

Koong Yi

Earth & Environmental Sciences Area
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RESEARCH INTEREST

Forest ecology, ecosystem carbon and water cycling, plant physiology

EDUCATION

- Ph.D. degree in Environmental Science January 2019
 - Indiana University Bloomington, IN
 - Advisor: Kimberly A. Novick
 - Research Committee: Kimberly A. Novick, Richard P. Phillips, Lixin Wang, Taehee Hwang
 - Dissertation: Impact of Drought on Species-specific Carbon Balance and Water Use

- Master's degree in Ecology and Environmental Biology August 2011
 - Korea University, Seoul, Korea
 - Advisor: Yowhan Son
 - Dissertation: A process-based model of forest soil carbon dynamics in Korea: model description and application

- Bachelor's degree in Environmental Science and Ecological Engineering February 2007
 - Korea University, Seoul, Korea

RESEARCH EXPERIENCES

- Lawrence Berkeley National Laboratory, CA: 2021 – Present Postdoctoral Scholar
 - Department: Earth & Environmental Sciences Area
 - Supervisors: Margaret S. Torn, Dennis D. Baldocchi
 - Projects:

- Co-lead AmeriFlux theme “the Year for Water Fluxes” activities, including planning workshops and interacting with scientists and stakeholders from participating communities.
 - Lead and conduct collaborative research related to water fluxes using AmeriFlux data.

- University of Virginia, VA: 2019 – 2021 Postdoctoral Research Associate
 - Department: Environmental Sciences
 - Supervisor: Xi Yang
 - Projects:
 - Continuous monitoring of tree canopy temperature using a thermal infrared camera coupled with sap flux measurement.
 - Monitoring solar-induced fluorescence (SIF) using the Fluospec2 system at the sites in Virginia, New Mexico, and Alaska.
 - Evaluation of marginal water use efficiency parameter and its sensitivity to changing vapor pressure deficit across various types of vegetation.
 - Monitoring leaf-angle variability of trees growing in temperate forests (Virginia & Indiana).

- Indiana University Bloomington, IN: 2013 – 2019 Ph.D. studies
 - Department: O’Neill School of Public and Environmental Affairs
 - Advisor: Kimberly A. Novick
 - Projects:
 - Impact of a severe drought on stem water uptake of isohydric and anisohydric species using sap flux, leaf gas exchange, and eddy-covariance measurements.
 - Impact of water stress on intrinsic water use efficiency and carbon assimilation of isohydric and anisohydric species using dendrochronology, leaf gas exchange, and eddy-covariance measurements.
 - Evaluation of ecosystem vulnerability to water stress across FLUXNET sites using stomatal optimization models.

- National Institute of Forest Science, Seoul, Korea: 2012 – 2013 Research Fellow
 - Department: Forest Conservation
 - Supervisor: Sang-Won Bae
 - Projects:
 - Monitoring the growth of *Pinus densiflora* and *Lespedeza cyrtobotrya* seedlings to restore/improve the quality of soil properties at an abandoned coal mine.

- Korea University, Seoul, Korea: 2009 – 2011 Master’s studies
 - Department: Environmental Science and Ecological Engineering

- Advisor: Yowhan Son
- Projects:
 - Development of a process-based soil carbon dynamics model for temperate forest ecosystems in Korea (Korean Forest soil carbon model, KFSC).
 - Effects of open-field experimental warming on the leaf phenology of pine and oak seedlings.

OTHER EXPERIENCE

- Military service (Republic of Korea Army): 2007 – 2009
 - Administrative clerk at 5th Artillery Brigade Headquarter

