

Tessa Swanson

Profile

Contact:

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GitHub: [tswan](https://github.com/tswan)

Research Group: <https://guikema.engin.umich.edu>

Summary:

I am a transdisciplinary geospatial data scientist with experience in machine learning, risk analysis, and transportation modeling seeking to work at the intersection of technology and policy planning for community resilience. My graduate research involves evaluating large-scale spatiotemporal data from smart phones to identify mobility patterns and behavioral responses to hazardous events to quantitatively describe the relationship between access to essential services and recovery. I believe equitable access to essential services and resources is a key component of climate change adaptation, disaster mitigation, sustainability, and resilience. I aspire to contribute to innovative planning, policy, and infrastructure solutions that promote equitable access, thus enabling resilient communities.

Skills:

Techniques: Simulation, optimization, machine learning, statistics, analytics, risk science, GIS, data visualization, database management, scenario planning, collaborative planning, travel demand forecasting, network modeling, stated preference surveys, econometrics

Tools: Python, R, ArcGIS, PostgreSQL, Keras, Gurobi, TransCAD, Cube, Tableau

Professional: Transdisciplinary research, project management, design thinking, mentorship

Education

University of Michigan, Ann Arbor, Michigan

Sept 2023 – Sept 2023

Ph.D. Candidate in Industrial and Operations Engineering

Advisor: Seth Guikema

Taubman College of Urban Planning Graduate Certificate in Urban Informatics

Northwestern University, Evanston, Illinois
B.S. Industrial Engineering and Management Sciences
Minors in Transportation and Logistics, Religious Studies
Murphy Institute Scholar

Sept 2018 – June 2016

Professional Experience

Steer, Boston, MA

Aug 2016 - Aug 2018

Consultant

- Produced ridership and revenue forecasts using network and econometric modelling techniques for intercity and regional rail, toll facilities, and ferries for both public and private sector clients
- Developed software tools for rail clients to run their own ridership, cost, and revenue forecasts for new and existing corridors and networks
- Created, implemented, and analyzed stated-preference surveys for travel-time and mode alternatives for tollway, ferry, and aerial tramway proposals
- Collected and analyzed terabytes of origin-destination, toll transaction, rail ridership, and economic data
- Visualized descriptive and forecasted results using including maps and network models

Volpe National Transportation Systems Center, Cambridge, MA

June 2015 – Aug 2015

Operations Research Analyst Student Trainee

- Consulted the Federal Aviation Administration on the implementation of NextGen Air Transportation System technologies and procedures
- Researched impacts of large-scale GPS failure disasters on US air traffic control systems
- Performed predictive analysis for planning and construction of aviation facilities
- Developed and reviewed federal aviation business reporting software

American Red Cross, Chicago, IL

June 2013-Dec 2014

Volunteer Dispatcher and Data Analyst

- Collected and analyzed incident data for organization responding to 1,200 local disasters annually
- Communicated with volunteers, local first responders, and disaster victims to provide appropriate assistance

Teaching Experience

Simulation Design and Analysis (IOE 574) Graduate Student Instructor
College of Engineering, University of Michigan

Fall 2021

Publications

Swanson, T, & Guikema, S (2023). Using mobile phone data to evaluate access to essential services following natural hazards. *Risk Analysis*, 00, 1– 24. <https://doi.org/10.1111/risa.14201>

Swanson T, Guikema S (2023). Using mobile phone data for quantifying large-scale household-level disaster recovery. *Computers, Environment and Urban Systems*. (under review).

Swanson T, Guikema S, Bagian J (2023). Beyond vaccination: a risk-Informed approach to defense in depth for COVID-19 response. *Scientific Reports*. (under review).

Swanson T, Zelner J, Guikema S (2022) COVID-19 has illuminated the need for clearer AI-based risk management strategies, *Journal of Risk Research*, 25:10, 1223-1238, <https://doi.org/10.1080/13669877.2022.2077411>

Swanson T, Guikema S, Bagian J, Schemanske C, Payne C (2022) COVID-19 aerosol transmission simulation-based risk analysis for in-person learning, *PLoS ONE* 17(7): e0271750. <https://doi.org/10.1371/journal.pone.0271750>

Swanson T, Guikema S, Bagian J, Payne C. (2021). Modeling COVID-19 aerosol transmission in primary schools. *MedRxiv*. <https://www.medrxiv.org/content/10.1101/2021.12.08.21267499v1> (preprint).

