Predictability of Moist Convection from Water Vapor fields through Machine Learning technique

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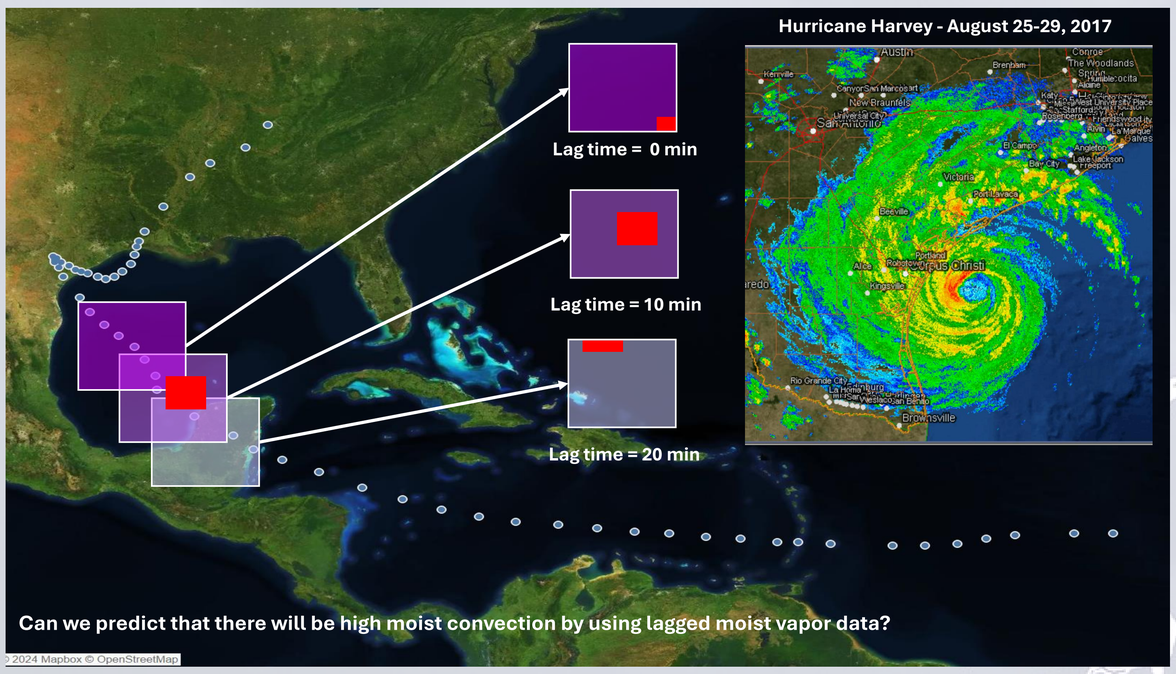
Introduction



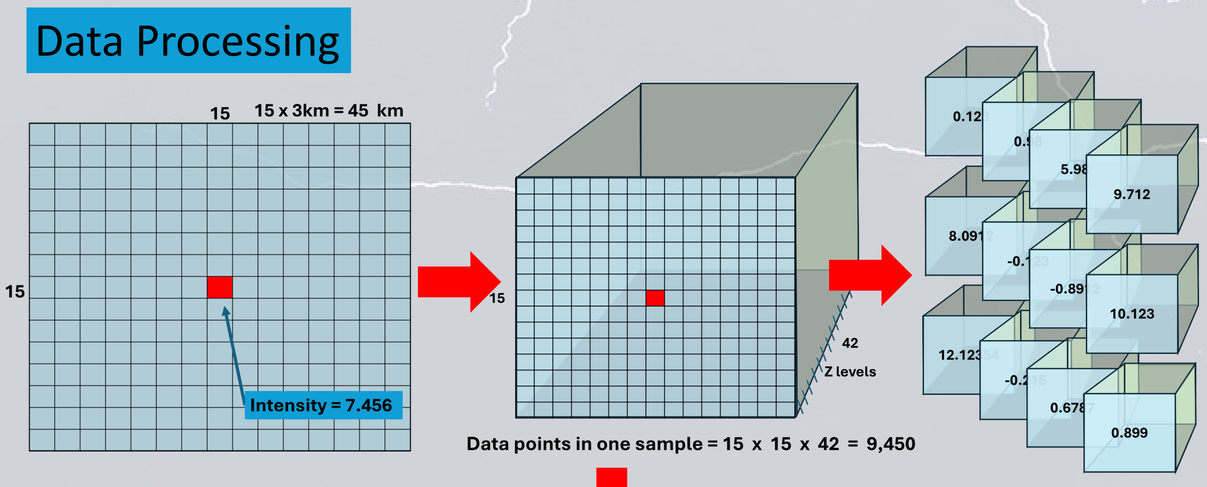
The primary objective is to develop an effective machine-learning pipeline capable of accurately predicting moist convection intensities in cyclone scenarios by capturing sequential dependencies in moisture profiles. This approach aims to enhance prediction accuracy for varying lag intervals, providing valuable insights for improved cyclone intensity forecasting.