PUBLICATIONS

- Yi, K.**, Zhang, Q., Wang, L., Hwang, T., Yang, X., Novick, K.A. Variability of marginal and intrinsic water-use efficiency in response to changing atmospheric water demand. *New Phytologist* (in review).
- Li, R., Lombardozzi, D., Shi, M., Frankenberg, C., Parazoo, N.C., Köhler, P., **Yi, K.**, Suyker, A.E., Guan, K., Yang, X. Representation of leaf-to-canopy radiative transfer processes improves simulation of far-red solar-induced chlorophyll fluorescence in the Community Land Model version 5. *Journal of Advances in Modeling Earth Systems* (in review).
- Poyatos, R. et al (**Yi, K.** among total 164 authors). 2021. Global transpiration data from sap flow measurements: the SAPFLUXNET database. *Earth System Science Data* 13(6): 2607-2649.
- Yi, K.**, Smith, J., Jablonski, A., Tatham, E., Lerdau, M., Scanlon, T., Novick, K., Yang, X. 2020. High heterogeneity in canopy temperature among co-occurring tree species in a temperate forest. *Journal of Geophysical Research: Biogeosciences* 125(12): e2020JG005892.
- Denham S.O., Oishi, A.C., Miniati, C.F., Wood, J.D., **Yi, K.**, Benson, M.C., Novick, K.A. 2020. Eastern US deciduous tree species respond dissimilarly to soil moisture but similarly to evaporative demand during hydrologic stress. *Tree Physiology*.
<https://doi.org/10.1093/treephys/tpaa153>
- Zhang, Q., Barnes, M., Benson, M., Burakowski, E., Oishi, A.C., Ouimette, A., Sanders-DeMott, R., Stoy, P.C., Wenzel, M., Xiong, L., **Yi, K.**, Novick, K.A. 2020. Reforestation and surface cooling in temperate zones: mechanisms and implications. *Global Change Biology* 26(6): 3384-3401.
- Maxwell, J.T., Harley, G.L., Mandra, T.E., **Yi, K.**, Kannenberg, S.A., Au, T.F., Robeson, S.M., Pederson, N., Sauer, P.E., Novick, K.A. 2019. Higher CO₂ concentrations and lower

- acidic deposition have not changed drought response in tree growth but do influence iWUE in hardwood trees in the Midwestern United States. *Journal of Geophysical Research: Biogeosciences* 124(12): 3798-3813.
- Yi, K.**, Maxwell, J.T., Wenzel, M.K., Roman, D.T., Sauer, P.E., Phillips, R.P., Novick, K.A. 2019. Linking variation in intrinsic water-use efficiency to isohydricity: a comparison at multiple spatiotemporal scales. *New Phytologist* 221(1): 195-208.
- Yi, K.**, Dragoni, D., Phillips, R.P., Roman, D.T., Novick, K.A. 2017. Dynamics of stem water uptake among isohydric and anisohydric species experiencing a severe drought. *Tree Physiology* 37(10): 1379-1392.
- Sulman, B.N., Roman, D.T., **Yi, K.**, Wang, L., Phillips, R.P., Novick, K.A. 2016. High atmospheric demand for water can limit forest carbon uptake and transpiration as severely as dry soil. *Geophysical Research Letters* 43: 9686-9695.
- Han, S., Chung, H., Noh, N.J., Lee, S.J., Jo, W., Yoon, T.K., **Yi, K.**, Park, C.W., Ko, S., Son, Y. 2014. Effect of open-field experimental warming on the leaf phenology of oriental oak (*Quercus variabilis*) seedlings. *Journal of Plant Ecology* 7(6): 559-566.
- Yi, K.**, Park, C.W., Ryu, S.R., Lee, K.H., Yi, M.J., Kim, C., Park, G.S., Kim, R., Son, Y. 2013. Simulating the soil carbon dynamics of *Pinus densiflora* forests in central Korea. *Scandinavian Journal of Forest Research* 28(3): 241-256.
- Yi, K.**, Lim, J.H., Kim, J.H., Lee, I.K., Jeong, Y.H. 2013. Effects of soil covering depth and vegetation base materials on the competition between *Pinus densiflora* Siebold & Zucc. and *Lespedeza cyrtobotrya* Miq. at abandoned coal mine land in Gangwon, Korea. *Journal of Korea Society of Environmental Restoration Technology* 16(1): 99-107.
- Park, C.W., **Yi, K.**, Lee, J.Y., Lee, K.H., Yi, M.J., Kim, C., Park, G.S., Kim, R. Son, Y. 2013. Estimation of long-term effects of harvest interval and intensity, and post-harvest residue management on the soil carbon stock of *Pinus densiflora* stands using KFSC model. *Journal of Korean Forest Society* 102(1):82-89.
- Kim, J.H., Lim, J.H., **Yi, K.**, Lee, I.K., Jeong, Y.H. 2012. Effects of soil covering depth and vegetation base materials on the growth of *Lespedeza cyrtobotrya* Miq. in abandoned coal mine land in Gangwon, Korea. *Journal of Korea Society of Environmental Restoration Technology* 15(6): 61-67.
- Park, C.W., Ko, S., Yoon, T.K., Han, S., **Yi, K.**, Jo, W., Jin, L., Lee, S.J., Noh, N.J., Chung, H., Son, Y. 2012. Differences in soil aggregate, microbial biomass carbon concentration and soil carbon between *Pinus rigida* and *Larix kaempferi* plantations in Yangpyeong, central Korea. *Forest Science and Technology* 8(1): 38-46.
- Yoon, T.K., Noh, N.J., Kim, R.H., Seo, K.W., Lee, S.K., **Yi, K.**, Lee, I.K., Lim, J.H., Son, Y. 2011. Mass dynamics of coarse woody debris in an old-growth deciduous forest of Gwangneung, Korea. *Forest Science and Technology* 7(4): 145-150.
- Jo, W., Son, Y., Chung, H., Noh, N.J., Yoon, T.K., Han, S., Lee, S.J., Lee, S.K., **Yi, K.**, Jin, L. 2011. Effect of artificial warming on chlorophyll contents and net photosynthetic rate of

