

# YAO HU

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## EDUCATION

- 08/2010 – 02/2016 **University of Illinois**, Urbana-Champaign, Illinois, United States  
Doctor of Philosophy in Civil and Environmental Engineering  
Dissertation: *Agent-based models to couple natural and human systems for watershed management analysis*
- 10/2006 – 10/2008 **Hamburg University of Technology**, Hamburg, Germany  
Master of Science, Environmental Engineering  
Thesis: *Modeled water flow in the unsaturated zone with Richards Equation and Storage Model*
- 09/2002 – 06/2006 **Huazhong University of Science and Technology**, Wuhan, China  
Bachelor of Engineering, Civil Engineering  
Bachelor of Science, Computer Science and Technology

## RESEARCH EXPERIENCE

- 03/2020 – Now **Assistant Professor**, Department of Geography & Spatial Sciences (Primary) and Department of Civil & Environmental Engineering, University of Delaware, Newark, DE, U.S.
- 08/2016 – 02/2020 **Postdoctoral Fellow**, University of Michigan, Ann Arbor, MI, U.S.
- Develop decision tools for agricultural nutrient application using National Water Model.
  - Estimate the impact of nutrient loading from urban areas on Lake Erie.
- 02/2016 – 07/2016 **Postdoctoral Fellow**, National Center for Supercomputing Applications (NCSA), U.S.
- Building a Geo-semantic Framework for Integrating Long-Tail Data and Models.
- 09/2010 – 01/2016 **Research Assistant**, University of Illinois, Dep. of Civil and Environmental Engineering Urbana-Champaign, IL, U.S.
- Derived farmers' groundwater pumping behavior using probabilistic graphical models (PGMs).
  - Developed an interactive groundwater model for a NSF funded education/outreach project.
  - Developed a methodological framework for global sensitivity analysis (GSA) for large-scale socio-hydrological models with Hadoop.
  - Designed a web-based application of the coupled multi-agent system model and environmental model for watershed management analysis using Hadoop.
- 05/2008 – 08/2010 **Junior Researcher**, UFZ (Environmental Research Centre), Dep. of Computational Hydrosystems, Leipzig, Germany
- 09/2007 – 11/2007
- Simulated plant-water consumption in Oman (funded by International Water Research Alliance Saxony).
  - Simulated water uptake by plant roots in the unsaturated zone with finite element method.
- 03/2007 – 04/2008 **Research Assistant**, Hamburg University of Technology, Dep. of River and Coastal Engineering & Dep. of Wastewater Management and Water Protection, Hamburg, Germany
- Refined the canny edge detector algorithm in Geoscience.
  - Developed post-processing capabilities in the rainfall runoff model KalypsoNA to derive design floods by implementation of the flood frequency analysis using Java.
  - Assessed agricultural water use and demand in Beijing, China, EU Switch-Asia Project, Reuse of Wastewater for Urban Agriculture.

## RESEARCH INTERESTS

Coupled Human and Natural Systems, Agent-based Modeling, Environmental Informatics, Hydrology and Water Resource Management, Environmental System Analysis and Optimization, Data Science

## GRANTS

- 06/2020 – 12/2021
- NOAA and University of Michigan. Developing a Decision Support Tool for Agricultural Nutrient Application Timing using the National Weather Service National Water Model Framework. Sub PI: Yao Hu, \$90,000.

