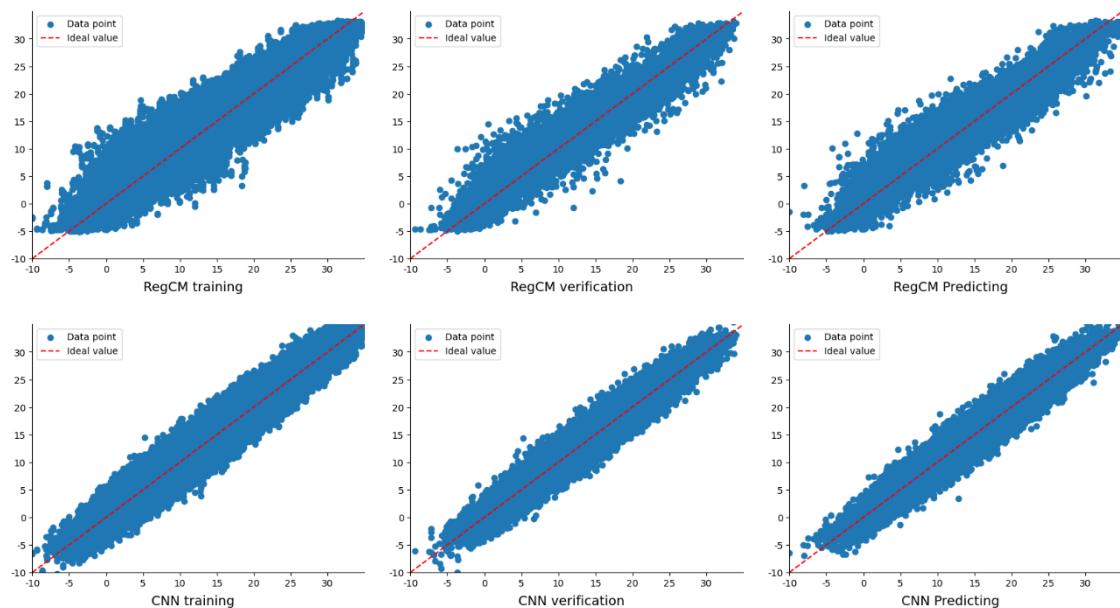
1 Appendix 1: Illustrative Diagrams of Model Prediction Results

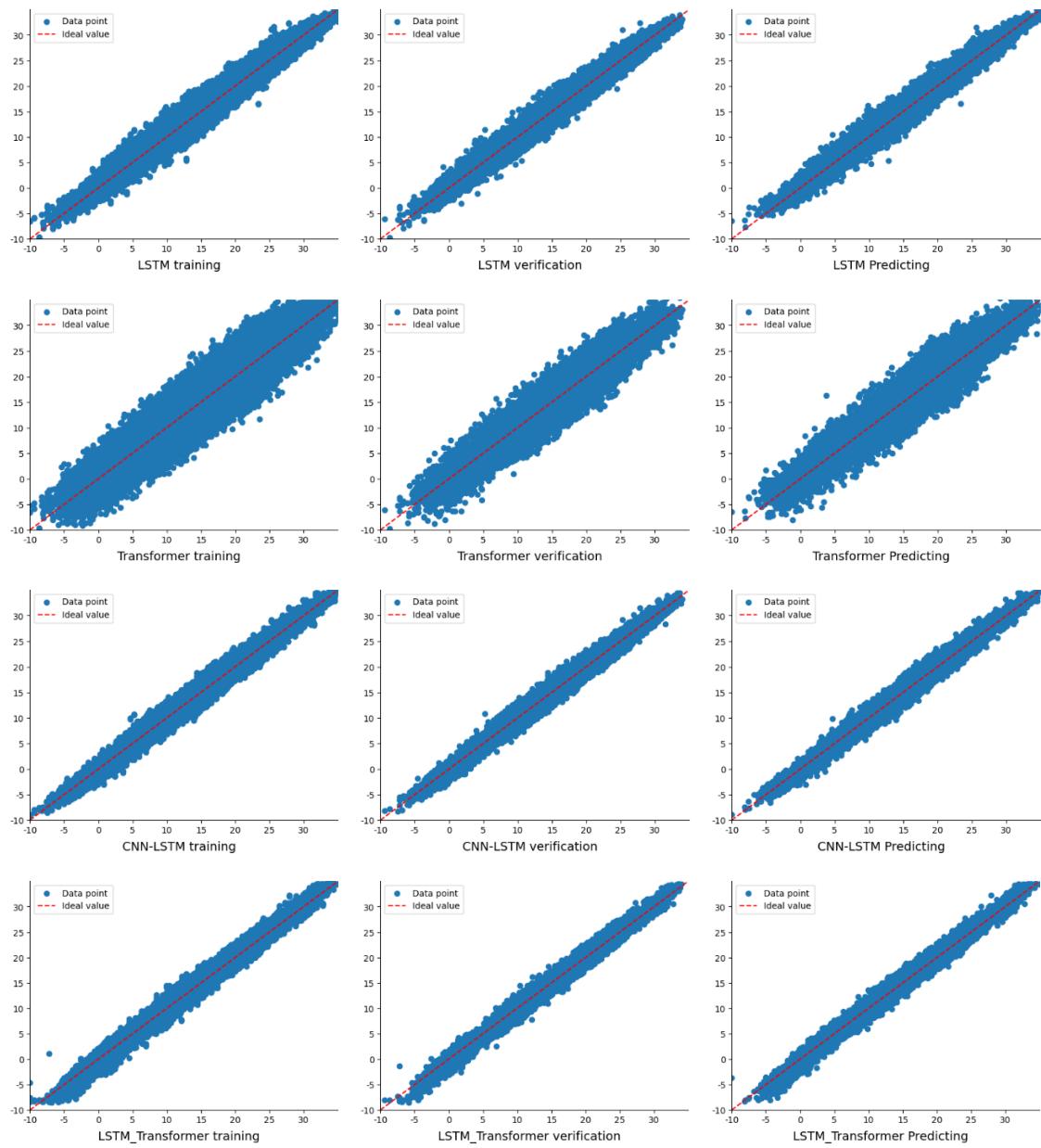
2 This appendix summarizes the performance of six types of models (RegCM, 3 CNN, LSTM, Transformer, CNN-LSTM, LSTM-Transformer) in predicting three 4 meteorological variables—temperature, precipitation, and relative humidity—through 5 illustrative diagrams, including:

