Brandon P. **Sloan**

Postdoctoral Research Associate in Bioresource Science and Engineering

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Education

University of Minnesota — *Minneapolis, MN*

PhD in Civil, Environmental, and Geo- Engineering, Minor in Mathematics — *Sep. 2016 - May 2023*

Advisor: Xue Feng

University of Iowa — *Iowa City, Iowa*

M.S. in Civil and Environmental Engineering — *Jan. 2012 - Aug. 2013*

Advisor: Nandita B. Basu

University of Wisconsin-Platteville — *Platteville, WI*

B.S. in Environmental Engineering — *Sep. 2007 - May 2011*

Advisor: Philip J. Parker

Experience

Oak Ridge National Laboratory — *Oak Ridge, TN*

Postdoctoral Research Associate in Bioresource Science and Engineering — *June 2023 - Present*

- Characterize the viability of poplar biofuel feedstock genotypes on marginal lands through model-data fusion.
- Update current agro-ecosystem modeling workflow with more physically-based models of plant carbon and water use.
- Parametrize agro-ecosystem models using eddy covariance, soil core, and high throughput phenotyping data in a reproducible workflow.
- Explore the genotypic and phenotypic controls on particulate and mineral associated organic carbon from soil cores at the Clatskanie GWAS site.

University of Minnesota — *Minneapolis, MN*

Graduate Fellow/Research Assistant — *Sep. 2016 - May 2023*

- Quantifying water use, yield, and energy production trade-offs of agrivoltaics (AV) around the globe by leveraging re-analysis data and the FAO GAEZ v4 model to explore the sensitivity of key cereal crops to AV shading and sheltering effects.
- Testing whether plants control stomata to optimize growth at the ecosystem scale using eddy covariance data.
- Disentangling joint effects of soil and atmospheric dryness on plant water and carbon uptake using eddy covariance data. The research has two prongs: 1) robustly identifying soil water stress signals from over 150 FLUXNET2015 sites using a simplified LSM, and 2) quantifying the significance of plant hydraulic transport effects through the coupling of atmospheric and soil water stress response by ecosystems.
- Defining fundamental differences between empirical and plant hydraulic models of plant water use under soil and atmospheric water stress common to terrestrial biosphere models. We identified for certain soil-plant systems, PHMs are necessary to account the joint effects of soil want atmospheric water stress on stomtal regulation.

University of Minnesota — *Minneapolis, MN*

Teaching Assistant for Hydrologic Design course for 7 semesters — *Sep. 2016 - Present*

- Teaching 30+ students hydrologic concepts through design projects during the weekly recitation sessions.
- Revamping the course material to more practical hydrologic methods used in industry and academia today.
- Reformatting the course material to LaTeX for better visualization for students.

St. Anthony Falls Laboratory — *Minneapolis, MN*

Researcher (part-time) — *Jan. 2016 - Sep. 2016*

- Pursued expanding my previous research on hydrologic impacts of agricultural tile drainage under the guidance of Dr. Efi Foufoula-Georgiou.
- Updated website content for an ongoing NSF funded project at SAFL.

IIHR-Hydroscience and Engineering — *Iowa City, IA*

Researcher (part-time) — *Jan. 2016 - Sep. 2016*

- Performed three dimensional subsurface flow simulations of tile drainage in Hydrus-3D to check the validity of the simplified deterministic model DRAINMOD.
- Aided researchers at the University of Iowa in efforts to implement a tile drainage module into the existing hydrologic model used for flood forecasting at the Iowa Flood Center.

Short Elliott Hendrickson, Inc (SEH) *St. Paul, Minnesota*

Water Resources Engineer, EIT *Sep. 2013 - Dec. 2015*

- Performed catch basin, culvert, pond, and stormwater quality design on over a dozen transportation drainage projects around the Twin Cities area. These projects ranged from rain garden design to multi-million dollar highway reconstruction projects
- Lead hydrologic and hydraulic modeling analysis of storm sewer systems in Minneapolis and various watersheds in the Midwestern United States.
- Worked in the field with contractor's as I was the resident project representative of a drainage project.

University of Iowa *Iowa City, IA*

Research Assistant *Jan. 2012 - Aug. 2013*

- My research thesis explored the hydrologic impacts of agricultural tile drainage from the field to catchment scale in Iowa using the deterministic field scale mode DRAINMOD in combination with a hillslope-link routing model. The research was part of a report delivered to the Iowa Economic Development Authority and lead to two first-author publications in peer-reviewed journals and multiple presentations at conferences.
- Traveled to Tamil Nadu, India for three weeks to participate in a rainwater harvesting vulnerability project. I executed baythmetric surveys with GPS, installed well monitoring equipment, and interacted with local farmers with the aid of the DHAN foundation. The goal of the project was to collect data about the hydrologic dynamics of restoring large-scale rainwater tanks to reduce drought vulnerability of these small farm communities in India.

