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SUNGWOOK WI

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Civil and Environmental Engineering
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Research Areas

- Assessing the impact of climate change and variability on water resources planning and management
- Terrestrial hydrologic models accounting for coupled natural and human-induced water cycle
- Evaluating regional climate change based on downscaled global and regional climate models
- Application of geographic information systems in hydrologic analysis and design
- Optimization techniques to hydrologic modeling and water resources planning and management
- Stochastic weather generation to evaluate sensitivity of hydrologic system to changes in climate
- Incorporating non-stationarity into frequency analysis of hydroclimatic variables.
- Utilizing high performance computing for hydrologic model calibration and uncertainty analysis

Education

- | | |
|-------------|---|
| 2012 | Doctor of Philosophy in Civil Engineering (Minor in Hydrology and Water Resources)
The University of Arizona, Tucson, AZ, U.S.A |
| 2008 | Master of Science in Water Resources and Environmental Engineering
Hanyang University, South Korea |
| 2006 | Bachelor of Science in Civil and Environmental System Engineering
Hanyang University, South Korea |

Honors

- 2011** **Salt River Project (SRP) Surface Water Hydrology Fellowship (2011)**
Awarded in 2011
- 2011** **Maria and James Hess Scholarship**
Awarded in 2011 Fall and 2012 Spring

Employment Experience

- 2016-** **Visiting Scientist**
Department of Hydrology and Atmospheric Sciences
The University of Arizona
- 2013-** **Postdoctoral Research Associate**
Department of Civil and Environmental Engineering,
University of Massachusetts Amherst
- 2009-12** **Research Assistant**
Department of Hydrology and Water Resources, The University of Arizona
- 2006-08** **Research Assistant**
Water Resources and Environmental Engineering, Hanyang University, South
Korea

Teaching Experience

- Fall 2012** **Teaching Assistant**
Water resources planning and management, The University of Arizona
- Spr 2012** **Teaching Assistant**
Statistical hydrology, The University of Arizona
- Fall 2006** **Teaching Assistant**
Probability and statistics, Hanyang University, South Korea
- Spr 2007** **Teaching Assistant**
Hydrology, Hanyang University, South Korea

Research Advising Experience

- *PhD Committee Member*
 - Muhammad Ajmal, Department of Civil and Environmental Engineering Hanyang University, S2015: “Assessment and development of event based rainfall-runoff models for improved surface direct runoff estimation.”

Publications

- *Peer reviewed journal articles*
 1. Yang, Y.C.E., **Wi, S.** (2017), Informing regional water-energy-food nexus with system analysis and interactive visualization – A case study in the Great Ruaha River of Tanzania, *Agricultural Water Management*, Accepted.
 2. **Wi, S.**, Ray, P.A., Demaria, E.M.C., Steinschneider, S., Brown, C.M. (2017), A user-friendly software package for VIC hydrologic model development, *Environmental Modelling & Software*, 98, 35-53.
 3. Khan, H., Yang, Y., Ringler, C., **Wi, S.**, Cheema, M., Basharat, M. (2016), Guiding groundwater policy in the Indus Basin of Pakistan using a physically based groundwater model, *Journal of Water Resources Planning and Management*, 05016014, doi: 10.1061/(ASCE)WR.1943-5452.0000733
 4. Valdés-Pineda, R., Demaria, E.M.C., Valdés, J. B., **Wi, S.**, Serrat-Capdevila, A. (2016), Bias correction of daily satellite-based rainfall estimates for hydrologic forecasting in the Upper Zambezi, Africa, *Hydrol. Earth Syst. Sci. Discuss.*, doi:10.5194/hess-2016-473
 5. Demaria, E.M.C., Roundy, J.K., **Wi, S.**, Palmer, R.N. (2016), The effects of climate change on seasonal snowpack and the hydrology of the Northeastern and Upper Midwest, U.S., *Journal of Climate*, doi: 10.1175/JCLI-D-15-0632.1
 6. Yang, Y.C.E., **Wi, S.**, Ray, P.A., Brown, C.M., and Khalil, A.F. (2016), The future nexus of the Brahmaputra River Basin: Climate, water, energy and food trajectories, *Global Environmental Change*, 37, 16-30, doi:10.1016/j.gloenvcha.2016.01.002
 7. **Wi, S.**, Valdés, J. B., Steinschneider, S., and Kim, T. W. (2016), Non-stationary frequency analysis of extreme precipitation in South Korea using peaks-over-threshold and annual