6 Scatter Plots: These plots show the relationship between the predicted values and 7 actual values of the models on the training set, validation set, and test set, used to 8 assess the model's fitting degree and linear correlation. The performance on the test 9 set particularly reflects the model's generalization ability (Figures A1, A3, A5).

10 Histogram of Residuals: Reflects the distribution of prediction errors across 11 models, used to analyze performance characteristics such as bias, variability, control 12 of extreme errors, and prediction stability (Figures A2, A4, A6).

13 All charts are based on observational data from 25 national meteorological 14 stations in Yunnan Province from 2004 to 2018 and the test set prediction results of 15 each model. Standardized variable inputs are uniformly adopted, with consistent 16 sample sizes. Evaluation metrics include root mean square error (RMSE), mean 17 absolute error (MAE), and Pearson correlation coefficient (R). Error units are 18 uniformly expressed in the original variable units ($^{\circ}\text{C}$, mm, %).



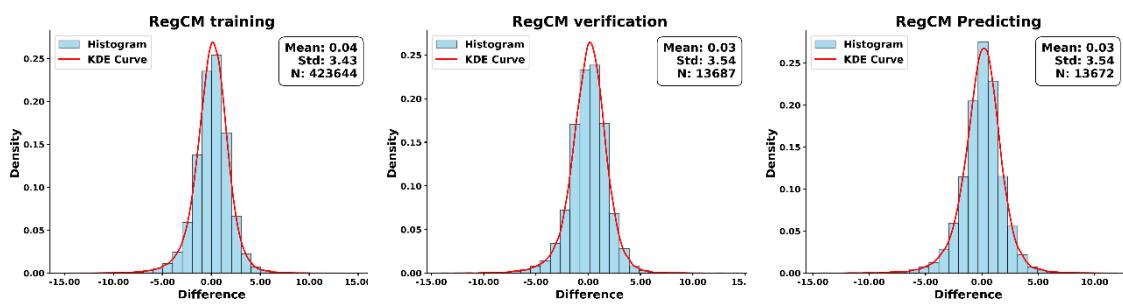


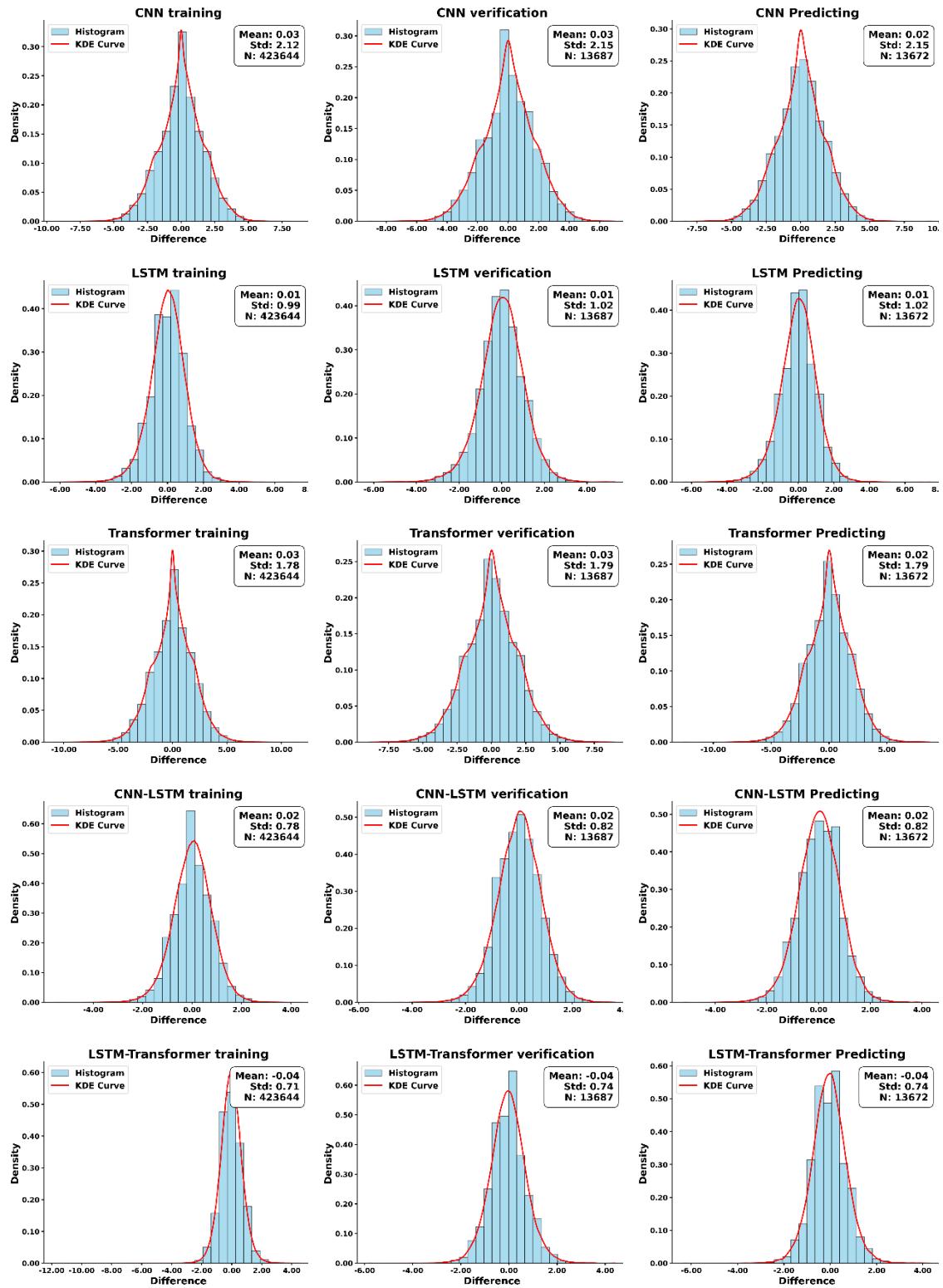
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Figure A1. Scatter plot of temperature predictions (from top to bottom: RegCM, CNN, LSTM, Transformer, CNN-

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LSTM, and LSTM-Transformer models; from left to right: training set, validation set, and test set results).



