

# Seonggyu Park

Assistant Research **Scientist**



## Curriculum Vita

My primary focus is on developing hydrologic models to identify challenges in present and future water resources management. I am particularly interested in assessing spatial-temporal patterns of interactions between groundwater and surface water, improving water quality and sanitation in developing countries with severe water shortages, and developing new water conservation technologies regarding water catchment and harvesting systems. I am also a strong proponent of open and reproducible workflows.

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🌐 spark  
🐙 Github  
🐦 Twitter  
👤 Google Scholar

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## Education

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- 2014 – 2018      Ph.D. in Groundwater Engineering, Department of Civil & Environmental Engineering. Colorado State University, Fort Collins, CO, United States  
*Dissertation:* [Dissertation: Enhancement of Coupled Surface/Subsurface Flow Models in Watersheds: Analysis, Model Development, Optimization, and User Accessibility.](#)
- 2004 – 2006      M.E. in Environmental Engineering. University of Suwon, Suwon, South Korea  
*Thesis:* A study on Adsorption Characteristics of VOCs on Activated Carbon.
- 1998 – 2004      B.E. in Environmental Engineering. University of Suwon, Suwon, South Korea

## Brief professional history

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- Apr. 2021 –      **Assistant Research Scientist**, Texas A&M AgriLife Research, Temple, TX, United States
- 2018 – 2021      **Postdoctoral Research Associate**, Texas A&M AgriLife Research, Temple, TX, United States
- 2015 – 2018      **Graduate Research Assistant**, [Ryan Bailey's Lab](#) in Dept. of Civil Engineering, Colorado State University, Fort Collins, CO, United States
- 2011 – 2012      **IT & Computer Instructor**, Intercultural Institute of California (IIC), San Francisco, CA, United States
- 2006 – 2014      **Researcher**, HWASHIN Engineering & Bio Technology Co., Ltd., Incheon, South Korea

# Research Experience

*Icons link to additional content*

I actively contribute to developing and enhancing hydrological models and software, engaging with the model and Python [communities](#). I maintain and support these tools, and below is an overview of my authored and contributed packages, along with interactive data applications.

## Model Applications

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- Provide technical support by developing the SWAT-MODFLOW model for the Yongsan River watershed in South Korea and conducting uncertainty analysis, (2024 – current). [SWAT-MODFLOW](#), [PEST](#), [swatmf](#)
- Conducted uncertainty analysis on SWATp-Paddy models for the Osu watershed in South Korea and the Albufera region in Spain, (2024 – 2024). [SWAT+](#), [PEST](#), [swatp](#)
- Analyzed spatio-temporal dynamics of groundwater-surface water interactions in the Koksilah River Watershed utilizing the SWAT-MODFLOW model and swatmf optimization framework, (2024 – 2024). [SWAT-MODFLOW](#), [PEST](#), [swatmf](#)
- Assessed Spatio-Temporal Patterns of Groundwater - Surface Water Interactions and Solute Transports in the Colorado River Basin using coupled APEX-MODFLOW Model, (2020 – 2023). [AMRS](#), [PEST](#)
- Assessed Water, Salt, Fire and Land Mangement in the Colorado River Basin using APEX, (2020 – 2023). [APEX](#)
- Developed modelling frameworks for parameter estimation, sensitivity and uncertainty analysis on integrated hydrological models, (2020 – 2022). [Python](#), [PEST](#)
- Developed SWAT-MODFLOW model to support resilient development and return on investment analyses in the Cubango-Okavango River Basin (CORB), (2020 – 2022). [SWAT-MODFLOW](#), [PEST](#)
- Provided technical supports by developing database, framework, and analysis tools for the Real-Time Conservation Effects and Assessment Project (CEAP) - National Modelling provided by United States Department of Agriculture (USDA), (2018 – 2019). [SWAT+](#), [Python](#)
- Assessed Surface Water and Groundwater Resources in the Middle Bosque, Texas Watershed using the coupled SWAT-MODFLOW model, (2017 – 2018). [SWAT-MODFLOW](#), [PEST](#)
- Conducted research on spatial integration of SWAT and MODFLOW and optimizing the model with Spatio-temporal variation, (2017 – 2018). [SWAT-MODFLOW](#), [PEST](#)
- Developed groundwater models with MODFLOW for several watersheds (Middle Bosque in Texas, United States, Missouri, Deer Creek in Missouri, United States, Neishaboor, Iran, and Limpopo, Southern Africa), (2015 – 2018). [MODFLOW](#)

