Dasol Kim

Current Affiliation

Assistant Professor

Department of Environmental Engineering, Seoul National University of Science and Technology

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Education

2020	**Ph.D.**, School of Earth and Environmental Sciences, Seoul National University
2012	**B.S.**, School of Earth and Environmental Sciences, Seoul National University

Professional Appointments

2024 FA – 2024 FA   **Assistant Professor**
Department of Environmental Engineering, Seoul National University of Science and Technology

2021 FA – 2024 FA   **Research Scholar**
Department of Geography, University of Florida
Supervisor: Corene J. Matyas
Projects: Development of an Explainable Artificial Intelligence Model for Tropical Cyclone Rainfall Prediction

2020 SP – 2021 FA   **Postdoctoral Fellow**
Research Institute for Basic Sciences, Seoul National University *Supervisor*: Chang-Hoi Ho
Projects: Development of Prediction System for Tropical Cyclone Rainfall using Artificial Intelligence

Research Interests

Greenhouse gas monitoring

Climate Prediction

Climate Change Risk Assessment (Extreme Weather and Climate)

Remote Sensing

Numerical Modelling

Artificial Intelligence

Research in progress

1. Park, D-S R*, **D Kim***, H-Y Ko, C C Nam, and T-W Park. An ensemble machine learning-based provincial tropical cyclone risk model over South Korea. Weather and Climate Extremes to be submitted.
2. Park, D-S R*, **D Kim**, D-H Cha, M Chang, J Heo, and Y-H Byun. Comparison of climatological characteristics of tropical cyclone activity over East Asia between summer and autumn. Asia-Pacific Journal of Atmospheric Sciences to be submitted.
3. Estimation of tropical cyclone winds from geostationary satellite data using GAN
4. Correction of tropical cyclone precipitation in reanalysis using GAN
5. Objective detection of tropical cyclone using random forests
6. Development of a risk model for tropical cyclones using random forests

Publications

The asterisks mean "contributed as a corresponding author".

1. J. Ju, D.-S. R. Park, **D. Kim**, M. Chang, C.-K. Park, J.-S. Kug, and D. Youn, 2025: Mechanism of seasonal differences in interdecadal changes in tropical cyclone genesis frequency over the western North Pacific, Journal of Climate, 38(15), 3787–3800.
2. C. J. Matyas, **D. Kim***, S. E. Zick, and K. M. Wood, 2025: Four patterns of moisture surrounding Atlantic hurricanes from deep learning, Atmospheric Research, 322, 108114.
3. Oh, H.-R., D.-S. R. Park, **D. Kim***, C.-H. Ho, and S. Lee, 2024: Factors of synoptic circulation associated with high-PM2.5 concentration during wintertime in Seoul, South Korea, Atmospheric Environment, 325, 120444.
4. Park, D.-S. R., E. Seo, M. Lee, D,-H. Cha, **D. Kim**, C.-H. Ho, M.-I. Lee, H.-S. Kim, and S.-K. Min, 2024: Sea surface temperature warming to inhibit mitigation of tropical cyclone destructiveness over East Asia in El Nino. npj Climate and Atmospheric Science, **7**, 24.
5. **Kim, D.**, and C. J. Matyas, 2024: Classification of tropical cyclone rain patterns using convolutional autoencoder, Scientific Reports, 14, 791, https://doi.org/10.1038/s41598-023-50994-5.
6. Moon, M., Ha, K. J., **Kim, D.**, Ho, C. H., et al., 2023: Rainfall strength and area from landfalling tropical cyclones over the North Indian and western North Pacific oceans under increased CO_2 conditions. Weather and Climate Extremes, 100581.
7. **Kim, D.**, D.-S. R. Park, M. Chang, D.-H. Cha, and M. Lee, 2023: Reanalyzing the Relationship of Tropical Cyclone Frequency and Intensity Affecting South Korea with the Pacific Decadal Oscillation, Journal of Climate, 36(9), 2847–2855.
8. **Kim, D.**, D.-S. R. Park, and C. J. Matyas, 2023: Spatial Variations in Tropical Cyclone Rainfall over the Western North Pacific According to ENSO Phase, Journal of Climate, 36(6), 1697–1710.
9. **Kim, D.**, D.-S. R. Park, C. C. Nam, and M. M. Bell, 2022: The parametric hurricane rainfall model with moisture and its application to climate change projections, npj Climate and Atmospheric Science, 5, 86.
10. **Kim, D.**, C.-H. Ho, I. Park, J. Kim, L. S. Chang, and M. H. Choi, 2022: Untangling the contribution of input parameters to an artificial intelligence PM$_{2.5}$ forecast model using the layer-wise relevance propagation method. Atmospheric Environment, 276, 119034.

11. Chang, M., D.-S. R. Park, **D. Kim**, and T.-W. Park, 2022: A possible relation of Pacific Decadal Oscillation with weakened tropical cyclone activity over South Korea. Journal of Korean Earth Science Society, 43, 23-29.

