Kwonil Kim

Research Associate at Stony Brook University

Room 385, 1500 Stony Brook Rd, Stony Brook, NY 11794
kwonil.kim@stonybrook.edu | kwonil.kim.0@gmail.com
Google Scholar: https://scholar.google.com/citations?user=XJq_DsgAAAAJ
ResearchGate: https://researchgate.net/profile/Kwonil_Kim
ORCID: https://orcid.org/0000-0001-8684-7277

Research interests

Mixed-phase precipitation microphysics Radar technologies
Orographic effect MP parameterization

Experience

Aug 2023 – present **Postdoctoral research associate**, Stony Brook University, NY

Mar 2023 – Jul 2023 **Postdoctoral research associate**, Kyungpook National University, Rep. of Korea

Education

Feb 2023 **Ph.D. in Atmospheric Sciences**, Kyungpook Natl. Univ., Rep. of Korea

- Dissertation: "The multi-scale processes of precipitation growth and decay over complex terrain"
- Advisor: Prof. GyuWon Lee

Aug 2015 **B.S. in Astronomy and Atmospheric Sciences**, Kyungpook Natl. Univ., Rep. of Korea

Peer-reviewed journal articles – International journals

[in preparation] **Kim, K.**, Tsai, C.-L., Lee, G.*: Statistical characteristics of radar-based precipitation growth and decay associated with the mountains in South Korea, *Q. J. R. Meteorol. Soc.*, in preparation.

Kim, K., Tsai, C.-L., Kim, S.-H., Lim, K.-S. S., Chang, E.-C., Min, K., Lee, G.*: Microphysical processes within in-cloud Kelvin-Helmholtz wave over Taebaek mountains, South Korea, *Atmos. Chem. Phys.*, in preparation.

Bang, W., Carlin, J. T., Ryzhkov, A. V., **Kim, K.**, and Lee, G.*: Prediction of winter precipitation type using spectral bin model: The comparison with the different prediction methods using ICE-POP 2018 field campaign data, *Atmos. Chem. Phys.*, in preparation.

Shin, K., **Kim, K.**, Lyu, G., and Lee, G.*: Supervised learning-based prediction of lightning probability in the warm season, *Q. J. R. Meteorol. Soc.*, in preparation.

Park, S., Lim, K.-S. S.*, **Kim, K.**, Lee, G., and Milbrandt, J. A.: Prognostic approach of graupel density in a bulk-type cloud microphysics scheme and evaluation during the ICE-POP field campaign, *Geosci. Model Dev.*, in preparation.

[submitted] Shin, K., **Kim, K.**, Song, J. J., and Lee, G.*: Polarimetric retrieval of raindrop size distribution: double-moment normalization approach and machine learning techniques, *Geophys. Res. Lett.*, submitted.

Hwang, B., Yoo, S., Chang, E.-C.*, Tapiador, F. J., **Kim, K.**, Lee, G.: Snowfall struc-

ture over the Eastern part of the Korean Peninsula, *EGUsphere*, submitted for ACP.

2023 **[14]** Kwon, J., Lim, K.-S. S.*, Park, S.-Y., **Kim, K.**, Lee, G.: Effects of Prognostic Number Concentrations of Snow and Graupel on the Simulated Precipitation over the Korean Peninsula, *Wea. Forecast.*, in press.

[13] Tokay, A.*, Helms, C. N., **Kim, K.**, Gatlin, P. N., and Wolff, D. B.: Evaluation of SWER(Ze) relationships by precipitation imaging package (PIP) during ICE-POP 2018, *J. Hydrometeorol.*, **24(2)**, 691-708, https://doi.org/10.1175/JHM-D-22-0101.1, 2023. (2021 IF=4.87, Q2)

[12] Joe, P.*,†, Lee, G.†, and **Kim, K.**†: The challenges of micro-nowcasting and the women's slope style event at the PyeongChang 2018 Olympic winter games, *Meteorol.*, **2(1)**, 107-127, https://doi.org/10.3390/meteorology2010008, 2023. (equally contributed)