Presentations

Swanson T. “Cell phone data for quantifying disaster recovery.” Oral presentation, American Association of Geographers Annual Meeting, Denver, CO 2023.

Swanson T, Guikema S. “Cell phone data for quantifying disaster recovery.” Oral presentation, Society for Risk Analysis Annual Meeting, Tampa, FL 2022.

Swanson T, Guikema S. “Using mobile phone data to evaluate access to essential services surrounding disruptive events.” Oral presentation, Michigan University-wide Sustainability and Environment Annual Conference, Virtual, 2022.

Swanson T, Guikema S, Bagian J, Schemanske C, & Payne C. “Simulating Covid-19 Risks Associated With Returning To In-person College Classes.” Oral presentation, Society for Risk Analysis Annual Meeting, Virtual, 2021.

Swanson T, Guikema S. “Using mobile phone data to evaluate access to essential services surrounding disruptive events.” Oral presentation, Society for Risk Analysis Annual Meeting, Virtual, 2021.

Swanson T, Guikema S, Bagian J, Schemanske C, & Payne C. “Simulating Covid-19 Risks Associated With Returning To In-person College Classes.” Oral presentation, INFORMS Annual Meeting, Anaheim, CA 2021.

Swanson T, Guikema S. “Using mobile phone data to evaluate access to essential services surrounding disruptive events.” Oral presentation, Natural Hazards Researchers Meeting, Virtual, 2021.

Swanson T, “Big data for Evaluating Urban Resiliency.” Workshop, Michigan University-wide Sustainability and Environment Initiative, Virtual, 2020.

Swanson T, Guikema S. “Travel mode classification of cell phone data in dense urban environments.” Oral presentation, IEEE International Conference on Intelligent Transportation Systems, Auckland, New Zealand 2019.

Swanson T., Fox A, Smilowitz K. “Volunteer Engagement in the Age of Analytics: A Study with the American Red Cross, Greater Chicago Region.” Oral presentation, INFORMS Annual Meeting, San Francisco, CA 2014.

Awards and Recognition

- **Graduate Research Fellowship** 2018-2023
National Science Foundation
- **Winner – Jeanne X. Kasperson Student Paper Competition** 2023
Hazards, Risks, and Disasters Specialty Group
American Association of Geographers
- **Winner - Student Merit Award** 2022
Engineering and Infrastructure Specialty Group
Society for Risk Analysis
- **Rackham Predoctoral Fellowship** 2022
Rackham Graduate School at University of Michigan
- **2nd Place - Student Merit Award** 2021
Engineering and Infrastructure Specialty Group
Society for Risk Analysis
- **Young Professionals Travelling Fellowship** 2019
IEEE Intelligent Transportation Systems Conference
- **IEMS Department Award** 2016
Northwestern University McCormick School of Engineering
- **2nd Place - Doing Good with Good OR Student Paper Competition** 2014
INFORMS Annual Meeting
- **Murphy Scholar** 2012-2016
Northwestern University McCormick School of Engineering

Leadership and Service

- **Department Steward** 2021-2023
Graduate Employees’ Organization Labor Union

- **Front Desk Volunteer** 2022-2023
 Avalon Housing
- **President** 2020-2022
 Student Leadership Board, UM IOE Department
- **Abstracts and Registration Coordinator** 2021
Attendee Logistics Coordinator 2020
 Michigan University-wide Sustainability and Environment Conference
- **PhD Student Mentor** 2019-2021
 INFORMS Student Chapter, University of Michigan
- **Mentorship Chair** 2020
 INFORMS Student Chapter, University of Michigan
- **Co-President** 2019-2020
 University of Michigan Grad Student Outdoors Club
- **Graduate Student Mentor** 2019
 University of Michigan College of Engineering
- **Global Healthcare Technologies Program** 2015
 Northwestern Center for Innovation in Global Health Technologies,
 Cape Town, South Africa