- maxima, *Stochastic Environmental Research and Risk Assessment*, 30, 583-606, doi: 10.1007/s00477-015-1180-8.
8. Ajmal, M., Waseem, M., **Wi, S.**, and Kim, T. W. (2015), Evolution of a parsimonious rainfall-runoff model using soil moisture proxies, *Journal of Hydrology*, 530, 623-633.
 9. Ray, P. A., Yang, Y. C. E., **Wi, S.**, Khalil, A., Chatikavanij, V. and Brown, C. (2015), Room for improvement : Hydroclimatic challenges to poverty-reducing development of the Brahmaputra River basin, *Environmental Science & Policy*, 54, 64-80, doi:10.1016/j.envsci.2015.06.015.
 10. Steinschneider, S., McCrary, R., **Wi, S.**, Mulligan, K., Mearns, L. O., and Brown, C. (2015), An augmented decision-scaling framework to select robust long-term water system plans under hydro-climatic uncertainties, *Journal of Water Resources Planning and Management*, 04015023, doi: 10.1061/(ASCE)WR.1943-5452.0000536.
 11. **Wi, S.**, Yang, Y. C. E., Steinschneider, S., Khalil, A., and Brown, C. (2015), Calibration approaches for distributed hydrologic models in poorly gaged basins: Implication for streamflow projections under climate change, *Hydrology and Earth System Sciences*, 19, 857-876, doi:10.5194/hess-19-857-2015.
 12. Steinschneider, S., **Wi, S.**, and Brown, C. (2015), The integrated effects of climate and hydrologic uncertainty on future flood risk assessments, *Hydrological Processes*, 29, 2823-2839, doi:10.1002/hyp.10409.
 13. **Wi, S.**, Dominguez, F., Durcik, M., Valdés, J., Diaz, H. F. and Castro, C. (2012), Climate Change Projection of Snowfall in the Colorado River Basin using Dynamical Downscaling. *Water Resour. Res.*, 48, W05504, doi:10.1029/2011WR010674.
 14. **Wi, S.**, Chung, G., and Kim, T.W. (2008), Development of a comprehensive flood index through standardizing distributions of runoff characteristics, *Journal of Korea Water Resources Association*, 41(6), 605-617, doi: 10.3741/JKWRA.2008.41.6.605
- *Peer reviewed journal articles in review/preparation*
1. Ray, P.A., Bonzanigo, L., **Wi, S.**, Yang, Y.C.E., Karki, P., Garcia, L., Rodriguez, D., Brown, C. Multidimensional resilience assessment of hydropower investments to climate, geophysical and economic uncertainty, under review at *Global Environmental Change*.

2. **Wi, S.**, Ray, P.A., Freeman, S., Rheinheimer, D., Yang, Y.C.E., Brown, C. A framework for human-hydrologic system model (HHSM) development integrating hydrology and river regulations: application to the Cutzamala water system in Mexico, in preparation.
3. Ray, P.A., **Wi, S.**, Schwarz, A., Correa, M., Brown, C. Water Storage, Delivery, and Delta Outflow in the California Central Valley Water System under Climate Change, in preparation.
4. Francois, B., Schlef, K.E., **Wi, S.**, Brown, C.M. Design Considerations for Hydrologic Extremes in a Changing Climate, in preparation.

- *Conference proceedings and presentations*

1. Khan, H.F., **Wi, S.**, Brown, C. (2017), Evaluating the effect of future climatic and socioeconomic changes on urban water supply performance in San Francisco, 2017 World Environmental & Water Resources Congress.
2. Ray, P., Brown, C., **Wi, S.**, Schwarz, A., Correa, M., Zelazo, M. (2017), Climate change stress test for the California Department of Water Resources - Methodology, 2017 World Environmental & Water Resources Congress.
3. Schwarz, A., Ray, P., **Wi, S.**, Brown, C. (2017), Analysis of California's water system to climate change using decision scaling, 2017 World Environmental & Water Resources Congress.
4. Valdés-Pineda, R., Valdés, J. B., Demaria, E.M.C., Serrat-Capdevila, A., **Wi, S.** (2017), Evaluation of Bias Correction Approaches for Daily Satellite-based Rainfall Estimates in the Upper Zambezi, Africa, American Meteorological Society.
5. Yang, Y.C.E., **Wi, S.**, Liden, R. (2016), Informing Regional Water-Energy-Food Nexus with System Analysis and Interactive Visualizations, Eos Trans. AGU, 97(52), Fall Meet. Suppl., Abstract PA43B-2226.
6. Valdés, J. B., Demaria, E.M., **Wi, S.**, Serrat-Capdevila, A., Valdés-Pineda, R., Durcik, M. (2016), Evaluating the performance of real-time streamflow forecasting using multi-satellite precipitation products in the Upper Zambezi, Africa, Eos Trans. AGU, 97(52), Fall Meet. Suppl., Abstract GC44A-06.