## Model Development

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6. **Park, S.**, and Jeong, J. (2024—current). [swatp-ghg](#): Develop a Carbon dynamics model for predicting GHG emission and sequestration in croplands [Fortran](#), [Python](#)
5. Jeong, J., Arnold, J., and **Park, S.** (2023—current). [swatp-paddy](#): Develop a Rice paddy module in SWAT+ for simulating paddy rice cultivation and irrigation management in agricultural watersheds [Fortran](#)
4. **Park, S.**, Jeong, J., Hong, Y., and Bailey, R. (2024). [swatmf-Hg](#): Developed a Mercury dynamics module for assessing spatial and temporal variability of Mercury transport in watersheds [Fortran](#)
3. Bailey, R., Jeong, J. and **Park, S.** (2023). [apex-mf \(ARMS\)](#): Contributed to the development of a new integrated model to simulate hydrological processes in watershed systems [Fortran](#)
2. Bailey, R. and **Park, S.** (2020). [swatp-mf](#): Contributed to enhancing SWAT+ simulation of groundwater flow and groundwater-surface water interactions using MODFLOW routines [Fortran](#)
1. Bailey, R and **Park, S.** (2017). [swat-mf](#): Contributed to enhancing SWAT-MODFLOW [Fortran](#)

## Software Development

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7. **Park, S.** (2024—current). [ghgpy](#): Develop a GHG emission dynamics module for predicting GHG emission and sequestration in croplands [Python](#)
6. **Park, S.** (2023—current). [apexmf](#): python modules for AMRS model parameter estimation and uncertainty analysis [Python](#) [doi](#) [10.5281/zenodo.6000645](https://doi.org/10.5281/zenodo.6000645)
5. **Park, S.** (2021—current). [swatmf](#): python modules for SWAT-MODFLOW model parameter estimation and uncertainty analysis [Python](#) [doi](#) [10.5281/zenodo.6000645](https://doi.org/10.5281/zenodo.6000645)
4. **Park, S.** (2023). [DayCentPy](#): Developed Python code for optimizing the DAYCENT model using the Bayesian method with the Differential Evolution Adaptive Metropolis (DREAM) algorithm [Python](#)
3. Jeong J and **Park, S.** (2023). [APEX-CUT](#): Contributed to the development of APEX model optimization tool [Python](#), [QT](#)
2. **Park, S.** (2023). [APEXMOD](#): Developed a graphical user interface, a workflow implemented in QGIS, for application and evaluation of APEX-MODFLOW models [Python](#), [QT](#), [QGIS](#)
1. **Park, S.** (2019). [QSWATMOD](#): Developed a graphical user interface, a workflow implemented (as a plugin) in QGIS, for application and evaluation of SWAT-MODFLOW models [Python](#), [QT](#), [QGIS](#)


## Web applications

5. Celray, J and Park, S (2024—current). Develop the CoSWAT framework to advance global crop ecosystem and hydrological analysis [Python](#), [SWAT+](#)
4. Park, S. (2023). Developed a web application for visualizing and analyzing Colorado River Basin (CRB) APEX-MODFLOW model performance [Python](#)
3. Park, S (2021). Developed a web application for visualizing and analyzing APEX simulation results [Python](#)
2. Park, S (2021). Developed a web application for visualizing and analyzing Biomass in grazing lands [Python](#)
1. Park, S. (2019). Developed a visualization tool for National SWAT+ model assessments [SWAT+](#), [Python](#)