12. Cheung, H. M., C.-H. Ho, M. Chang, **D. Kim**, J. Kim, W. Choi, 2021: Development of a Track-Pattern-Based Medium-Range Tropical Cyclone Forecasting System for the Western North Pacific. Weather and Forecasting, 36, 1505-1518.

13. **Kim, D**., C.-H. Ho, H. Murakami, and D.-S. R. Park, 2021: Assessing the influence of large-scale environmental conditions on rainfall structure of Atlantic tropical cyclones: An observational study, Journal of Climate, 34, 2093-2106.

14. D.-S. R. Park, C.-H. Ho, **D. Kim**, N.-Y. Kang, Y. Han, and H.-R. Oh, 2019: Tropical cyclone as a possible remote controller of air quality over the Republic of Korea through poleward propagating Rossby waves, Journal of Applied Meteorology and Climatology, 58(11), 2523–2530.

15. **Kim, D.**, C.-H. Ho, D.-S. R. Park, and J. Kim, 2019: Influence of vertical wind shear on wind- and rainfall areas of tropical cyclones making landfall over South Korea, PLOS One, 14, 1, https://doi.org/10.1371/journal.pone.0209885

16. **Kim, D.**, C.-H. Ho, D.-S. R. Park, J. C. L. Chan, and Y. Jung, 2018: The relationship between tropical cyclone rainfall area and environmental conditions over the subtropical oceans, Journal of Climate, 31, 4605–4616.

17. **Kim, D.**, C.-S. Jin, C.-H. Ho, J. Kim, and J.-H. Kim, 2015: Climatological features of WRF-simulated tropical cyclones over the western North Pacific, Climate Dynamics, 44(11-12), 3223–3235.

18. Jin, C.-S., C.-H. Ho, D.-S. R. Park, W. Choi, **D. Kim**, J.-H. Lee, K.-H. Chang, and K.-R. Kang, 2014: Development of the automated prediction system for seasonal tropical cyclone activity over the western North Pacific and its evaluation for early predictability, Atmosphere, 24, 123–130 (written in Korean with English abstract).

Patents

1. **Kim, D.**, D.-S. R. Park, and C. C. Nam, System and method for predicting typhoon precipitation distribution using the parametric hurricane rainfall model with moisture, Korean Patent P-2023-012-01-KR, filed March 31, 2023.

Presentations Delivered

1. Kim, D., C. J. Matyas, 2025, Pattern classification of tropical cyclone rainfall using convolutional autoencoder, Korean Meteorological Society Conference, Seoul, South Korea.

2. **Kim, D.**, D.-S. R. Park, C. C. Nam, and M. Bell, 2023, Development of a parametric model for tropical cyclone rainfall over the western North Pacific and application to future climate projections, American Geophysical Union Fall Meeting, San Francisco, California, USA.

3. **Kim, D.**, D.-S. R. Park, and C. J. Matyas, 2023, Influence of El Niño–Southern Oscillation on rainfall characteristics of tropical cyclones over the western North Pacific, American Geophysical Union Fall Meeting, San Francisco, California, USA.

4. **Kim, D.**, D.-S. R. Park, C. C. Nam, and M. Bell, 2022, Assessing future changes in tropical cyclone rainfall over the western North Pacific using a parametric model, 35th Conference on Hurricanes and Tropical Meteorology, New Orleans, USA.

5. **Kim, D.**, C.-H. Ho, H. Murakami, and D.-S R. Park, 2021, Influence of large-scale environmental conditions on tropical cyclone rainfall over the North Atlantic, 34th Conference on Hurricanes and Tropical Meteorology, Online.
6. **Kim, D.**, C.-H. Ho, D.-S. R. Park, J. C. L. Chan, and Y. Jung, 2019, Modulation of Tropical Cyclone Rainfall Area by Sea Surface Temperature and Environmental Flows, Asia Oceania Geosciences Society 16th Annual Meeting, Singapore.
7. **Kim, D.**, C.-H. Ho, D.-S. R. Park, J. C. L. Chan, and Y. Jung, 2019, Variation of tropical cyclone rainfall area influenced by environmental flow, European Geosciences Union General Assembly, Vienna, Austria.
8. **Kim, D.**, C.-H. Ho, and D.-S. R. Park, J. C. L. Chan, and Y. Jung, 2018, Influence of environmental flow on tropical cyclone rainfall area in the subtropical oceans, American Geophysical Union Fall Meeting, Washington D.C., USA.
9. **Kim, D.**, C.-H. Ho, and D.-S. R. Park, 2016, Strong-wind and heavy-rainfall extents induced by tropical cyclones over South Korea, European Geosciences Union General Assembly, Vienna, Austria.
10. **Kim, D.**, C.-H. Ho, D.-S. R. Park, and J. Kim, 2015, Extent of high winds and heavy rainfall induced by tropical cyclones in South Korea, American Geophysical Union Fall Meeting, San Francisco, California, USA.
11. **Kim, D.**, C.-H. Ho, D.-S. R. Park, and J. Kim, 2015, Anti-correlated strong-wind and heavy-rainfall fractions induced by tropical cyclones over South Korea, The Korean Society of Climate Change Research Annual Conference, Seoul, South Korea.
12. **Kim, D.**, C.-H. Ho, and C.-S. Jin, 2013, Climatology and ENSO-related variations of WRF-simulated tropical cyclones over the Western North Pacific, Sixth China-Korea-Japan Joint Conference on Meteorology, Nanjing, China.
13. **Kim, D.**, C.-H. Ho, and C.-S. Jin, 2012, Seasonal predictability of tropical cyclone activity over the Western North Pacific using WRF model, Korean Meteorological Society Conference, Daegu, South Korea.