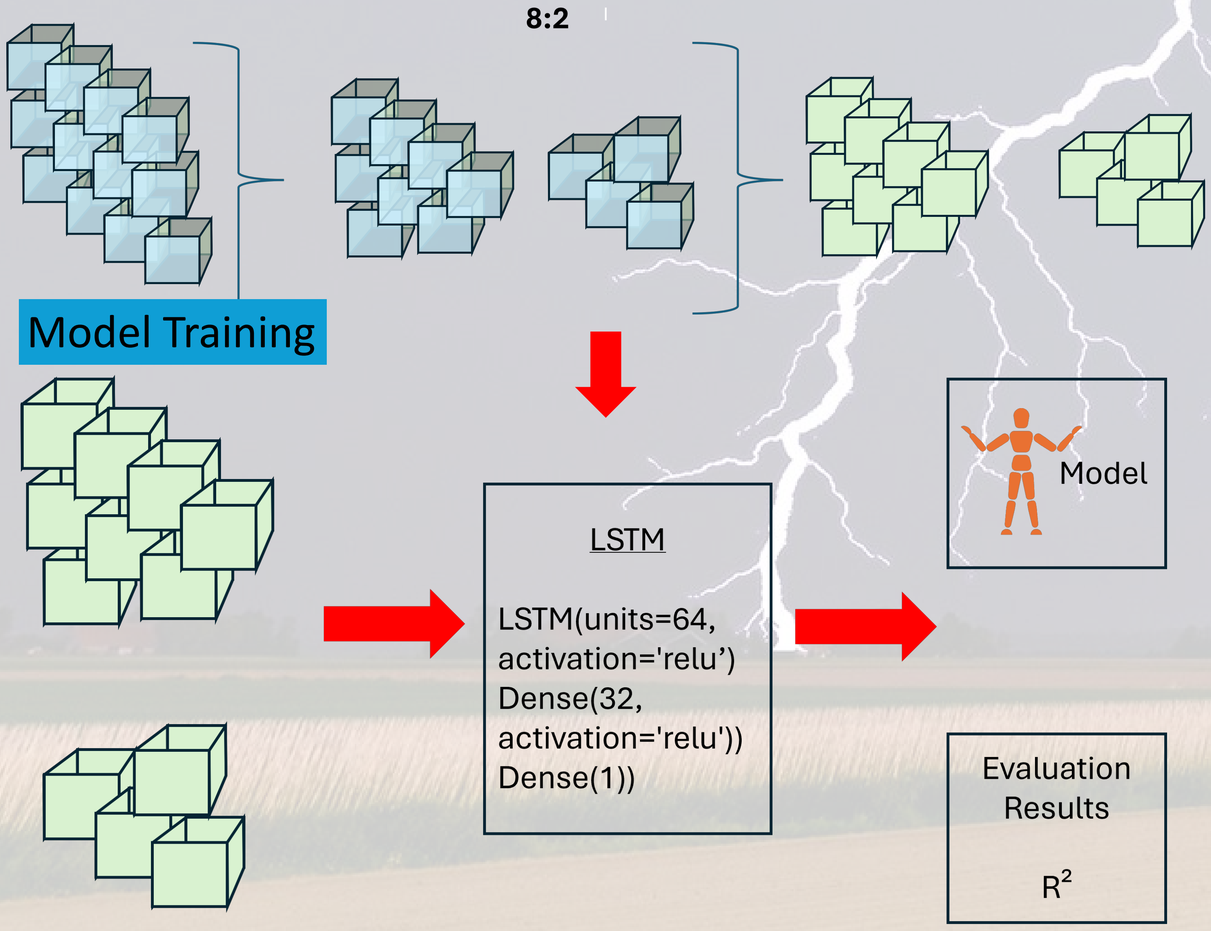
Methodology

Data source

Early stage (before the onset of rapid intensification) of Hurricane Harvey (2017); Ensemble forecast initialized with APSU EnKF analysis by assimilating all-sky satellite infrared radiances from GOES-16

