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**Education**

Ph. D. in Resources, Environment and Sustainability, The University of British Columbia, Canada. [2022]  
Thesis title: Interactions between the land surface and the near-surface atmosphere: implications for evaporative demand and evapotranspiration under a changing climate.

BSc. in Rural Systems Engineering (Agricultural Eng.), Seoul National University, South Korea. [2016]  
Thesis title: Interannual variations in methane emission from an irrigated rice paddy caused by rainfall during the aeration period.

**Professional experience**

Postdoctoral Research fellow, University of British Columbia (PI: Dr. Mark Johnson) [2023 – present]  
Graduate Research Assistant, University of British Columbia (PI: Dr. Mark Johnson) [2017 – 2022]  
Research Associate, National Center for Agro-Meteorology, South Korea [2016. 9 – 12]  
Undergraduate Research Assistant, National Center for Agro-Meteorology, South Korea [2014 – 2015]

**Teaching experiences**

Module developer and delivery. Course: Ecohydrology of Watersheds and Water Systems (ENVR 420),  
Guest lecture topic: Evapotranspiration theory and applications [2019 – present]  
Mentor of Research Experience program (REX) for UBC undergraduate students [2022 – 2023]  
Mentor of a graduate student project. Course: Artificial Intelligence for Social Impact (CPSC 532L) [2020]  
Teaching Assistant. Course: Ecohydrology of Watersheds and Water Systems (ENVR 420) [2018]  
Teaching Assistant. Course: Land, Food and Community 1 (LFS 250) [2017 – 2018]

**Research interests**

Soil hydrology, climate change adaptation and mitigation, ecohydrology, biometeorology, land-atmosphere coupling, evapotranspiration, satellite remote sensing, and machine learning applications

**Honors and awards**

Graduate program

2020 – 2022. President's Academic Excellence Initiative PhD Award. UBC  
2018 – 2022. Four Years Doctoral Fellowships. UBC  
2017 – 2022. International Tuition Award. UBC  
2017 – 2018. Faculty of Science Graduate Award. UBC  
2019. Mitacs Globalink research internship, Technical University of Denmark (DTU)  
2018. Award by President of Korea Water Resources Corporation. Idea contest for sustainable water management in South Korea

Undergraduate program

2017. Excellent Degree Thesis Award. College of Agriculture and Life Science, SNU  
2016. Graduation with *Cum laude*, SNU  
2015. Grand Prize (Award by President of SNU). SNU Undergraduate Research Program, SNU  
2015. Evergreen Scholarship. SNU Evergreen Scholarship Foundation  
2014 – 2015. Agricultural Engineering Scholarship. SNU Alumni Association of Agricultural Engineering  
2011, 2014-2015. Merit Based Scholarship (Scholarship of Superior Academic Performance). SNU  
2009. National Scholarship for Science and Engineering. Korea Student Aid Foundation

## Research projects

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### Current projects

Improving Estimates of Evapotranspiration and Land Surface Relative Humidity Using Satellite-Derived Soil Moisture and Vegetation Optical Depth from SMAP-SMOS and Land Surface Temperature from Sentinel-3, C\$ 250,000 from *Canadian Space Agency*. **Co-Investigator** on project and **Co-author** of grant proposal [2021 – 2024]

### Previous projects

Agricultural Water Innovation in the Tropics (AgWIT) project funded by the EU Joint Call for the Water Joint Programming Initiative 2016, *Natural Sciences and Engineering Research Council of Canada*. Graduate Research Assistant [2017 – 2020]  
Constructing the foundation of core technologies for custom-made agricultural & forest meteorological services, *Korea Meteorological Administration*. Research Associate [2016]  
Constructing the terrestrial ecosystem carbon database for the Carbon-Tracker-Asia improvement, *Korea Meteorological Administration*. Undergraduate Research Assistant [2015]  
Development of time series database for CO<sub>2</sub> fluxes and investigation of ecosystem carbon dynamics, *Korea Meteorological Administration*. Undergraduate Research Assistant [2014 – 2015]

## Publications

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1. **Kim, Y.**, García, M., & Johnson, M. S. (2023). Land-atmosphere coupling constrains increases to potential evaporation in a warming climate: Implications at local and global scales. *Earth's Future*. 11 (2). doi: 10.1029/2022EF002886  
※ SCI. 2021 IF=8.852, Rank=7/202 (Geoscience, multidisciplinary). Time Cited: 0.
2. **Kim, Y.**, Morillas, L., Garcia, M., Weber, U., Black, T. A. & Johnson, M. S. (2021). Relative humidity gradients as a key constraint on terrestrial water and energy fluxes. *Hydrology and Earth System Sciences*. 25 (9), 5175-5191. doi: 10.5194/hess-25-5175-2021  
※ SCI. 2021 IF=6.617, Rank=14/202 (Geoscience, multidisciplinary). Time Cited: 4.  
※ This article was selected as EGU highlights by European Geosciences Union.
3. **Kim, Y.**, Johnson, M. S., Knox, S., Black, T. A., Dalmagro, H. J., Kang, M., Kim, J. & Baldocchi, D. (2020). Gap-filling approaches for eddy covariance methane flux: a comparison of three machine learning algorithms and a traditional method with and without principal component analysis. *Global Change Biology*. 26 (3), 1499-1518. doi:10.1111/gcb.14845.  
※ SCI. 2021 IF=13.212, Rank=17/279 (Environmental Sciences). Time Cited: 79.
4. **Kim, Y.**, Talucder, M. S. A., Kang, M., Shim, K. -M., Kang, N. & Kim, J. (2016). Interannual variations in methane emission from an irrigated rice paddy caused by rainfall during the aeration period. *Agriculture, Ecosystems & Environment*. 223, 67-75. doi: 10.1016/j.agee.2016.02.032  
※ SCI. 2021 IF=6.576, Rank=5/59 (Agriculture, Multidisciplinary). Time Cited: 38.