Invited Talk

Seminar, Department of Geography, University of Florida, September 21, 2023

Seminar, Department of Earth and Environmental Sciences, Jeonbuk National University, Jeonju, South Korea, November 4, 2020.

Workshop, Department of Atmospheric Sciences, Pusan National University, Busan, South Korea, October 15–17, 2020.

Seminar, Department of Earth and Environmental Sciences, Jeonbuk National University, Jeonju, South Korea, August 21, 2020.

Seminar, Department of Civil Urban Earth and Environmental Engineering, Ulsan National Institute of Science and Technology, Ulsan, South Korea, August 6, 2020.

Seminar, Division of Environmental Science and Engineering, Pohang University of Science and Technology, Pohang, South Korea, May 26, 2020.

Numerical Modelling and Computing skills

1. Numerical Modelling: WRF-ARW, MPAS, Barotropic dynamic core model

2. Computing Languages: Fortran 90, c-shell/bourn-shell, python, NCL, MATLAB
3. Techniques: Vortex tracking, GIS for tropical cyclone analysis

Machine Learning and Artificial Intelligence Techniques
1. Artificial Neural Networks: Multi-Layer Perceptron, Convolutional Neural Network, Autoencoder, Generative Adversarial Network (GAN)
2. Fuzzy c-means, k-means clustering
3. Decision Tree and Random Forest
4. Layer-wise Relevance Propagation

Teaching and Mentoring Experiences
2024-present   **Lecture**, Introduction to Environmental Engineering, Climate Change and Greenhouse Gas Management, Capstone Design, Energy Environment Convergence Seminar,

Nov. 2023   **Guest lecture**, MET1010: Introduction to Weather and Climate, University of Florida

2020–2022   **Mentoring**, Dong-Gyu Hyeon (Ph.D. Course, Seoul National University)

2020–2022   **Mentoring**, Seungwoo Yoo (Ph.D. Course, Seoul National University)

2019–2021   **Mentoring**, Ingyu Park (Ph.D. Course, Seoul National University)

2019–2021   **Mentoring**, Ka-Young Kim (Ph.D. Course, Seoul National University)

2019–2021   **Graduate Teaching Assistant**, Climate Dynamics, Human and Earth Environment, Seoul National University

Development of Education Contents
Guides for Theories and Prediction to Tropical Cyclones, National Typhoon Center
2021 E-learning Contents of Climate Dynamics, Korea Meteorological Administration

Professional Service and Outreach Activities
2020–Present   **Reviewer** for Advances in Atmospheric Sciences, Climate Dynamics, Geoscience Letters, International Journal of Climatology, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Journal of Climate, Journal of Hydrology, Nature Communications, Scientific Online Letters on the Atmosphere, Weather and Forecasting, npj Climate and Atmospheric Science, and Frontiers in Marine Science

2009   Volunteer teacher, Gochang-gun, Jeollabuk-do, South Korea

2008   Volunteer for oil spill cleanup, Taean-gun, Chungcheongnam-do, South Korea

Grants Activities
Development of Technology for Predicting in Health Impact of Environmental Hazards Based on Big Data in Environmental Health, Ministry of Environment, **$2,730,000** (2025–2028), Role: **CoI**.

Development of an Explainable Artificial Intelligence Model for Tropical Cyclone Rainfall Prediction, National Research Foundation of Korea (NRF), **$100,000** (2021–Present), Role: **PI**.

Development of Prediction System for Tropical Cyclone Rainfall using Artificial Intelligence, National

Research Foundation of Korea (NRF), **$74,000** (2020–2021), Role: **PI**.

Honors and Awards

2021   Editor's Award for contributing a reviewer's report of outstanding merit on a manuscript submitted for publication in Advances in Atmospheric Sciences (AAS) in 2020

2018   Award in 5th 3D Scientific Visualization VAPOR Competition

2018   Long-term Study Abroad Program Scholarship (Seoul National University)

2017   Brain Korea 21 Conference Travel Grant

2016   Brain Korea 21 Overseas Training Program Scholarship

2016   Brain Korea 21 Conference Travel Grant

2015   Best Paper Award (oral presentation) in The Korean Society of Climate Change Research Annual Conference

2015   Korea Environmental Industry & Technology Institute Conference Travel Grant

2015   Engineering Research Center Travel Grant

2014   Brain Korea 21 Overseas Training Program Scholarship

2012–2016   Brain Korea 21 Scholarships

2012   Teaching assistant scholarship (Seoul National University)

2011   SNU Development Fund Scholarships

2009   Korea Scholarship Foundation

2008–2012   Superior Academic Performance Scholarships (Seoul National University)