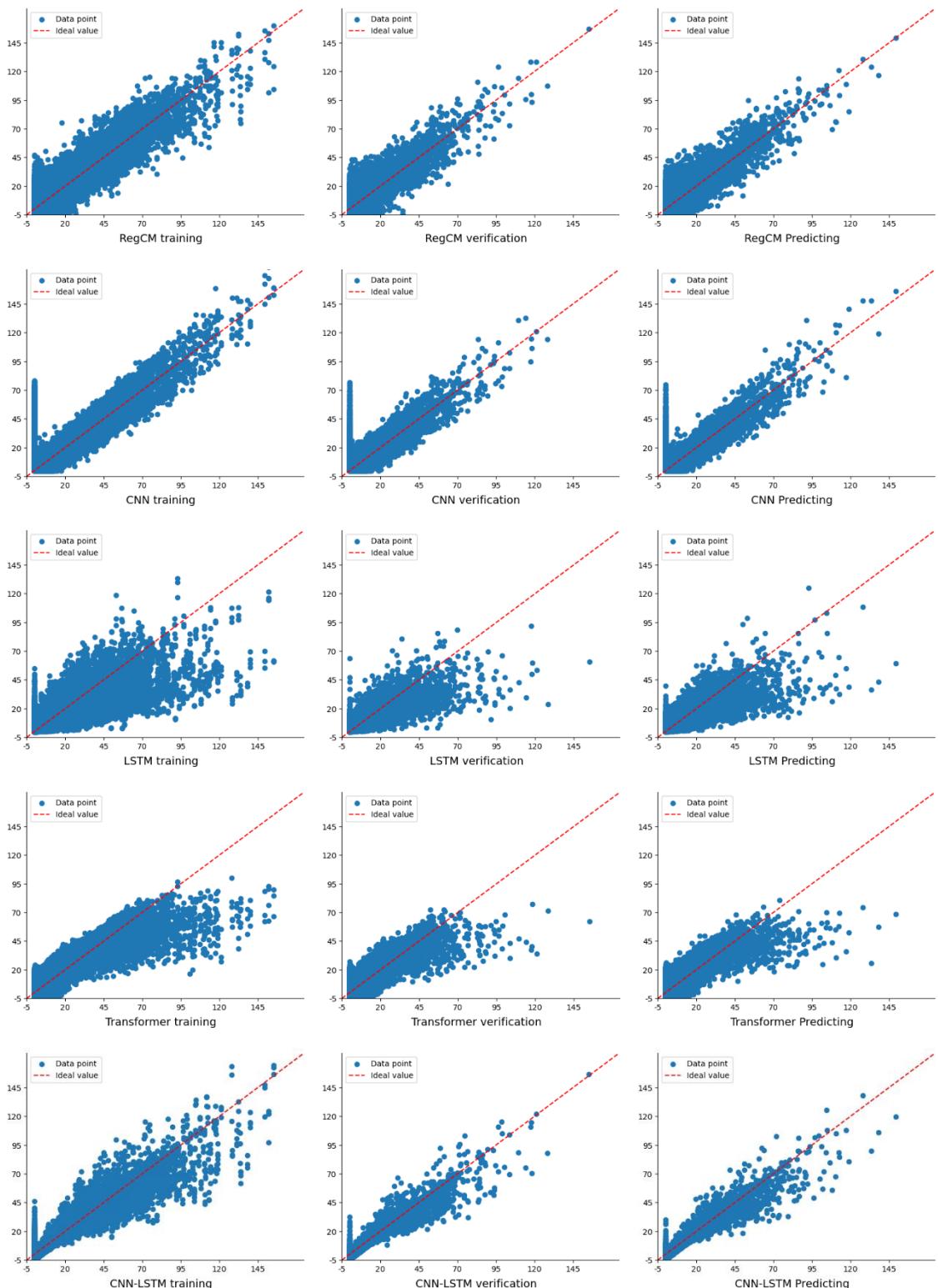


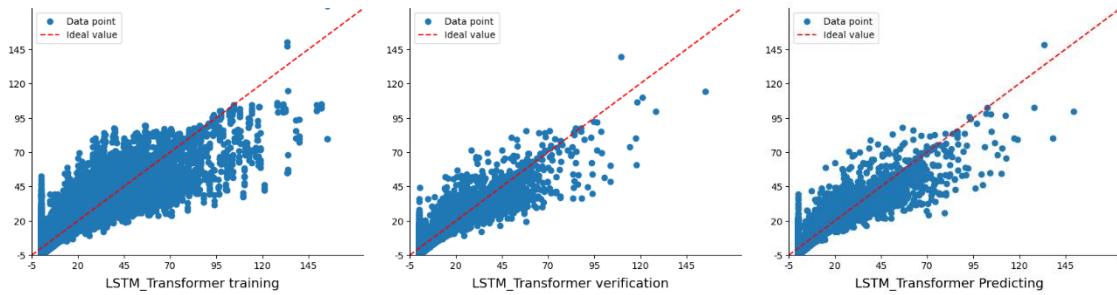
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Figure A2 Histogram of temperature prediction error distribution (Mean is the mean value, Std is the standard