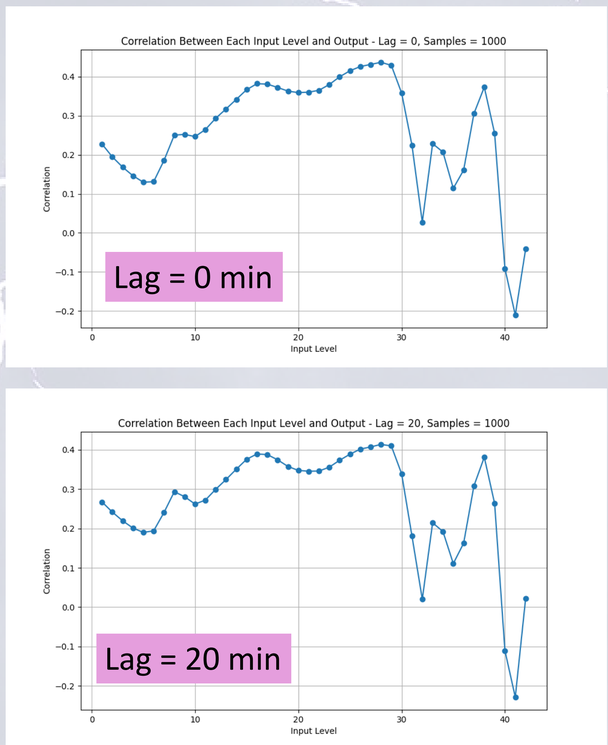
Data Processing



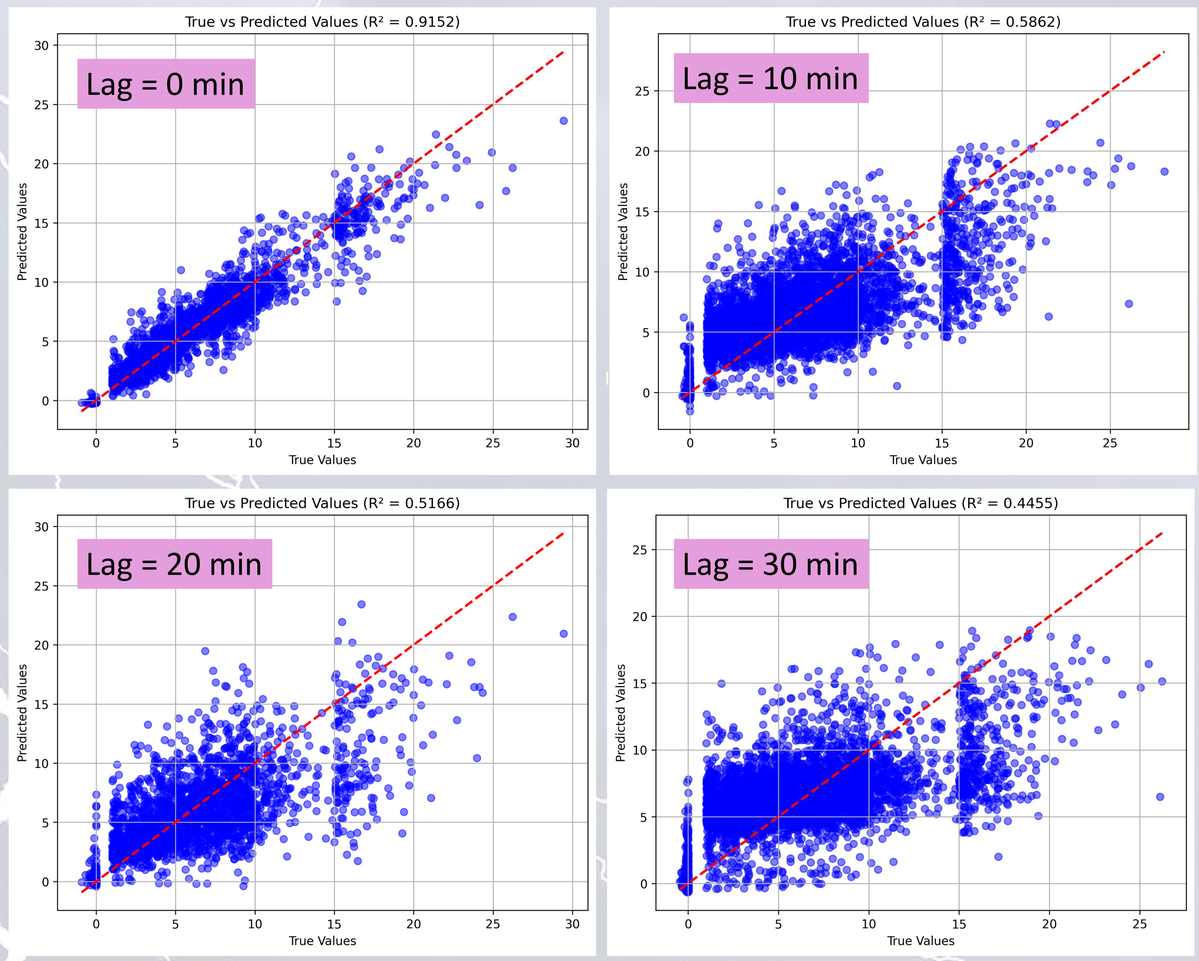


Results

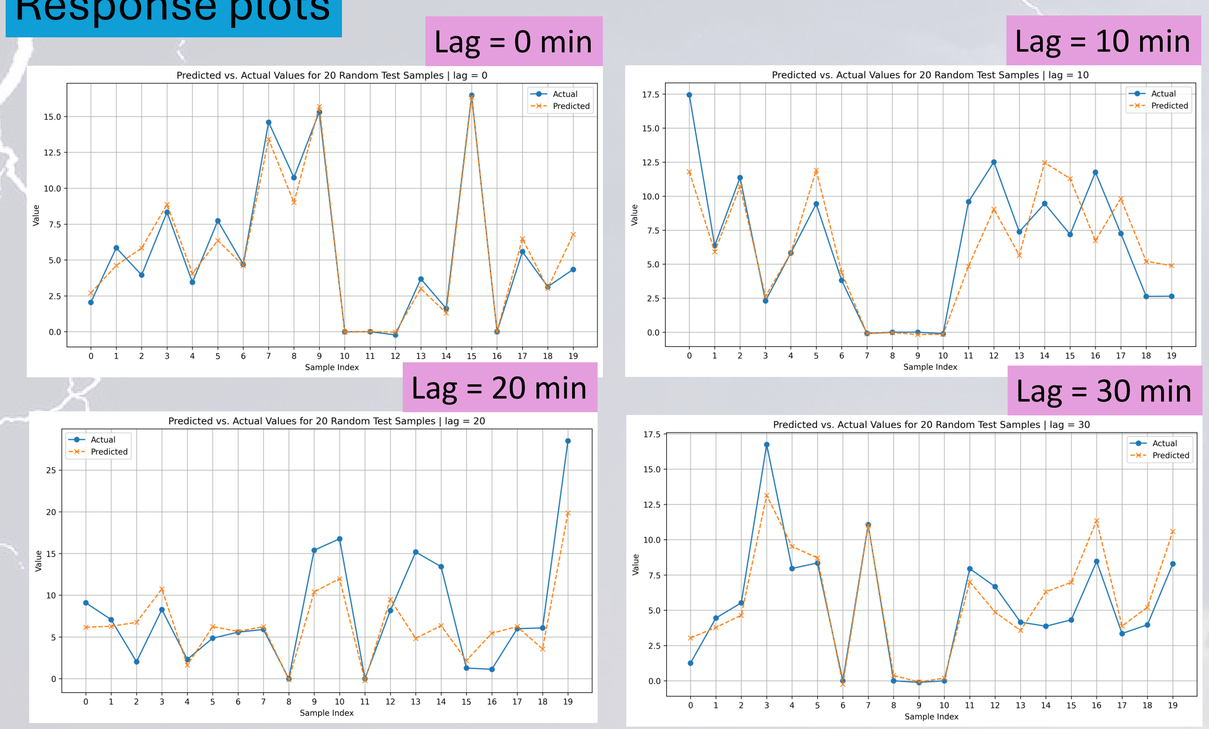
Correlation: Inputs vs Output



Evaluation results: R2



Response plots



Conclusion

- LSTM-based machine learning pipeline successfully captures the temporal dependencies essential for predicting moist convection intensities in cyclone scenarios.
- This approach demonstrates the potential for enhancing cyclone intensity forecasting, aiding in better preparation and response to extreme weather events.

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