[11] Tsai, C.-L., **Kim, K.**, Liou, Y.-C., and Lee, G.*: High-resolution 3D winds derived from a modified WISSDOM synthesis scheme using multiple Doppler lidars and observations, *Atmos. Meas. Tech.*, **16(3)**, 845-869, https://doi.org/10.5194/amt-16-845-2023, 2023. (2021 IF=4.18, Q2)

2022 **[10]** Shin, K., **Kim, K.***, Song, J. J., and Lee, G: Classification of precipitation types based on machine learning using dual-polarization radar measurements and thermodynamic fields, *Remote Sens.*, **14(15)**, 3820, https://doi.org/10.3390/rs14153820, 2022. (2021 IF=5.35, Q1) (corresponding author)

[09] Ko, J.-S., Lim, K.-S. S.*, **Kim, K.**, Lee, G., Thompson, G., and Berne, A.: Simulated microphysical properties of winter storms from bulk-type microphysics schemes and their evaluation in the Weather Research and Forecasting (v4.1.3) model during the ICE-POP 2018 field campaign, *Geosci. Model Dev.*, **15(11)**, 4529–4553, https://doi.org/10.5194/gmd-15-4529-2022, 2022. (2021 IF=6.89, Q1)

[08] Tsai, C.-L., **Kim, K.**, Liou, Y.-C., Kim, J.-H., Lee, Y., and Lee, G.*: Orographic-induced strong wind associated with a low-pressure system under clear-air condition during ICE-POP 2018, *J. Geophys. Res.-Atmos.*, **127(13)**, e2021JD036418, https://doi.org/10.1029/2021JD036418, 2022. (2021 IF=5.22, Q1)

2021 **[07]** **Kim, K.**, Bang, W., Chang, E., Tapiador, F. J., Tsai, C., Jung, E., and Lee, G.*: Impact of wind pattern and complex topography on snow microphysics during International Collaborative Experiment for PyeongChang 2018 Olympic and Paralympic winter games (ICE-POP 2018), *Atmos. Chem. Phys.*, **21(15)**, 11955–11978, https://doi.org/10.5194/acp-21-11955-2021, 2021. (2020 IF=6.13, Q1)

[06] Jang, S., Lim, K.-S. S.*, Ko, J., **Kim, K.**, Lee, G., Cho, S.-J., Ahn, K.-D., and Lee, Y.-H.: Revision of WDM7 microphysics scheme and evaluation for precipitating convection over the Korean peninsula, *Remote Sens.*, **13(19)**, 3860, https://doi.org/10.3390/rs13193860, 2021. (2020 IF=4.85, Q1)

[05] Tapiador, F. J.*, Villalba-Pradas, A., Navarro, A., Martín, R., Merino, A., García-Ortega, E., Sánchez, J. L., **Kim, K.**, and Lee, G.: A satellite view of an intense snowfall in Madrid (Spain): The storm 'Filomena' in January 2021, *Remote Sens.*, **13(14)**, 2702, https://doi.org/10.3390/rs13142702, 2021. (2020 IF=4.85, Q1)

[04] Tapiador, F. J.*, Villalba-Pradas, A., Navarro, A., García-Ortega, E., Lim, K.-S. S., **Kim, K.**, Ahn, K. D., and Lee, G.: Future directions in precipitation science, *Remote Sens.*, **13(6)**, 1074, https://doi.org/10.3390/rs13061074, 2021. (2020 IF=4.85, Q1)

2020 **[03]** Jeoung, H., Liu, G.*, **Kim, K.**, Lee, G., and Seo, E.-K.: Microphysical properties of three types of snow clouds: implication for satellite snowfall retrievals, *Atmos. Chem. Phys.*, **20(23)**, 14491–14507, https://doi.org/10.5194/acp-20-14491-2020, 2020. (2019 IF=5.41, Q1)

[02] Lim, K.-S. S.*, Chang, E.-C., Sun, R., **Kim, K.**, Tapiador, F. J., and Lee, G.: Evaluation of simulated winter precipitation using WRF-ARW during the ICE-POP 2018 field campaign,