- Quercus variabilis* seedlings in an open-field experiment. *Journal of Korean Forest Society* 100(4): 733-737.
- Lee, A.R., **Yi, K.**, Son, Y., Kim, R., Kim, C., Park, G.S., Lee, K.H., Yi, M.J. 2010. Approaches for developing a Korean model through analysis of overseas forest soil carbon models. *Journal of Korean Forest Society* 99(6): 791-801.
- Son, Y., Lee, M.H., Noh, N.J., Kang, B.H., Kim, K.O., Yi, M.J., Byun, J.K., **Yi, K.** 2007. Fertilization effects on understory vegetation biomass and structure in four different plantations. *Journal of Korean Forest Society* 96(5): 520-527.

FIRST AUTHOR CONFERENCE PRESENTATIONS (* indicates oral presentation)

- *Yi, K.**, Yang, X. 2020. Impact of heat and water stress on SIF: from tower-based observation at a temperate forest. *AGU Fall Meeting Online*.
- Yi, K.**, Smith, J.W., Jablonski, A.D., Tatham, E.A., Lerdau, M.T., Scanlon, T.M., Novick, K.A., Yang, X. 2019. Species-specific relationship between leaf cooling and transpiration inferred from continuous on-site thermal imaging of tree canopy. *AGU Fall Meeting. San Francisco, CA*.
- *Yi, K.**, Maxwell, J.T., Wenzel, M.K., Roman, D.T., Sauer, P.E., Phillips, R.P., Novick, K.A. 2018. Linking variation in intrinsic water-use efficiency to isohydricity: a comparison at multiple spatiotemporal scales. *Ameriflux PI Meeting. Bloomington, IN*.
- Yi, K.** 2018. Influence of drought on water-use of trees growing at Morgan-Monroe State Forest. *IU/WonderLab Summer Science Institute for Teachers. Bloomington, IN*.
- Yi, K.**, Zhang, Q., Novick, K.A. 2017. Strong influence of vapor pressure deficit on plants' water-use efficiency: a modelling approach. *AGU Fall Meeting. New Orleans, LA*.
- *Yi, K.**, Maxwell, J.T., Wenzel, M.K., Gray, A., Roman, D.T., Novick, K.A. 2015. Species-specific intrinsic water use efficiency and its mediation of carbon assimilation during drought. *AGU Fall Meeting. San Francisco, CA*.
- *Yi, K.**, Novick, K.A., Dragoni, D., Moore, W., Roman, D.T. 2015. Characterizing water use strategies of *Acer saccharum*, *Liriodendron tulipifera*, and *Quercus spp.* during a severe drought (update). *15th Annual Conference of the Association of SPEA Ph.D. Students. Bloomington, IN*.
- Yi, K.**, Novick, K.A., Dragoni, D., Moore, W., Roman, D.T. 2014. Characterizing water use strategies of *Acer saccharum*, *Liriodendron tulipifera*, and *Quercus spp.* during a severe drought. *AGU Fall Meeting. San Francisco, CA*.
- Yi, K.**, Park, C.W., Son, Y., Kim, Y.G. & Kim, R. 2012. Improvement of Korean Forest Soil Carbon model (KFSC) in biomass growth module and its application to oak forests in Korea. *Summer Meeting of the Korean Forest Society. Gwangju, Korea*.