## Peer-Reviewed Publications

- 2024
  21. Bazrkar, M.H., Han, H., Abitew, T., **Park, S.**, Zamani, N., and Jeong, J (2024). Application of an Ensemble Stationary-Based Category-Based Scoring Support Vector Regression to Improve Drought Prediction in the Upper Colorado River Basin, *Atmosphere*. 15, 1505. [doi 10.3390/atmos15121505](#)
  20. Han, H., Abitew, T.A., Bazrkar, H., **Park, S.**, and Jeong, J (2024). Integrating machine learning for enhanced wildfire severity prediction: A study in the Upper Colorado River basin, *Science of The Total Environment*. 952, 175914. [doi 10.1016/j.scitotenv.2024.175914](#)
  19. Balakrishnan, J.V., Bailey, R.T., Jeong, J., **Park, S.** and Abitew, T (2024). Quantifying climate change impacts on future water resources and salinity transport in a high semi-arid watershed, *Journal of Contaminant Hydrology*. 267, 104289. [doi 10.1016/j.jconhyd.2023.104289](#)
- 2023
  18. Wang, X., Jeong, J., **Park, S.**, Zhang, X., Gao, J. and Silvero, N.E (2023). DayCent-CUTE: A global sensitivity, auto-calibration, and uncertainty analysis tool for DayCent, *Environmental Modelling & Software*. 169, 105832. [doi 10.1016/j.envsoft.2023.105832](#)
  17. Han, H., Abitew, T.A., **Park, S.**, Green, C.H. and Jeong, J (2023). Spatio-Temporal Evaluation of Satellite-based Precipitation Products in the Colorado River Basin, *Journal of Hydrometeorology*. 27 (7), [doi 10.1175/JHM-D-23-0003.1](#)
  16. **Park, S.**, Jeong, J., Motter, E., and Bailey, R (2023). Introducing APEXMOD, A QGIS plugin for application and evaluation for the Enhanced APEX model, *Environmental modelling & software*. 165, 105723. [doi 10.1016/j.envsoft.2023.105723](#)
- 2022
  15. Saadatpour, A., Bailey, R., Izady, A., Amin, Ziaei, A. and **Park, S.** (2022). Quantifying the impact of climate change and irrigation management on groundwater in an arid region with intensive groundwater abstraction, *Environmental Earth Sciences*. 81, 531. [doi 10.1007/s12665-022-10662-9](#)

14. White, M.J., Arnold, J.G., Bieger, K., Allen, P.M., Gao, J., Cerkasova, N., Gambone, M., **Park, S.**, Bosch, D.D., Yen, H. and Osorio, J.M (2022). Development of a Field Scale SWAT+ Modeling Framework for the Contiguous US, *Journal of the American Water Resources Association*. 146, doi [10.1111/1752-1688.13056](https://doi.org/10.1111/1752-1688.13056)
13. Bailey, R.T., Jeong, J., **Park, S.** and Green, C.H (2022). Simulating salinity transport in High-Desert landscapes using APEX-MODFLOW-Salt, *Journal of Hydrology*. 610, doi [10.1016/j.jhydrol.2022.127873](https://doi.org/10.1016/j.jhydrol.2022.127873)
12. Zaremehrijardy, M., Victor, J., **Park, S.**, Smerdon, B., Alessi, D.S. and Faramarzi, M (2022). Assessment of snowmelt and groundwater-surface water dynamics in mountainous, foothill, and plain regions in northern latitudes, *Journal of Hydrology*. 606, 127449. doi [10.1016/j.jhydrol.2022.127449](https://doi.org/10.1016/j.jhydrol.2022.127449)
- 2021      11. Bailey, R.T., Tasdighi, A., **Park, S.**, Tavakoli-Kivi, S., Abitew, T., Jeong, J., Green, C.H. and Worqlul, A.W (2021). APEX-MODFLOW: A New Integrated Model to Simulate Hydrological Processes in Watershed Systems, *Environmental Modelling & Software*. 134, 105093. doi [10.1016/j.envsoft.2021.105093](https://doi.org/10.1016/j.envsoft.2021.105093)
- 2020      10. Liu, W., **Park, S.**, Bailey, R.T., Molina-Navarro, E., Andersen, H.E., Thodsen, H., Nielsen, A., Jeppesen, E., Jensen, J.S., Jensen, J.B. and Trolle, D (2020). Quantifying the streamflow response to groundwater abstractions for irrigation or drinking water at catchment scale using SWAT and SWAT-MODFLOW, *Environmental Sciences Europe*. 32, 1-25. doi [10.1186/s12302-020-00395-6](https://doi.org/10.1186/s12302-020-00395-6)
9. Liu, W., Bailey, R.T., Andersen, H.E., Jeppesen, E., Nielsen, A., Peng, K., Molina-Navarro, E., **Park, S.**, Thodsen, H. and Trolle, D (2020). Quantifying the effects of climate change on hydrological regime and stream biota in a groundwater-dominated catchment: A modelling approach combining SWAT-MODFLOW with flow-biota empirical models, *Science of The Total Environment*. 745, 140933. doi [10.1016/j.scitotenv.2020.140933](https://doi.org/10.1016/j.scitotenv.2020.140933)
8. Kim, S., Kim, S., Cho, J., **Park, S.**, Jarrín Perez, F.X. and Kiniry, J.R (2020). Simulated biomass, climate change impacts, and nitrogen management to achieve switchgrass biofuel production at diverse sites in US, *Agronomy*. 10, 503. doi [10.3390/agronomy10040503](https://doi.org/10.3390/agronomy10040503)
7. Bailey, R.T., **Park, S.**, Bieger, K., Arnold, J.G. and Allen, P.M (2020). Enhancing SWAT+ simulation of groundwater flow and groundwater-surface water interactions using MODFLOW routines, *Environmental Modelling & Software*. 126, 104660. doi [10.1016/j.envsoft.2020.104660](https://doi.org/10.1016/j.envsoft.2020.104660)
6. Liu, W., Bailey, R.T., Andersen, H.E., Jeppesen, E., **Park, S.**, Thodsen, H., Nielsen, A., Molina-Navarro, E. and Trolle, D (2020). Assessing the impacts of groundwater abstractions on flow regime and stream biota: Combining SWAT-MODFLOW with flow-biota empirical models, *Science of the Total Environment*. 706, 135702. doi [10.1016/j.scitotenv.2019.135702](https://doi.org/10.1016/j.scitotenv.2019.135702)