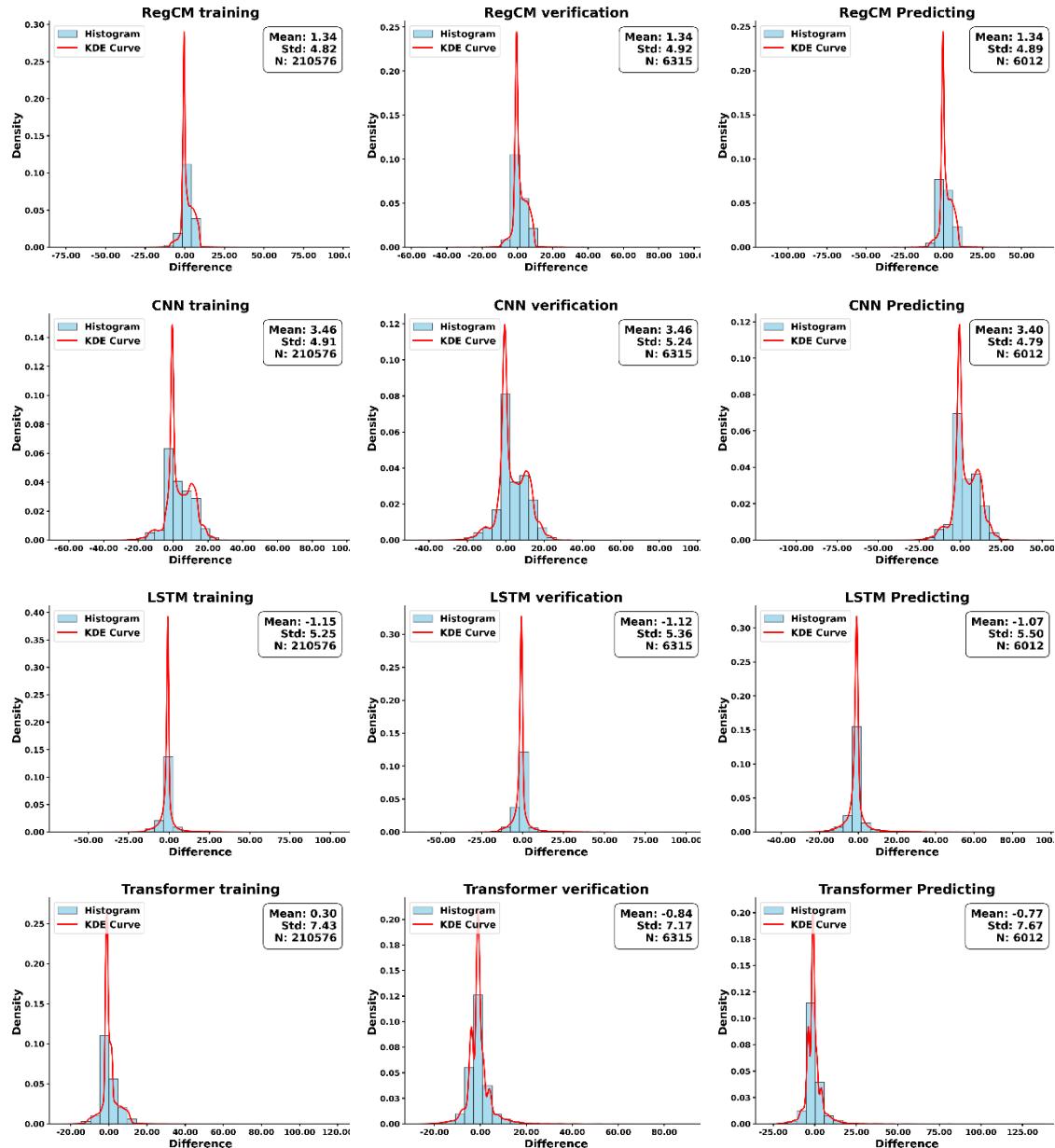
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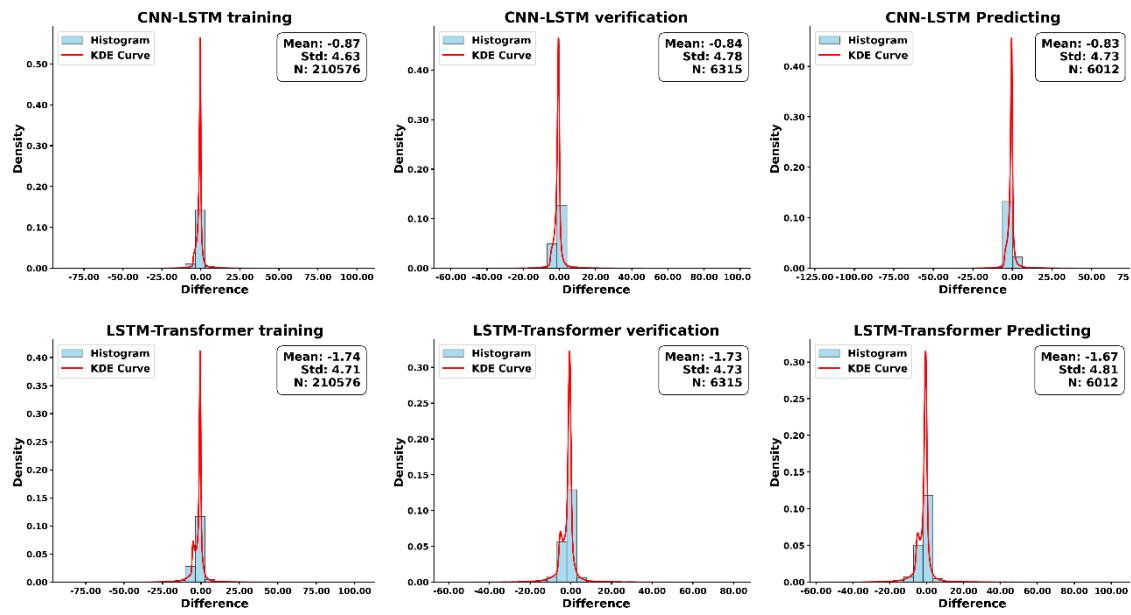
deviation, and N is the sample size).