Wea. Forecast., **35(5)**, 2199–2213, https://doi.org/10.1175/WAF-D-19-0236.1, 2020. (2019 IF=2.95, Q2)

2018 **[01]** Tsai, C.-L.*, **Kim, K.**, Liou, Y.-C., Lee, G., and Yu, C.-K.: Impacts of topography on airflow and precipitation in the Pyeongchang area seen from multiple-Doppler radar observations, *Mon. Wea. Rev.*, **146(10)**, 3401–3424, https://doi.org/10.1175/MWR-D-17-0394.1, 2018. (2017 IF=3.25, Q1)

Peer-reviewed journal articles – Korean journals

2022 **[04]** **Kim, K.**, Lyu, G., Baek, S., Shin, K., and Lee, G.*: Retrieval and accuracy evaluation of horizontal winds from Doppler lidars during ICE-POP 2018, *Atmosphere*, **32**, 163–178, https://doi.org/10.14191/Atmos.2022.32.2.163, 2022.

2020 **[03]** Kim, D.-S., Lim, K.-S. S.*, **Kim, K.**, and Lee, G.: Effects of the realistic description for the terminal fall velocity-diameter relationship of raindrops on the simulated summer precipitation over South Korea, *Atmosphere*, **30**, 1–17, https://doi.org/10.14191/Atmos.2020.30.4.421, 2020.

2019 **[02]** Bang, W., **Kim, K.**, Yeom, D., Cho, S.-J., Lee, C.-L., Lee, D., Ye, B.-Y., and Lee, G.*: Characteristics analysis of snow particle size distribution in Gangwon region according to topography, *J. Korean Earth Sci. Soc.*, **40(3)**, 227–239, https://doi.org/10.5467/JKESS.2019.40.3.227, 2019.

2018 **[01]** **Kim, K.**, Lee, H.-W., Jung, S.-H., Lyu, G., and Lee, G.*: Characteristics of summer season precipitation motion over Jeju island region using variational echo tracking, *Atmosphere*, **28(4)**, 443–455, https://doi.org/10.14191/Atmos.2018.28.4.443, 2018.

Research projects

2023 – present **KPOP-MS**, Korea Precipitation Observation Program: international collaborative experiments for Mesoscale convective system in Seoul metropolitan area

- Contributed to the overall management of intensive observation (8 sounding sites) as an experiment coordinator
- Contributed to the establishment of a reporting system for science, weather, and instrument
- Contributed to the training of participants in observation techniques and understanding of microphysical instruments
- Contributed to the establishment of scanning strategies for radars and lidars
- Contributed to the overall operation of mobile X-band polarimetric radar (namely T-REX) from UCLM, Spain

2018 – present **The second phase of ICE–POP 2018**, International Collaborative Experiments for Pyeongchang 2018 Olympic and Paralympic winter games

- Contributed to revealing the primary snow growth processes in three different wind patterns in Pyeongchang (Kim et al., 2021)
- Contributed to the generation of radar-based products for nine major events: (1) multiple-Doppler 3D wind field, (2) QPE (precipitation rate) with 1-km horizontal resolution, and (3) 3D multi-radar mosaic of reflectivity
- Contributed to the reflectivity calibration of the surveillance radars (in collaboration with Dr. Michelson, ECCC, and Mr. Lee, KNU)
- Contributed to the evaluation of the accuracy of spectral bin classifier (SBC) using disdrometers in complex topography (in collaboration with Dr. Carlin and Dr.

Ryzhkov, OU, and Mr. Bang, KNU)

2016 – 2018 **The first phase of ICE–POP 2018**, International Collaborative Experiments for Pyeongchang 2018 Olympic and Paralympic winter games

- Contributed to the designing of the observation network (particularly to where and how to organize the supersites, and where to place the many different instruments)
- Contributed to on-site management (installation, operation, real-time data collection, repair, etc.) of the microphysical instruments during the field campaign (leading role on the KNU side)
- Contributed to the unification of scanning strategies for MRR2 and Doppler lidars from various agencies
- Contributed to the overall operation of mobile X-band polarimetric radar (namely T-REX) from UCLM, Spain (platform designing, installation, solar calibration, operation, real-time data collection, repair, etc.)