- 2019
5. Mosase, E., Ahiablame, L., **Park, S.** and Bailey, R (2019). Modelling potential groundwater recharge in the Limpopo River Basin with SWAT-MODFLOW, *Groundwater for sustainable development*. 9, 100260.  [10.1016/j.gsd.2019.100260](https://doi.org/10.1016/j.gsd.2019.100260)
  4. Yen, H., **Park, S.**, Arnold, J.G., Srinivasan, R., Chawanda, C.J., Wang, R., Feng, Q., Wu, J., Miao, C., Bieger, K. and Daggupati, P (2019). IPEAT+: A built-in optimization and automatic calibration tool of SWAT+, *Water*. 11 (1681),  [10.3390/w11081681](https://doi.org/10.3390/w11081681)
  3. Liu, W., **Park, S.**, Bailey, R.T., Molina-Navarro, E., Andersen, H.E., Thodsen, H., Nielsen, A., Jeppesen, E., Jensen, J.S., Jensen, J.B. and Trolle, D (2019). Comparing SWAT with SWAT-MODFLOW hydrological simulations when assessing the impacts of groundwater abstractions for irrigation and drinking water, *Hydrology and Earth System Sciences. Discussions*, 1-51.  [10.5194/hess-2019-232](https://doi.org/10.5194/hess-2019-232)
  2. **Park, S.**, Nielsen, A., Bailey, R.T., Trolle, D. and Bieger, K (2019). A QGIS-based graphical user interface for application and evaluation of SWAT-MODFLOW models, *Environmental modelling & software*. 111, 493-497.  [10.1016/j.envsoft.2018.10.017](https://doi.org/10.1016/j.envsoft.2018.10.017)
  1. Molina-Navarro, E., Bailey, R.T., Andersen, H.E., Thodsen, H., Nielsen, A., **Park, S.**, Jensen, J.S., Jensen, J.B. and Trolle, D (2019). Comparison of abstraction scenarios simulated by SWAT and SWAT-MODFLOW, *Hydrological Sciences Journal*. 64, 434-454.  [10.1080/02626667.2019.1590583](https://doi.org/10.1080/02626667.2019.1590583)

## Technical Reports

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7. Jeong, J. and **Park, S.** (2024). Development of a Carbon dynamics model for predicting GHGs emission and sequestration in croplands, BREC Report No. 24-02. #M2400956
6. **Park, S.**, Suarez, D., Glesson, T., and Jeong, J (2024). XWULQW'SELU WATERSHED SWAT-MODFLOW MODEL VALIDATION REPORT, BREC Report No. 24-01. #PO-094550
5. **Park, S.**, Abitew, T. and Jeong, J (2023). Enhancement of APEX for simulating soil erosion and salt transport in the Colorado River Basin, BREC Report No. 23-01
4. **Park, S.** (2022). QSWATMOD: Advances and Applications, Korea Institute of Civil Engineering and Building Technology No. 22-02
3. **Park, S.** (2022). Latest Advances and Applications of SWAT-MODFLOW, Korea Institute of Civil Engineering and Building Technology No. 22-01
2. **Park, S.**, Baker, T., Srinivasan, R. and Jeong, J (2022). SWAT-MODFLOW Relink Editor On Hydrologic And Water Quality System (HAWQS), BREC Report No. 22-01
1. **Park, S.**, Baker, T. and Jeong, J (2021). Development Of The Cubango-Okavango River Basin SWAT-MODFLOW Model, BREC Report No. 21-01