### **Korean journal**

5. Choi, S.W., Kim, H., **Kim, Y.**, Kang, M. & Kim, J. (2016). Estimation and mapping of methane emission from rice paddies in Gyunggi-do using the modified water management scaling factor. *Korean Journal of Agricultural and Forest Meteorology*. 18(4), 320-326

### **Under review and in preparation**

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1. **Kim, Y.** & Johnson, M. S. (under review in *Proceedings of the National Academy of Sciences of the United States of America*). Differential runoff, soil moisture, and near-surface humidity responses to changes in precipitation and temperature.
2. **Kim, Y.**, García, M., Black, T. A. & Johnson, M. S. (under second round review in *Journal of Advances*

in *Modeling Earth Systems*). Assessing the complementary role of Surface Flux Equilibrium (SFE) theory and Maximum Entropy Production (MEP) principle in the estimation of actual evapotranspiration. Preprint available in: *Earth and Space Science Open Archive*. doi:10.1002/essoar.10511856.1

3. **Kim, Y.**, García, M., Black, T. A. & Johnson, M. S. (in preparation, 90% done). Comparing three hybrid evapotranspiration models with satellite-derived inputs using different physical constraints.

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### Presentation and posters

1. **Kim, Y.** & Johnson, M. S. (2023). Satellite observations-derived inputs for hybrid evapotranspiration models: towards physically sound integration of machine learning approaches. *2023 SMAP Canada Workshop*. Montreal, Canada (Invited)
2. **Kim, Y.** (2022). Improving Estimates of Evapotranspiration Using Satellite-Derived Soil Moisture. *Canadian Space Agency*. online (Invited)
3. **Kim, Y.** & Johnson, M. S. (2022). The sensitivity of evaporation to soil moisture: the role of relative humidity gradient. *2022 SMAP Canada Workshop*. online (Invited)
4. **Kim, Y.**, Johnson, M. S., Knox, S., Black, T. A., Dalmagro, H. J., Kang, M., Kim, J., Ryu, Y., Baldocchi, D. (2019). CH<sub>4</sub> flux gap-filling approaches for eddy covariance data: a comparison of three machine learning algorithms and marginal distribution sampling method with and without principal component analysis. *2019 EGU General Assembly*. Vienna, Austria (Poster)
5. **Kim, Y.** & Johnson, M. S. (2017). Spectral entropy as a mean to quantify water stress history for natural vegetation and irrigated agriculture in a water-stressed tropical environment. *2017 AGU Fall Meeting*. New Orleans, Louisiana, USA (Poster)
6. Johnson, M. S., Lathuilliere, M. J., Morillas, L., Dalmagro, H. J., D'Acunha, B., **Kim, Y.**, Suarez, A. & Couto, E. G. (2017). Carbon and water fluxes and footprints in tropical agricultural systems under rainfed and irrigated conditions. *2017 AGU Fall Meeting*. New Orleans, Louisiana, USA (invited)
7. Choi, S.W., Kang, M., Indrawati, Y.M., Kim, H., **Kim, Y.** & Kim, J. (2016). Carbon footprint estimation using long-term flux measurement in Haenam, Korea: Implication for climate-smart agriculture. *EcoSummit 2016*. Le Corum, Montpellier, France (Poster)
8. **Kim, Y.**, Talucder, M. S. A., Kang, M., Kang, N., Shim, K. -M. & Kim, J. (2015). Changes in methane emission from rice paddy triggered by rainfall during the mid-season Drainage (in Korean). *The 2015 Korean Meteorological Society Fall Conf*. Jeju, Korea (Oral)

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### Journal referee

*Agricultural and Forest Meteorology; Earth's Future; Hydrology and Earth System Sciences; Journal of Hydrology; Remote Sensing of Environment*

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### Workshop and other activities

2019. Visiting PhD student (three months). Dr. Monica García's group at Department of Environmental Engineering, Technical University of Denmark  
2019. Invited workshop participant. 2019 AmeriFlux Early Career Workshop, Boulder, CO, USA  
2019. Workshop participant. CLM (Community Land Model) / CTSM (Community Terrestrial Systems Model) tutorial, National Center for Atmospheric Research (NCAR) Mesa Lab, Boulder, CO, USA  
2016. Workshop participant. The International Workshop on Agromet and GIS Applications for Agricultural Decision Making (AgMP, WMO), Jeju, South Korea

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### PhD committee members

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#### PhD supervisor:

Dr. Mark S. Johnson (Institute for Resources, Environment & Sustainability/ Department of Earth, Ocean, & Atmospheric Sciences, UBC)

#### PhD supervisory committee:

Dr. T. Andrew Black (Faculty of Land and Food Systems, UBC), Dr. Sara H. Knox (Department of Geography, UBC), Dr. Monica Garcia (DTU through 2021, now at Universidad Politécnica de Madrid), and Dr. Paulo Brando (Yale University)