Skills

Software: MATLAB, R, Python, Google Earth Engine, LaTex, Linux, MobaXTerm, WinSCP, Mathematica, ArcGIS, Archydro Tools, Hydrus-3D, LabView, DaVis, XP-SWMM, HEC-RAS, HEC-GeoRAS, HydroCAD, HY-8, CulvertMaster, Hydraulic Toolbox, Microstation, Geopak Drainage, AutoCAD Civil3D, Tecplot, DRAINMOD, P8, Microsoft Office

Data Products: Flux tower: FLUXNET2015, AmeriFlux, OzFlux, ICOS; **Plant:** SapFluxNet, Xylem Functional Trait database, TRY Plant Trait database; **Satellite:** ECOSTRESS, MODIS, GLEAM, GRACE, TRMM, GPM; **Reanalysis/Interpolated:** GLDAS, TerraClimate, PRISM, SILO, CAMELS

Experimental Methods/Instrumentation: Soil Moisture/Heat Sensor, Relative Humidity/Vapor Pressure Sensor, Net Radiometer, Thermocouples, Particle Image Velocimetry (PIV), Hotwire Anemometry, Pitot Velocity Measurement, Standard Sieve Analysis

Publications

Submitted/In preparation

Holtzmann, N, **Sloan, B.P.**, Potkay, A., Feng, X., Konings, A.: Ecosystem water-saving timescale varies spatially with typical drydown length. *In Review*

Yang, Y., Guan K., Peng B., **Sloan, B. P.**, Feng, X., Xu, X., Pan, M., Zhang, J., Zhou, J., Li, L., Sivapalan, M., Ainsworth, E., Novick, K., Yang, Z., & Wang, S.: A unified framework to reconcile theories of modeling transpiration response to drought: plant hydraulics, supply-demand balance, and empirical soil water stress. *In Review*

Field, J.L., Abramoff, R., Craig, M., **Sloan, B. P.**, et al: Which plant traits drive soil carbon sequestration? Empirical evidence from a long-term Populus genetic diversity trial. *In preparation*

Sloan, B. P. & Feng, X.: Practical Guidance for Robust Detection of Ecosystem Water Stress from Eddy Covariance Data. *In preparation*

Peer reviewed

[1] **Sloan, B. P.**, Feng, X. (2023). Robust inference of ecosystem soil water stress from eddy covariance data. Agricultural and Forest Meteorology, 343, 109744. https://doi.org/10.1016/j.agrformet.2023.109744

[2] Lu, Y., **Sloan, B. P.**, Thompson, S., Konings, A., Bohrer, G., Matheny, A., & Feng, X.: Intra-Specific Variability in Plant Hydraulic Parameters Inferred From Model Inversion of Sap Flux Data. *Journal of Geophysical Research: Biogeosciences*, 127, e2021JG006777. https://doi.org/10.1029/2021JG006777.

[3] **Sloan, B. P.**, Thompson, S., & Feng, X. (2021): Plant hydraulic transport controls transpiration sensitivity to soil water stress. *Hydrol. Earth Syst. Sci.*, 25(8), 4259-4274. https://doi.org/10.5194/hess-25-4259-2021.

[4] **Sloan, B. P.**, Basu, N. B., & Mantilla, R. (2017). Hydrologic impacts of subsurface drainage from the field to watershed scale. *Hydrological Processes*, 31(17), 3017-3028. http://doi.org/10.1002/hyp.11218.

[5] **Sloan, B. P.**, Basu, N. B., & Mantilla, R. (2016). Hydrologic impacts of subsurface drainage at the field scale: Climate, landscape and anthropogenic controls. *Agricultural Water Management*, 165, 1-10. http://doi.org/10.1016/j.agwat.2015.10.008.

Other

[6] Franz, K., Basu, N. B., Simpkins, W., Helmers, M., Acar, O., Scheler, B., **Sloan, B.P.**, Morrison, A., Weber, L., & Cruse, R. (2014). Hydrologic Impacts of Drainage Systems. IIHR Technical Report No. 486, IIHR - Hydroscience & Engineering, Iowa City.