## PUBLICATIONS

- 2019
- **Y. Hu**, C.M. Long, Y.C. Wang, B. Kerkez and D. Scavia\* (2019). Urban Total Phosphorus Loads to the St. Clair-Detroit River System. *Journal of Great Lakes Research*, 45(6), 1142-1149.
  - D. Scavia\*, S.A. Bocaniov, A. Dagneu, **Y. Hu**, B. Kerkez, C.M. Long, R.L. Muenich, J. Read, L. Vaccaro, Y.C. Wang (2019). Detroit River Phosphorus Loads: Anatomy of a Binational Watershed. *Journal of Great Lakes Research*, 45(6), 1142-1149.
- 2018
- **Y. Hu**, D. Scavia and B. Kerkez\* (2018). Are all data useful? Inferring causality to predict flows across sewer and drainage systems using Directed Information and Boosted Regression Trees. *Water Research*, 145, 697-706.
  - **Y. Hu\*** and S. Beattie (2018). The Role of Heterogeneous Behavioral Factors in an Agent-based Model of Crop Choice and Groundwater Irrigation. *Journal of Water Resources Planning and Management*, 145(2), 04018100.
- 2017
- **Y.Hu\***, C. J. Quinn, X. M. Cai and N. W. Garfinkle (2017). Combining human and machine intelligence to derive agents' behavioral rules for groundwater irrigation. *Advances in Water Resources*, 109, 29-40.
- 2015
- **Y. Hu\***, X. M. Cai and B. DuPont (2015). Design of a web-based application of the coupled multi-agent system model and environmental model for watershed management analysis using Hadoop, *Environmental Modelling & Software*, doi:10.1016/j.envsoft.2015.04.011
  - **Y. Hu\***, O. Garcia-Cabrejo, X.M. Cai, A. J. Valocchi and B. Dupont (2015). Global sensitivity analysis for large-scale socio-hydrological models using Hadoop, *Environmental Modelling and Software*, doi:10.1016/j.envsoft.2015.08.015
  - **Y. Hu**, A. J. Valocchi\*, S. A. Lindgren, E. A. Ramos and R. A. Byrd (2015). Groundwater Modeling with MODFLOW as a Web Application, *Groundwater*, doi:10.1111/gwat.12372

## PRESENTATIONS AND POSTERS

- 2019
- Assessing Runoff Risk to Support Nutrient Application Timing Using a Hybrid of Physically-based and Statistical Models—an Application of National Water Model (poster), American Geophysical Union (AGU), San Francisco, California, Dec 9 – 13, 2019
- 2018
- Modeling flows across combined sewer systems using Directed Information and Boosted Regression Trees, 11<sup>th</sup> International Conference on Under Drainage Modelling (UDM), Palermo, Italy, Sep 23 – 26, 2018
  - A data-driven approach to model flows across combined sewer systems. World Environment and Water Resources Congress (EWRI), Minneapolis, Minnesota, June 3 – 7, 2018
- 2010 – 2016
- Deriving agents' behavioral rules using directed information graph. Eastlake Forum, Huazhong University of Science and Technology, Wuhan, China, Dec, 26, 2016.
  - Combining human and machine intelligence to derive agents' behavioral rules for groundwater irrigation (poster). American Geophysical Union (AGU), Dec 14 – 18, 2015

- Design of a web-based application of the coupled multi-agent system model and environmental model for watershed management analysis using Hadoop. Dalian University of Technology, Dalian, China, Mar 2 – 3, 2015
- Global sensitivity analysis for large-scale socio-hydrological models using Hadoop (poster). American Geophysical Union (AGU), San Francisco, US, Dec 14 – 19, 2014
- A software tool to couple agent-based decision-making model and groundwater simulation model for understanding environmental changes in a river basin context. World Environment and Water Resources Congress (EWRI), Cincinnati, Ohio, US, May 19 –23, 2013
- Integrating agent-based model and groundwater simulation model to understand the environmental changes in Republican River basin. World Environment and Water Resources Congress (EWRI), Albuquerque, New Mexico, US, May 20 – 24, 2012
- Estimation of root water uptake as a sink term by inverse modeling (poster). European Geosciences Union (EGU), Vienna, Austria, May 02 – 07, 2010

## TEACHING EXPERIENCE

- 08/2015 – 12/2015     **Teaching Assistant**, University of Illinois, Dep. of Civil and Environmental Engineering, Urbana-Champaign, IL, U.S.
- Holding office hours, leading supplementary classes and grading for CEE201: Systems Engineering and Economics.

## SKILLS

Computer	Proficient in Java, Python, FORTRAN, SQL, Hive and MATLAB; Familiar with C/C++, R, HBase, Hadoop, Unix Programming Environment, Vim, LaTeX, Mathematica, PHP and JavaScript
Software	WRF-HYDRO, MODFLOW, HYDRUS, SWMM, SWAT, HEC-HMS and ArcGIS
Language	Chinese (Native), English (Fluent), German (Intermediate), Spanish (Elementary)