## Training Manuals

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3. **Park, S.**, Bailey, R.T. and Bieger, K (2019). QGIS Interface for SWAT-MODFLOW (QSWATMOD), Blackland Research and Extension Center, Texas A&M AgriLife Research, Temple, TX
2. Bailey, R.T. and **Park, S.** (2019). SWAT-MODFLOW Tutorial Version 3 – Documentation for Preparing Model Simulations, Department of Civil and Environmental Engineering, Colorado State University: Fort Collins, CO, United States
1. **Park, S.** and Bailey, R.T (2017). SWAT-MODFLOW Tutorial—Documentation for Preparing Model Simulations, Department of Civil and Environmental Engineering, Colorado State University: Fort Collins, CO, United States

## National & International Conference Presentations

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|------|--|
| 2024 | <p>29. <b>Park, S.</b>, Jeong, J., and Jeffrey, A (July, 2024). <i>Introduction to modeling practices for predicting Carbon dynamics and GHG Emissions in croplands</i>, at the 2024 International SWAT Conference,  Strasbourg, France.</p> <p>28. <b>Park, S.</b>, Jeong, J., Bailey, R., Kim, H., Hong, Y., and Kim, K (July, 2024). <i>Assessment of Spatial and Temporal Variability of Mercury Transport in the Gumu Watershed</i>, at the 2024 International SWAT Conference,  Strasbourg, France.</p>  |
| 2023 | <p>27. <b>Park, S.</b>, Jeong, J., Motter, E., Xiang, Z., and Bailey, R (June, 2023). <i>Uncertainty Quantification of Salinity Transport Simulation for Integrated Hydrological Models</i>, at the 2023 UCOWR Annual Water Resources Conference,  Fort Collins, CO, United States.</p> <p>26. Xiang, Z., Bailey, R., <b>Park, S.</b>, and Jeong, J (June, 2023). <i>Exploring the Controlling Factors on the Process of Salt Transport within the Upper Colorado River Basin Using APEX-MODFLOW-Salt</i>, at the 2023 UCOWR Annual Water Resources Conference,  Fort Collins, CO, United States.</p> <p>25. <b>Park, S.</b>, Abitew, T., and Jeong, J (March, 2023). <i>Reproducible Parameter Estimation Framework for Integrated Hydrological Models</i>, at the 2nd PEST Conference,  La Jolla, CA, United States.</p> |
| 2022 | <p>24. Jeong, J. and <b>Park, S.</b> (July, 2022). <i>Assessment of Spatial and Temporal Variability of Water Resources and Fluxes in the Okavango Basin</i>, at the 2022 International SWAT Conference,  Prague, Czechoslovakia.</p> <p>23. <b>Park, S.</b>, Han, H., Abitew, TA., Jeong, J., and Green, C (June, 2022). <i>Climate Change Impacts on Water Balance and Groundwater/Surface Water Interactions in the Colorado River Basin</i>, at the 2022 World Environmental &amp; Water Resources Congress,  Atlanta, GA, United States.</p>  |