23 Figure A3. Scatter plot of precipitation forecasts (from top to bottom: RegCM, CNN, LSTM, Transformer, CNN-
24 LSTM, and LSTM-Transformer models; from left to right: training set, validation set, and test set results).

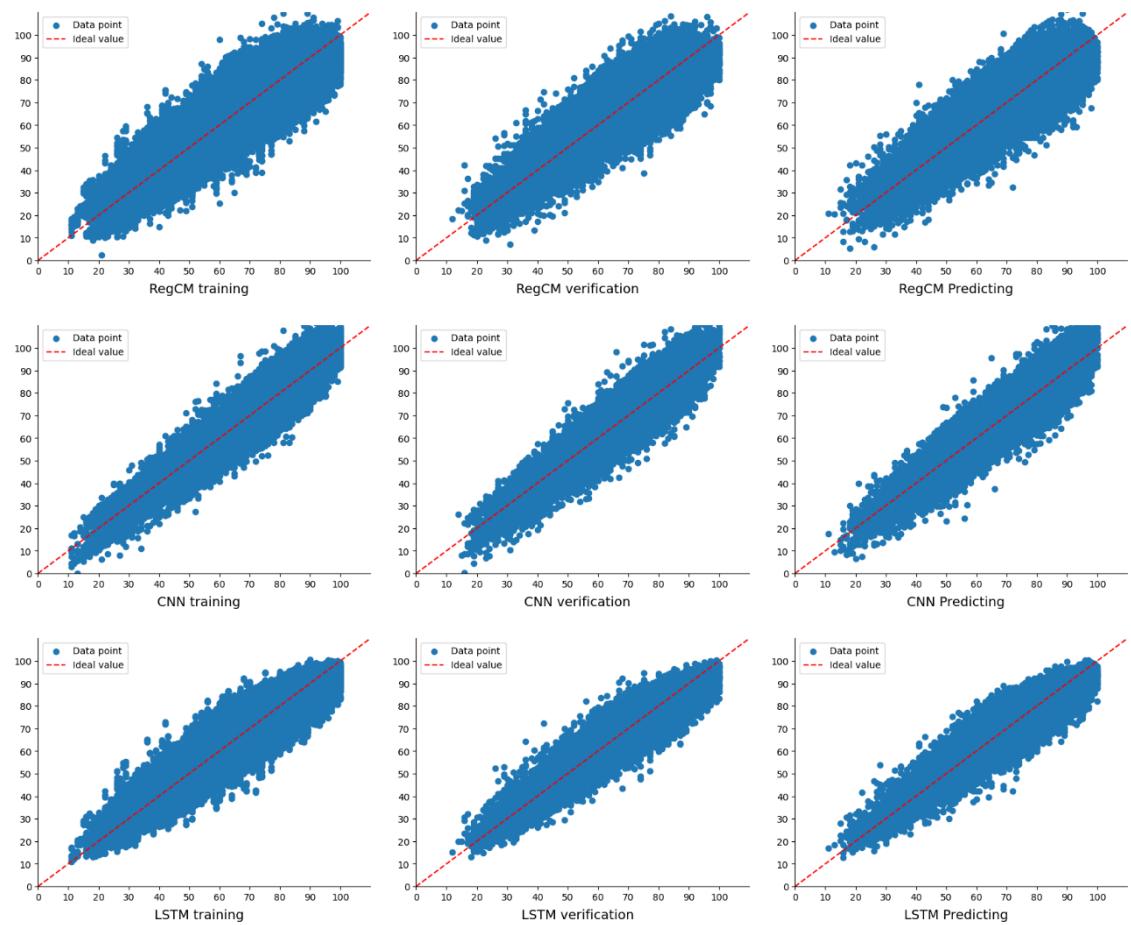