Activities

- **Journal Review**: Journal of Applied Meteorology and Climatology, Journal of Hydrology, Remote Sensing
- **Program committee (reviewer)**: 40th Conference on Radar Meteorology (QPE and Hydrology section), 28 Aug. – 01 Sept. 2023
- **Visiting researcher**, University of Oklahoma, USA (duration: Jan 13 – Feb 21, 2018; Supervisor/Collaborator: Prof. Ryzhkov, Dr. Carlin, and Dr. Bukovcic): Polarimetric QPE for snow and spectral bin classifier using ICE-POP 2018 data
- **Visiting researcher**, Ecole Polytechnique Fédérale de Lausanne, Switzerland (duration: Jan 22 – Feb 01, 2017; Supervisor/Collaborator: Prof. Berne and Dr. Gehring): MASC snow habit classification
- **Visiting researcher**, Colorado State University, USA (duration: Jan 24 – Feb 20, 2016; Supervisor/Collaborator: Prof. Bringi, Prof. Notaros, Dr. Thurai, and Dr. Huang): 2DVD snow rematching, MASC operation, POSS snow habit classification
- **Research assistant** to Prof. GyuWon Lee (2018-2020): Conducted a research project that developed effective quality control methods to remove non-meteorological signals and retrieve the vertical profile of horizontal wind from Doppler lidars. This led to the publication of a domestic journal paper (Kim et al., 2022).
- **Teaching assistant** to Prof. GyuWon Lee: Introduction to Atmospheric Sciences, Mathematical Methods for Atmospheric Sciences, Computational Atmospheric Sciences and Practice, Cloud Physics, and Radar Meteorology.
- Received a 5-day **training course for King Air research aircraft data acquisition and processing** in 2018 (given by Dr. Delene and Dr. Neumann-Skow): experienced in data acquisition tool (M300) and data processing tool (ADPAA) for PIP and CIP.

Honors

Nov. 2019 **Best poster presentation** (out of 34 competitors in *Atmospheric Physics* session), Autumn Meeting of Korean Meteorological Society, Republic of Korea

Nov. 2018 **Citation of Administrator of Numerical Modeling Center**, Korea Meteorological Administration, Republic of Korea

Oct. 2017 **Best poster presentation** (out of 34 competitors in *Atmospheric Physics* session), Autumn Meeting of Korean Meteorological Society, Republic of Korea

Patents (Korean)

- **Kim, K.**, Lee, G., and Shin, K.: Fuzzy logic based micro rain radar interference cancellation method, apparatus and recording medium for performing the same. Korean patent, Application No. 10-2022-0155604 (18 Nov 2022), Registration No. 10-2544890 (14 Jun 2023).
- **Kim, K.**, Lee, G., Lyu, G., and Bang, W.: Portable manless observation system for PARSIVEL disdrometer including the method of real-time data quality control and determination of precipitation type. Korean patent, Application No. 10-2020-0050778 (27 Apr 2020), Registration No. 10-2200566 (4 Jan 2021).

Skills

Language	English and Korean
Programming	Python (preferred) – pyart, xarray, metpy, pandas, scipy, numpy, etc. C, IDL, Fortran, Matlab Git, Bash scripting, anaconda, docker
Writing	LaTeX and MS Word
NWP model	WRF
Experienced instruments	Ground-based radar – Meteor 60DX, D3R, VertiX, RPG-FMCW-94, MRR2, MRR-PRO Doppler lidar – Streamline-XR+, Streamline-XR, Windex-2000, Wind3D Wind profiler – Degreane PCL1300 Disdrometer – 2DVD, PARSIVEL, PIP, POSS, MASC Weighing gauge – Pluvio, Geonor Radiosonde – Graw, Modem, StormTracker Miscellaneous – WXT520, USA-1