[7] **Sloan, B. P.** (2013). Hydrologic impacts of tile drainage in Iowa. MS (Master of Science) thesis, University of Iowa. http://ir.uiowa.edu/etd/5060.

[*] I have also peer-reviewed articles for *Water Resources Research*, *Journal of Hydrology*, and *Geoscientific Model Development*.

Presentations

[1] **Sloan, B. P**. & Feng, X. (December 2023). "Performance Pitfalls in Detecting Ecosystem Soil Water Stress from Eddy Covariance Data". Poster presentation at AGU Fall Meeting 2023.

[2] **Sloan, B. P**. & Feng, X. (December 2022). "Robust Identification of Soil Water Stress Signals from Flux Tower Data". Oral presentation at AGU Fall Meeting 2022.

[3] **Sloan, B. P**. & Feng, X. (December 2020). "A Maximum Entropy Approach for Inferring Ecosystem Hydraulic Trait Composition". Oral presentation at AGU Fall Meeting 2020.

[4] **Sloan, B. P**., Thompson, S., & Feng, X. (December 2020). "Why Plant Hydraulics is Necessary to Predict Evapotranspiration Under Soil Water Stress". Invited eLightning poster presentation at AGU Fall Meeting 2020.

[5] **Sloan, B. P**., Thompson, S., & Feng, X. (December 2019). "When is Plant Hydraulics Necessary for Predicting Soil Water Stress in Land Surface Models?". Poster presented at AGU Fall Meeting in San Francisco,CA and won Outstanding Student Presentation Award.

[6] **Sloan, B. P**., Guala, M.,& Ebtehaj, A. (December 2017). "Parametrizing Evaporative Resistance for Heterogeneous Sparse Canopies through Novel Wind Tunnel Experimentation". Poster presented at AGU Fall Meeting in New Orleans, LA.

[7] **Sloan, B. P.**, Basu, N. B.,& Mantilla, R. (September 2016). "Hydrologic Impacts of Tile Drainage from Field to Catchment Scale: A Diagnostic Study". Presentation at the 10th International Drainage Symposium in Minneapolis, MN.

[8] **Sloan, B. P**., Basu, N. B.,& Mantilla, R. (December 2013). "Hydrologic Impacts of Tile Drainage in Iowa: From Field to Catchment Scale". Poster presented at AGU Fall Meeting in San Francisco, CA.

[9] **Sloan, B. P.** (April 2013). "Hydrologic Impacts of Agricultural Tile Drainage in Iowa". Presentation at North Central Extension and Research Activity 217-Drainage Design and Management Practices to Improve Water Quality and Agricultural Drainage Management Systems Task Force (ADMS TF) Meeting in Sioux Falls, SD.

[10] **Sloan, B. P.** (March 2013). "Hydrologic Impacts of Agricultural Tile Drainage in Iowa". Presentation at Iowa Water Conference in Ames, IA.

Honors & Awards

2021	**Winner**, 2021-2022 Edward Silberman Fellowship: $10,000
2019	**Winner**, American Geophysical Union Outstanding Student Presentation Award: $200
2019	**Winner**, Julie and Frank Tsai SAFL Travel Grant: $500
2018	**Winner (Declined)**, U of M Informatics Institute MnDrive Fellowship: $48,199
2017	**Winner**, Julie and Frank Tsai SAFL Travel Grant: $500
2017	**Honorable Mention**, National Science Foundation (NSF) Graduate Research Fellowship Program
2016	**Winner**, U of M Dept. of Civil, Environmental, and Geo-Engineeing Graduate Fellowship: Two years of funding and tuition with $2000 signing bonus
2015	**Finalist**, SEH Act of Excellence Award for teaching undergraduate students about stormwater management
2011	**Graduated Summa Cum Laude**, from University of Wisconsin-Platteville

Volunteering

Minds Matter

Minneapolis, MN

Mentor

Sep. 2016 - May 2019

- Aided my mentee, Shellcie, with essay writing, ACT test preparation, and applying to summer pre-college programs at Johns Hopkins University and an ecotourism course in Columbia, South America.
- Worked with Shellcie to apply to four year universities, and she is currently attending Augsburg University.

St. Anthony Falls Laboratory *Minneapolis, MN*

Tour Guide/Exhibitor *Sep. 2016 - PRESENT*

- Give public tours of SAFL when certain conferences or events are near the lab.
- Volunteered at the SAFL booth at the Minneapolis State Fair in Summer 2018, promoting the research and teaching kids about science experiments.