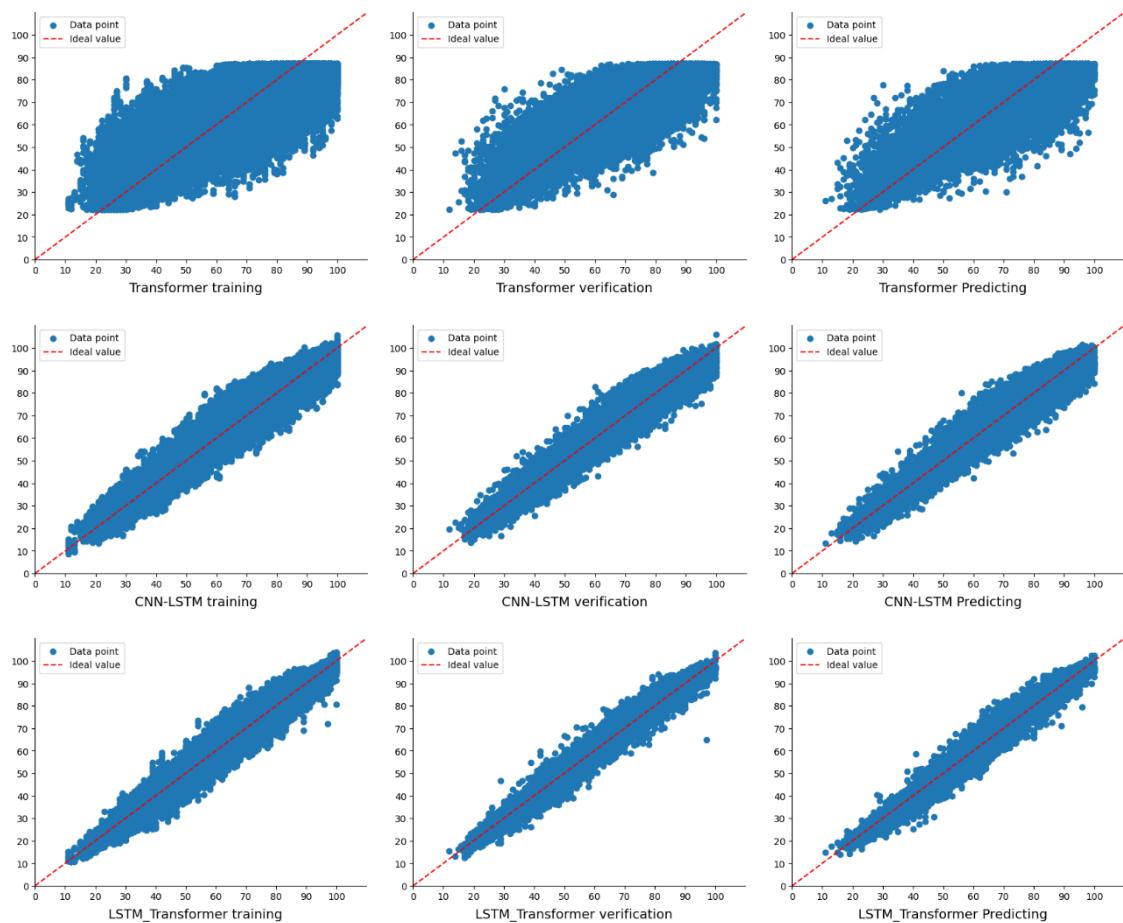


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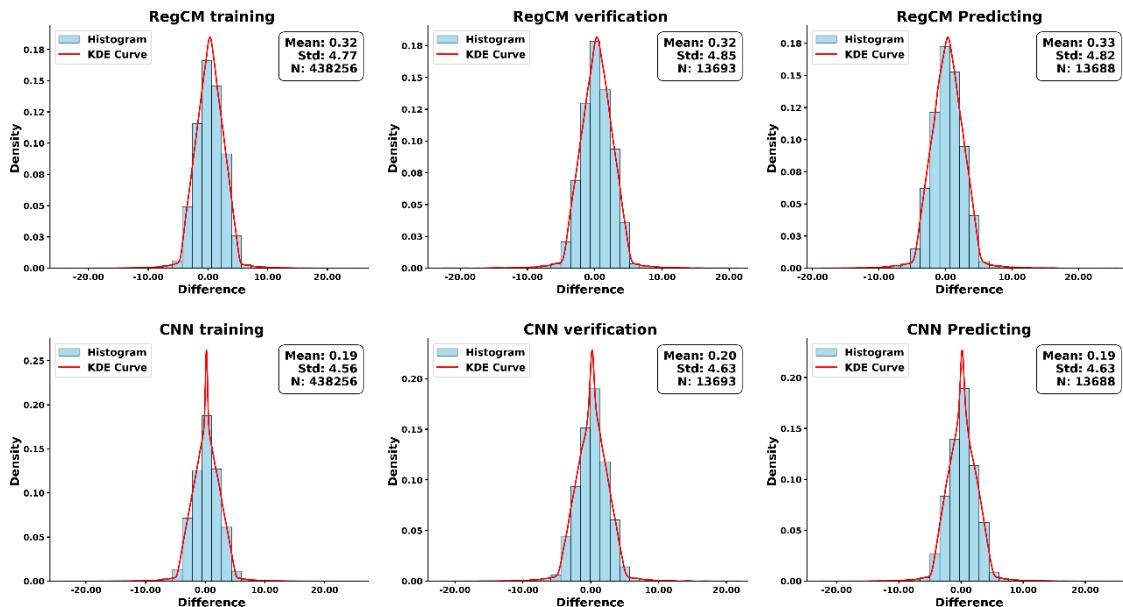
Figure A4 Histogram of precipitation forecast error distribution (Mean is the mean value, Std is the standard deviation, and N is the sample size).