21. **Park, S.**, Abitew, T.A., Jeong, J., Han, H., and Green, C (December, 2021). *Reproducible Parameter Estimation Framework for Integrated Hydrological Models as Evidenced in the Colorado River Basin*, Poster presented at the AGU Fall Meeting 2021, New Orleans, LA, United States.
20. Han, H., Abitew, T.A., **Park, S.**, Green, C., and Jeong, J (December, 2021). *A Machine Learning Approach for Assessing Wildfire Vulnerability in the Colorado River Basin*, Poster presented at the AGU Fall Meeting 2021, New Orleans, LA, United States.
- 2020     19. **Park, S.**, White, M.J., Gao, J., Bieger, K., and Arnold, J.G (August, 2020). *Analysis and visualization of large-scale model output with an interactive web-based dashboard*, at the 2020 Annual Water Resources Conference, Virtual.
- 2019     18. Sheng, Z., Ahn, S., Jung, C., **Park, S.**, Bailey, R., Granados-Olivas, A., Mirchi, A., Samimi, M. and Hargrove, W.L (December, 2019). *Coupled SWAT-MODFLOW Modeling for Determining Groundwater Sustainability Under Climate and Pumping Scenarios in a Semi-Arid Agricultural Watershed*, at the AGU Fall Meeting 2019, San Francisco, CA, United States.
17. **Park, S.**, Bailey, R.T., Schürz, C., Arnold, J.G., and Bieger, K (July, 2019). *Framework for quantifying uncertainty, sensitivity, and estimating parameters for SWAT+ with MODFLOW routines*, at the 2019 International SWAT Conference, Vienna, Austria.
16. Bailey, R.T., **Park, S.**, Navarro, E.M., Liu, W., Wei, X. and Trolle, D (July, 2019). *SWAT-MODFLOW: Recent Applications and an Introduction to Version 3*, at the 2019 International SWAT Conference, Vienna, Austria.
15. Bailey, R.T., **Park, S.**, Bieger, K., and Arnold, J.G (July, 2019). *Enhancing groundwater flow and groundwater-surface exchange simulation in SWAT+ using MODFLOW routines*, at the 2019 International SWAT Conference, Vienna, Austria.
14. Yen, H., **Park, S.**, Arnold, J.G., Chawanda, C.J. and Griensven, A.V (July, 2019). *IPEAT+: FORTRAN-based Automatic Calibration Tool Coupled with SWAT+*, at the 2019 International SWAT Conference, Vienna, Austria.
13. Chawanda, C.J., Yen, H., Arnold, J.G., Griensven, A.V., and **Park, S.** (July, 2019). *IPEAT+UI: An Automatic Calibration Tool with User Interface of SWAT+*, at the 2019 International SWAT Conference, Vienna, Austria.
- 2018     12. Ahn, S., Sheng, Z., **Park, S.**, and Bailey, R. T (December, 2018). *Surface Water-Groundwater modeling for Semi-Arid Agricultural Areas using SWAT-MODFLOW*, at the 2018 Fall Meeting AGU, Washington, D.C., United States.
11. **Park, S.**, Bailey, R.T., Bieger, K., and Arnold, J.G (September, 2018). *Coupling the SWAT+ and MODFLOW codes for enhanced surface / subsurface flow modeling in watersheds*, at the 2018 International SWAT Conference, Brussels, Belgium.

10. Molina-Navarro, E., Bailey, R.T., Andersen, H.E., Thodsen, H., Nielsen, A., **Park, S.**, Jensen, J. S., Jensen, J. B., and Trolle, D (September, 2018). *Comparison of performance and simulation of groundwater abstraction scenarios*, at the 2018 International SWAT Conference,  Brussels, Belgium.
9. **Park, S.**, and Bailey, R. T (June, 2018). *Methodology for quantifying model factor sensitivity, uncertainty, and estimation for integrated groundwater/surface water hydrologic models*, at the 9th International Congress on Environmental Modelling & Software,  Fort Collins, CO, United States. 
8. Bailey, R.T., **Park, S.**, Bieger, K., and Arnold, J.G (June, 2018). *A new model for simulating surface-subsurface hydrological processes at the watershed scale*, at the 9th International Congress on Environmental Modelling & Software,  Fort Collins, CO, United States. 
7. **Park, S.**, Nielsen, A., Bailey, R.T., Trolle, D., and Bieger, K (June, 2018). *A QGIS-based graphical user interface for application and evaluation of SWAT-MODFLOW models*, at the 9th International Congress on Environmental Modelling & Software,  Fort Collins, CO, United States. 
6. Saadatpour, A., Alizadeh, A., Ziaei, A.N., Bailey, R.T., **Park, S.**, Izady, A., and A.H. Zahraee (April, 2018). *A model for simulating coupled groundwater/surface water hydrology and impact of groundwater pumping in arid irrigated watersheds*, at the EGU General Assembly 2018,  Vienna, Austria.
- 2017 5. Bieger, K., Bailey, R.T., **Park, S.**, and Arnold, J.G (November, 2017). *Development of an improved modeling framework for simulating nutrient transport in tile-drained watersheds*, at the 2017 AWRA Annual Conference,  Portland, OR., United States.
4. Bailey, R.T, and **Park, S.** (October, 2017). *SWAT-MODFLOW: Hydrologic and Water Quality Modeling Tool for Coupled Land Surface / Groundwater Systems*, at the ASA-CSSA-SSSA 2017,  Tampa, FL, United States.
- 2016 3. Bailey, R.T, Wei, X., **Park, S.**, Rathjens, H., Bieger, K., Abbas, S., and Ajaaj, A (November, 2016). *Recent Advances in using SWAT-MODFLOW to Simulate Hydrological Processes in River Basins*, at the 2016 AWRA Annual Water Resources Conference,  Orlando, FL, United States.
2. **Park, S.**, Bailey, R.T., and Bieger, K (July, 2016). *Quantifying Surface Water and Groundwater Resources in the Middle Bosque, Texas Watershed using the Coupled SWAT-MODFLOW Model*, at the 2016 International SWAT conference,  Beijing, China.
1. Bailey, R.T., Rathjens, H., Bieger, K., **Park, S.**, and Wei, X (July, 2016). *SWATMOD-Prep: A Graphical User Interface for Preparing Coupled SWAT-MODFLOW simulations*, at the 2016 International SWAT conference,  Beijing, China.

