ChangJae Lee

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Education

Yonsei University **Korea**
- ***B.S. Atmospheric Science*** *Fall 2014*
Coursework: Atmospheric Dynamics, Atmospheric Physics, Atmospheric Analysis, Statistical Analysis in Meteorology, Calculus

University of Texas at Austin **USA**
- ***M.S. Data Science*** *Expected Fall 2025*
Coursework: Machine Learning, Deep Learning, Reinforcement Learning, Natural Language Processing, Deep Generative Models, Optimization, Data Structures & Algorithms

Research Experience

Center for Analysis and Prediction of Storms (CAPS) **University of Oklahoma**
- ***Visiting Scientist*** *Aug 2022 – Feb 2024*

- Co-authored a peer-reviewed paper on **Spatial Aligned Mean (SAM), an ensemble consensus technique for quantitative precipitation forecasting** (*Weather and Forecasting*).
- Delivered **two oral presentations** at the AMS 28th Conference on Numerical Weather Prediction and the 104th AMS Annual Meeting.
- Participated in the **2023 NOAA Hazardous Weather Testbed** (Week 1, 1–5 May, 2023).
- Contributed ensemble post-processing results (**Spatial Aligned Mean**) for operational evaluation to the **2023 NOAA Flash Flood and Intense Rainfall Experiment**.
- **Highlighted by 2024 FFaIR participants and facilitators** for improved ensemble focus and realism, **with a recommendation that Spatial Aligned Mean methods be transitioned into NWS operational use**. [2024 FFaIR Final Report]

Korea Meteorological Administration (KMA) **Korea**
- ***Data Scientist*** *Mar 2024 – Present*

- Co-authored two preprints:
  1. **Deep-Learning-based Quantitative Precipitation Forecasting** (U-Net, GANs).
  2. **Multimodal Reasoning for Skew-T Log-P Diagrams using Vision-Language Models**.
- Released fully documented code and reproducible inference pipelines on GitHub.

Publications & Preprints

Peer-Reviewed: Lee, C., K. A. Brewster, N. Snook, P. Spencer, and J. Park, 2024: Spatial Aligned Mean: A Method to Improve Consensus Forecasts of Precipitation from Convection-Allowing Model Ensembles. *Wea. Forecasting*, 39, 1545–1558. doi:10.1175/WAF-D-23-0229.1

Preprint: Lee, C., H. Yang, and B. Kim, 2025: Improving Post-Processing for Quantitative Precipitation Forecasting Using Deep Learning. *arXiv*. doi:10.48550/arXiv.2506.03842

Preprint: Lee, C., H. Yang, and J. Choi, 2025: Exploring Multimodal AI Reasoning for Meteorological Forecasting from Skew-T Diagrams. *arXiv*.

Conference Presentations

AMS 2023: Spatial alignment of CAM ensemble members to improve ensemble consensus precipitation. Oral presentation at the 28th Conference on Numerical Weather Prediction, Madison, WI.

AMS 2024: Spatial Aligned Mean Ensemble Consensus Method Applied to CAM Precipitation Forecasts in the 2023 FFaIR Experiment. Oral presentation at the 104th AMS Annual Meeting, Baltimore, MD.

Professional Experience

Korea Meteorological Administration (KMA)
- ***Data Scientist / Software Engineer*** *2016 – Present (concurrent with Weather Forecaster role)*

- Developed post-processing and visualization tools for forecast systems.
- Led AI/ML integration into operational workflows.
- Conducted verification and statistical evaluation of NWP models.
- Performed in-depth statistical analysis using observational datasets and NWP outputs.

Korea Meteorological Administration (KMA)
- ***Weather Forecaster*** *2016 – Present*

- Analyzed and interpreted NWP output, radar, and satellite imagery to support high-impact weather forecasting and risk communication.
- Delivered weather briefings to the public and media, including live broadcasts and interviews for upcoming weather events.

Republic of Korea Air Force
- ***Weather Observer*** *2011 – 2013*

- Collected, coded, and quality-controlled METAR and synoptic surface observations.

Technical Skills

Languages: Python, C, JavaScript, R, PHP, Bash

Tools: Git, Docker, Linux, VSCode, Google Colab

Frameworks: PyTorch, Scikit-learn, D3.js, Leaflet (GIS), LaTeX

Selected Projects

Deep-Learning QPF: Developed a U-Net and GAN-based post-processing model trained on high-resolution precipitation observations to improve NWP Quantitative Precipitation Forecasting (QPF) performance. (https://github.com/hunter3789/Deep-Learning-QPF)

Vision–Language Skew-T: Fine-tuned a lightweight Vision–Language Model (VLM) for atmospheric sounding diagnosis and precipitation classification using synthetic prompting and curriculum learning. (https://github.com/hunter3789/VLM-Skew-T)

SLR Observational Study: Conducted a statistical analysis of the relationship between surface observations and Snow-to-Liquid Ratio (SLR). (https://github.com/hunter3789/SLR-study)

Lightning Forecasting and Climatological Analysis: Developed a post-processing model for lightning prediction based on NWP and observed lightning data. Performed statistical analysis on lightning event characteristics and forecasting potential.