7. Valdés-Pineda, R., Valdés, J. B., Serrat-Capdevila, A., **Wi, S.**, Demaria, E.M., Roberts, J.B., Robertson, F.R. (2016), Skill Analysis of Seasonal Streamflow Forecasting for the Upper Zambezi, Africa, Eos Trans. AGU, 97(52), Fall Meet. Suppl., Abstract H51I-1646.
8. Schwarz, A., Ray, P., Brown, C., **Wi, S.** (2016), Effective Decision Maker-Scientist Engagement: Climate Change Vulnerability Analysis of California's Water System to Using Decision Scaling, Proceedings of the American Geophysical union 2016 Fall Meeting, San Francisco, CA, 12-16 December.
9. **Wi, S.**, Ray, P., Brown, C. (2016), A user-friendly software package to ease the use of VIC hydrologic model for practitioners, Proceedings of the American Geophysical union 2016 Fall Meeting, San Francisco, CA, 12-16 December.
10. Ray, P., Schwarz, A., **Wi, S.**, Correa, M., Brown, C. (2015), Evaluating options for improving California's drought resilience, Proceedings of the American Geophysical union 2015 Fall Meeting, San Francisco, CA, 14-18 December.
11. **Wi, S.**, Yang, Y.C.E., Ray, P., Brown, C. (2015), Modular modeling system for building distributed hydrologic models with a user-friendly software package, Proceedings of the American Geophysical union 2015 Fall Meeting, San Francisco, CA, 14-18 December.
12. Ray, P., Bonzanigo, L., Taner, U., **Wi, S.**, Yang, Y.C.E., Brown, C. (2015), Lessons learned from applications of a climate change decision tree to water system projects in Kenya and Nepal, Proceedings of the American Geophysical union 2015 Fall Meeting, San Francisco, CA, 14-18 December.
13. **Wi, S.**, Isenstein, L., Yang, Y.C.E., Brown, C. (2015), Multi-Target Calibration with a VIC Hydrologic Model: Impacts of Climate Change and Risk Assessment in the Colorado River Basin, Eos Trans. AGU, 96(52), Fall Meet. Suppl., Abstract H51N-1602.
14. Valdes, J.B., **Wi, S.**, Serrat-Capdevila, A., Demaria, E.M., Durcik, M. (2015), A satellite Driven Real-time Forecasting Platform in the Upper Zambezi Basin: A Multi-model Comparison, Eos Trans. AGU, 96(52), Fall Meet. Suppl., Abstract H23L-07.
15. Serrat-Capdevila, A., Valdes, J.B., **Wi, S.**, Roy, T., Roberts, J.B., Robertson, F.R., Demaria, E.M. (2015), Seasonal Streamflow Forecasts for African Basins, Eos Trans. AGU, 96(52), Fall Meet. Suppl., Abstract H31L-07.

16. Yang, Y.C.E., **Wi, S.**, Brown, C.M. (2015), The Development of a Glacio-hydrologic Model in the River Basin Context: Applicability for Climate Change Risk Assessment, *Eos Trans. AGU*, 96(52), Fall Meet. Suppl., Abstract C51C-0751.
17. Khan, H.F., Yang, Y.C.E., **Wi, S.**, Ringler, C., Cheema, M.J.M, Bashart, M. (2015), Guiding groundwater policy in the Indus Basin using a physically-based groundwater model, *Eos Trans. AGU*, 96(52), Fall Meet. Suppl., Abstract GC33C-1299.
18. Isenstein, E. M., **Wi, S.**, Yang, Y. C. E., and Brown, C. (2015), Calibration of a Distributed Hydrologic Model Using Streamflow and Remote Sensing Snow Data, *World Environmental and Water Resources Congress 2015*, 973-982, doi: 10.1061/9780784479162.093.
19. **Wi, S.**, Khalil, A.F., Yang, Y.C.E. (2014), Assessing the climate impact on snow-glacier melting dominated basins in the Greater Himalaya region using a distributed glacio-hydrologic model, *Eos Trans. AGU*, 95(52), fall Meet. Suppl., Abstract GC13E-0694.
20. **Wi, S.**, Brown, C.M. (2014), Estimating design storms using Bartlett-Lewis rainfall model in a climate change scenario, *World Environmental and Water Resources Congress*, Portland, OR, USA, June 2014.
21. Yang, Y., Ray, P., **Wi, S.**, and Brown, C. (2014), Climate change risk on the water resources management of Himalayan Basins, *World Environmental and Water Resources Congress 2014*, 2118-2126, doi: 10.1061/9780784413548.211.
22. Ray, P.A., **Wi, S.**, Schwarz, A., Correa, M., Brown, C.M. (2014), A drought vulnerability analysis of California's Central Valley Project, Second Annual Workshop on Decision Making Under Deep Uncertainty, RAND Corporation, Santa Monica, CA, 18-19 November.
23. Yang, Y.C.E., Ray, P.A., **Wi, S.**, Brown, C.M., Khalil, A.F. (2014), Modeling the Brahmaputra River: Hydrology, hydropower, flooding and human systems, *Proceeding of the Assam Water Conference and Internal Meeting*, Guwahati, India, 3-7 February.
24. **Wi, S.**, Brown, C.M. (2013), Exploring the effect of spatial disaggregation of conceptual hydrologic models for improved flow forecasting, *Eos Trans. AGU*, 94(52), Fall Meet. Suppl., Abstract H23A-1225.
25. Steinschneider, S., **Wi, S.**, Brown, C.M. (2013) The integrated effects of future climate and hydrologic uncertainty on sustainable flood risk management, *Proceedings of the American Geophysical union 2013 Fall Meeting*, San Francisco, CA, 9-13 December.