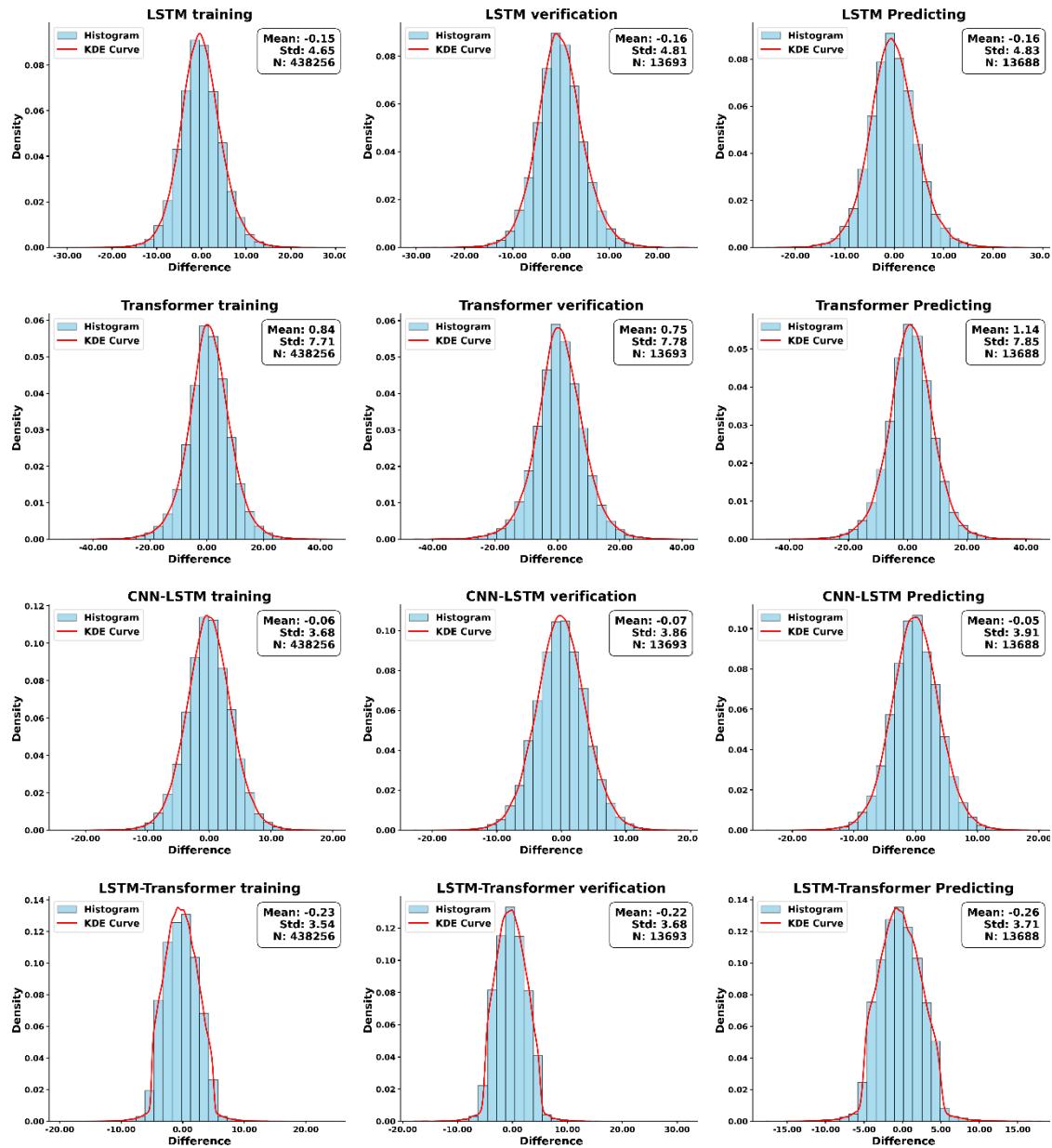
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27 Figure A5. Scatter plot of relative humidity predictions (from top to bottom: RegCM, CNN, LSTM, Transformer,
 28 CNN-LSTM, and LSTM-Transformer models; from left to right: training set, validation set, and test set results).





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Figure A6 Histogram of relative humidity prediction error distribution (Mean is the mean value, Std is the

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standard deviation, and N is the sample size).