# Funding Activity

Icons link to additional content

## Under review

1. Development of a Novel Water Quality Index Considering Impacts of Natural and Anthropogenic Hazards using APEX-MODFLOW. January 2023 to December 2025. *Environmental Protection Agency (EPA), United States* . Proposed budget: \$734,219. **Role:** Co-PI. PI: Jaehak Jeong. FTE: 0.50.

## Current projects

1. Soil Health Demonstrations to Increase Regenerative Agricultural Intensification in Southern High Plains. September 2024 to September 2029. *USDA-Natural Resources Conservation Services* . Proposed budget: \$4,999,387. **Role:** Co-PI. PI: Joseph Burke. FTE: 0.20.
2. Climate-Smart Agricultural Water Resource Adaptation Platform. November 2023 to December 2025. *Rural Development Administration of the Republic of Korea* . Total budget: \$540,000. **Role:** Co-PI. PI: Jaehak Jeong. FTE: 0.50 to 1.00 across project years.
3. Development of Catchment-scale Computational Model for Assessing Climate Change Impact and Risks on Water Environment in Agriculture. January 2023 to December 2025. *Rural Development Administration (RDA), Korea* . Total budget: \$540,000. **Role:** Co-PI. PI: Jaehak Jeong. FTE: 0.30 to 0.50 across project years.

## Completed projects

1. Koksilah SWAT-MODFLOW model optimization. November 2023 to March 2024. *University of Victoria, Canada* . Total budget: \$20,000. **Role:** PI. PI: Seonggyu Park. FTE: 0.70 to 1.00 across project years.
2. Assessment of Water, Salt, Fire and Land Management in Colorado River Basin using APEX. May 2017 to August 2023. *Bureau of Land Management (BLM), United States* . Total budget: \$2,404,036. **Role:** Assistant Research Scientist. PI: Jaehak Jeong. FTE: 1.00.
3. Development of DayCent Optimization framework with the Differential Evolution Adaptive Metropolis (DREAM) algorithm. January 2023 to March 2023. *Agoro Carbon Alliance, United States* . Total budget: \$25,000. **Role:** Co-PI. PI: Jaehak Jeong. FTE: 0.10 to 0.50 across project years.
4. SWAT-MODFLOW modeling to support resilient development and return on investment analyses in the Cubango-Okavango River Basin (CORB). April 2020 to April 2021. *The Nature Conservancy (TNC), United States* . Total budget: \$30,000. **Role:** Co-PI. PI: Jaehak Jeong. FTE: 0.10 to 0.50 across project years.

# Professional Service

## Workshops delivered

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10. Integrated Hydrological Modeling Practices and Uncertainty Analysis, number of attendees: 34, (July 24-26, 2024). *Korea Institute of Geoscience and Mineral Resources*, Daejeon, South Korea.
9. ArcAPEX for Agricultural Watershed Modeling Workshop | Uncertainty Analysis (4th Day), number of attendees: 8, (April 18-21, 2023). *Blackland Research and Extension Center, Temple, TX*, Virtual.
8. SWAT-MODFLOW Workshop, number of attendees: 6, (Jul. 27-29, 2022). *Korea Institute of Civil Engineering and Building Technology*, Goyang, South Korea.
7. SWAT-MODFLOW / QSWATMOD, number of attendees: 15, (May 6, 2022). *Ulsan National Institute of Science and Technology (UNIST)*, Ulsan, South Korea.
6. ArcAPEX for Agricultural Watershed Modeling Workshop | APEX-MODFLOW (3rd Day), number of attendees: 39, (Mar. 16-18, 2022). *Blackland Research and Extension Center, Temple, TX*, Virtual.
5. Salinity Modeling Workshop (3 hours-session), number of attendees: 20, (Jan. 26, 2022). *Blackland Research and Extension Center, Temple, TX*, Virtual.
4. SWAT-MODFLOW / QSWATMOD with Dr. Ryan Bailey, number of attendees: 11, (Jul. 15-16, 2019). *2019 International SWAT Conference*, Vienna, Austria.
3. SWAT-MODFLOW / QSWATMOD with Dr. Ryan Bailey, number of attendees: 20, (Sep. 17-18, 2018). *2018 International SWAT Conference*, Brussels, Belgium.
2. Introduction to QSWATMOD, number of attendees: 20, (Jun. 24, 2018). *9th International Congress on Environmental Modelling & Software*, Fort Collins, CO, United States.
1. Introduction to SWAT-MODFLOW / Model Optimization with PEST, number of attendees: 7, (Nov. 16, 2017). *Aarhus University*, Aarhus, Denmark.