26. Ray, P.A., Yang, Y.C.E, **Wi, S.**, Brown, C.M. (2013), Future Visions of the Brahmaputra - Establishing Hydrologic Baseline and Water Resources Context, Proceedings of the American Geophysical union 2013 Fall Meeting, San Francisco, CA, 9-13 December.
27. **Wi, S.**, Dominguez, F., Durcik, M., Valdes, J.B., Diaz, H. (2010), Climate Change Projections using Dynamical downscaling for the Colorado River Basin, Eos Trans. AGU, 91(52), Fall Meet. Suppl., Abstract GC43F-1023.

- *Professional reports*

1. Brown, C., Steinschneider, S., **Wi, S.**, Weatherly, J., Case, M., Hayden, T., Koster, A., Mearns, L., Bukovsky, M., McCrary, R. (2016), Climate Risk Assessment: Technical Guidance Manual for DoD Installations and Built Environment, Department of Defense Strategic Environmental Research and Development Program (SERDP).
2. Brown, C., Weatherly, J., Mearns, L., Steinschneider, S., Wi, S., Case, M., Hayden, T., Koster, A., Bukovsky, M., McCrary, R. (2016), Decision-Scaling: A decision framework for DoD climate risk assessment and adaptation, University of Massachusetts Amherst, USA.
3. Yang, Y., **Wi, S.**, and Liden, R. (2015), Water resources system analysis for the Usangu Plains and its subbasins Tanzania, *World Bank*, Washington D. C. USA.
4. Yang, Y., **Wi, S.**, Brown, C. M., and Khalil, A. F. (2014), Strategic Assessment of Hydropower Development Alternatives in the Kunar River Basin of Afghanistan and Pakistan: Water Balance and Climate Change Analyses, *World Bank*, Washington D. C. USA.
5. Ray, P. A., Yang, Y., **Wi, S.**, Brown, C. M., Khalil, A. F., and Chatikavanij, V. (2014), State of the Brahmaputra River Basin: Hydro-climate and Anthropocentric Water Systems, *World Bank*, Washington D. C. USA.

Research Grants

Co-PI: World Bank 1173286: Including Climate Uncertainty in Water Resources Planning and Project Design: Pilot Studies, 2015-2017, \$609,386

Co-PI: CA Department of Water Resources: California Climate Risk: Evaluation of Climate Risks and Adaptation Options, 2016-2017, \$188,333

Journal Reviewer

Climatic Change
 Hydrology and Earth System Sciences
 Hydrological Sciences Journal
 Journal of Cleaner Production
 Journal of Geophysical Research – Atmosphere
 Journal of Hydrologic Engineering
 Journal of Hydro-environmental Research
 KSCE Journal of Civil Engineering
 Stochastic Environmental Research and Risk Assessment
 Weather and Climate Extremes
 Water Resources Research

Computer/Programming skill

Languages	C, Matlab, R, Python, FORTRAN, HTML, JavaScript
Software	Matlab, ArcGIS, SPSS, SAS, EPANET The Hydrologic Engineering Center (HEC) software: RAS, SSP, HMS All aspects of Windows platform (Word, PowerPoint, Excel)
Operation systems	Windows, Unix and Linux
Hydrologic models	VIC (developed at the University of Washington) PRMS (developed at USGS) SAC-SMA (NWS)

References

Dr. Juan B. Valdes
(PhD Advisor)

Professor

Hydrology and Water
Resources

The University of Arizona

Dr. Casey Brown
(PostDoc Advisor)

Professor

Civil and Environmental
Engineering

University of Massachusetts
Amherst