- Yi, K.**, Son, Y., Park, C.W., Ryu, S.R., Lee, K.H., Yi, M.J., Kim, C., Park, G.S., Kim, R. 2011. A national scale estimation of soil carbon stocks of *Pinus densiflora* forests in Korea: a modeling approach. *AGU Fall Meeting, San Francisco, CA*.
- *Yi, K.**, Son, Y., Park, C.W., Ryu, S.R., Lee, K.H., Yi, M.J., Kim, C., Park, G.S., Kim, R. 2011. Changes in forest soil carbon storage to climate change in Korea. *The 3rd ASIAHORCs Joint Symposium. Beijing, China*.
- Yi, K.**, Son, Y. 2010. Changes in soil carbon storage of *Pinus densiflora* forests to climate change in Korea. *The 74th Annual Meeting of the Botanical Society of Japan. Kasugai, Japan*.
- Yi, K.**, Lee, A.R., Son, Y. 2010. Comparison of forest soil carbon models and their applicability in Korea: a review. *The 57th Annual Meeting of the Ecological Society of Japan. Tokyo, Japan*.

SKILLS AND TOOLS

- Lab/field skills
 - Automated field Solar-Induced Fluorescence (SIF) measurement system (Fluospec2)
 - Terrestrial laser scanning (LiDAR; FARO Focus 3D)
 - Automated thermal infrared camera (FLIR-A655sc)
 - Portable photosynthesis system (LI-6400, LI-6800)
 - Sap flow measurement (heat ratio method)
 - Plant canopy analyzer (leaf area index; LAI-2200)
 - Pressure chamber (PMS-600)
 - Tree-ring measurement system (Velmex)
 - Certified boom-lift operator
- Analysis software
 - MATLAB, SPSS and SigmaPlot

HONORS AND AWARDS

- Research Grant (Indiana University Research and Teaching Preserve; IURTP). Spring 2017.
- Roy W. Shin Fellowship (School of Public and Environmental Affairs, Indian University). Spring 2017.
- Yang-Sook Park Foundation scholarship (Korea University). Spring 2011.
- The second stage of BK21 scholarship (Korea University). Fall 2009.
- College specialization support project scholarships (Korea University). Fall 2006.

TEACHING EXPERIENCES

- Teaching assistantship for graduate-level courses
 - Math Camp (advanced math for admitted graduate students). Indiana University Bloomington. Summer 2016 & 2017. *Instructor: Kimberly A. Novick.*
 - Applied Mathematics for Environmental Science. Indiana University Bloomington. Spring 2017. *Instructor: Kimberly A. Novick.*
- Teaching assistantship for undergraduate-level courses
 - Forest and Environment, Korea University. Spring 2011. *Instructor: Yowhan Son.*
 - Ecosystem Ecology and Laboratory, Korea University. Fall 2010. *Instructor: Yowhan Son.*

SERVICE

- Assistantship at a workshop for middle and high-school teachers from Indiana (2018 IU/WonderLab Summer Science Institute for Teachers). June 2018.
- Mentoring underrepresented high-school students through Jim Holland Summer Science Research Program (July 2015 & July 2017) and through STEM Summer Research Experience Program (July 2016) at Indiana University Bloomington.
- Training and supervising graduate and undergraduate students
 - Jacob Smith, undergraduate student at University of Virginia. 2019: Sap flux – Measurement, data analysis, and writing thesis.
 - Tessa Mandra, master student at Indiana University Bloomington. 2017: Dendrochronology - Data analysis and measurement.
 - Alex Gray, master student at Indiana University Bloomington. 2015: Chemical extraction of cellulose from tree-ring samples.
 - Morgan Mosley, undergraduate student at Indiana University Bloomington. 2014: Leaf gas exchange measurement at canopy-level.
- Leading field trips at Morgan-Monroe State Forest, Indiana (an Ameriflux/FLUXNET site). November 2013, January 2016, and May 2018.
- Participating in a research site preparation (creation of soil pits for research purpose) for Central States Forest Workshop. September 2015.
- Involvement in the peer review process
 - Forest Ecology and Management (two reviews), 2019
 - Turkish Journal of Agriculture and Forestry (two reviews), 2019
 - Environmental Science and Pollution Research, 2018
 - Ecological Engineering, 2017
 - Journal of Arid Environments, 2015

PROFESSIONAL MEMBERSHIP

- American Geophysical Union (AGU, member)
- American Association for the Advancement of Science (AAAS, member)