## Invited talks

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8. Reproducible framework for model calibration and uncertainty analysis, (Jan. 9, 2025). *Texas A&M AgriLife Research*, Temple, TX, United States.
7. Foundational Approaches to Predicting Carbon Dynamics and Greenhouse Gas Emissions in Cropland Ecosystems, (Jul. 18, 2024). *National Institute of Agricultural Sciences (NAS)*, Wanju-gun, South Korea.

6. Introduction to modeling practices for predicting Carbon dynamics and GHG emissions in croplands, (Jun. 19, 2024). *USDA Agricultural Research Service*, Jonesboro, AK, United States.
5. Uncertainty Quantification of Nitrate Transport Simulation for Integrated Hydrological Models, (Jun. 30, 2023). *National Institute of Agricultural Sciences (NAS)*, Wanju-gun, South Korea.
4. Assessment of spatio-temporal variation of water resource and fluxes using integrated models, (Jun. 23, 2022). *2022 UST Global Mentoring Conference*, Virtual.
3. Overview of SWAT / SWAT+, (May 4, 2022). *National Academy of Agricultural Sciences*, Wanju-gun, South Korea.
2. Fundamentals of Hydrogeology and Model Applications, (Apr. 28, 2022). *Dankook University*, Cheonan, South Korea.
1. Introduction to the SWAT-MODFLOW model, (Aug. 11, 2016). *Ulsan National Institute of Science and Technology (UNIST)*, Ulsan, South Korea.

## Teaching

*Icons link to additional content*

### Graduate Student Committee Involvement

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|---------------|---|
| Spring 2025 — | <b>Co-promotor</b> , Master program in Water and Climate Department, Vrije Universiteit Brussel,  Brussel, Belgium  |
| Fall 2024 —   | <b>Committee member</b> , Kangwei Shin from China, Master program in Civil & Environmental Engineering, Hanbat National University, Chair: Jin Chul Joo,  Daejeon, South Korea                                  |
| Fall 2024 —   | <b>Committee member</b> , Suryeon Kim from China, Master program in Civil & Environmental Engineering, Hanbat National University, Chair: Jin Chul Joo,  Daejeon, South Korea                                   |
| Fall 2023 —   | <b>Committee member</b> , Ali Akram Niazi from Pakistan, Ph.D program in Water Management & Hydrological Science (WMHS), Texas A&M University, Chair: Huilin Gao (WMHS),  College Station, Texas, United States |

### Related experience

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- Provided in-depth instruction on 2D and 3D groundwater flow modeling in Groundwater Hydrology (CIVE423), covering model construction using tools like Excel, Text Editor, and ModelMuse, while bridging theoretical concepts with practical applications to help students translate conceptual models into computational frameworks.. (2018 — 2018). **MODFLOW**

- Developed and implemented lesson plans encompassing software programs such as Excel, Word, Access, Outlook, and PowerPoint through hands-on demonstrations and personalized support. (2011 – 2012).
- Provided undergraduate students with a broad introduction into 2-dimensional and 3-dimensional Computer-Aided Design (CAD) with a focus on construction and architecture-specific applications including environmental infrastructure. (2004 – 2006). *AutoCAD*
- Taught an industry-leading CAD software program (Autodesk AutoCAD) to model construction projects and then create and distribute basic, industry-standard architectural drawings. (2004 – 2006). *AutoCAD*

## Journal issues edited

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2022 – 2023     **Guest editor**, [Special Issue “Impact of Climate Change on Watershed Hydrology: Latest Advances and Prospects”](#), Sustainability

## Fellowships & Awards

3. Whitney Borland Scholarship, Colorado State University, \$5000, (2017).
2. Whitney Borland Scholarship, Colorado State University, \$5000, (2016).
1. Hwashin E&B Affiliated Research Institute Foundation Research Award, Hwashin E&B, \$24000, (2014).

## Professional Affiliations

2. American Geophysical Union
1. American Water Resources Association