

David W. Wanik, PhD, EIT

Senior Modeler – Hartford Steam Boiler/Munich Re Group
Assistant Professor-in-Residence – University of Connecticut
Research Fellow – Mississippi State University, Social Science Research Center
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SUMMARY

I am an engineer with a passion for data science. I currently work as a Senior Modeler in the Business Intelligence and Analytics Group at Hartford Steam Boiler (HSB)/Munich Re and lead research on analytics solutions for IoT technologies, remote sensing, and weather-impact modeling. Before coming to HSB, I served as an Assistant Research Professor in the Department of Civil & Environmental Engineering at the University of Connecticut. I also served as the Manager of a Center of Excellence called the “Eversource Energy Center”, where I co-led storm outage modeling activities and provided technical guidance and high-level management of 15 funded research projects. Although I’ve left the university as a full-time researcher, I still serve as an Adjunct Professor in the Schools of Business and Engineering, and am associate advisor to several graduate students at UConn.

HIGHLIGHTS

- Work experience in academia, insurance and utilities.
- Attracted >\$4M in research funding as PI, co-PI or senior personnel for my research on predictive analytics as part of the “Eversource Energy Center”.
- My collaborators include researchers from the University of Connecticut, Mississippi State University, North Carolina State University, State University of New York – Albany, NASA’s Goddard and Marshall Space Flight Centers, and Eversource Energy.
- A provisional patent application filed for my storm outage model (co-developed with researchers at University of Connecticut) in July 2015 (Application No. 62/363,156.)
- Developed and taught two large-enrollment graduate courses in “Predictive Analytics for Scientists and Engineers” (UConn School of Engineering) and “Introduction to Deep Learning” (UConn School of Business).
- 9 peer-reviewed journal articles, 3 manuscripts under review, and 5 more manuscripts in preparation.
 - Google Scholar: 82 citations; h-index=5; i10-index=5 (as of 4/3/2019.)

ACADEMIC APPOINTMENTS

- University of Connecticut – School of Business; Adjunct Assistant Professor (2019)
- University of Connecticut – School of Engineering; Assistant Professor in Residence (2017 – present)
- Mississippi State University – Social Science Research Center; Research Fellow (2017 – present)

EXPERTISE

- **Skills:** predictive analytics, deep learning, geospatial data processing.
- **Research:** weather-impact modeling for electric utilities, risk sciences, decision-support, natural hazards, climate change, infrastructure resilience, emergency preparedness, smart cities.

EDUCATION

University of Connecticut - Storrs, CT

- Ph.D. Environmental Engineering August 2015
- M.S. Environmental Engineering December 2012
- B.S. Environmental Science, *cum laude* August 2011

TEACHING EXPERIENCE

- CEE/ENVE 5090: “Predictive Analytics for Scientists and Engineers”
 - Spring 2016 (Storrs); Spring 2017 (Storrs); Fall 2019 (Storrs)
- OPIM 5894: “Introduction to Deep Learning”
 - Spring 2019 (Hartford, Stamford)
- OPIM 5512: “Data Science with Python”
 - Summer 2019 (Stamford)

SOFTWARE COMPETENCIES

- Programming Languages: R (expert), Python (expert)
- Geographic Information Systems (GIS): ESRI/ArcGIS (expert), Quantum GIS (expert)

SCHOLARLY/CREATIVE RECORD

REFEREED JOURNAL ARTICLES

1. Cerrai, D.; **Wanik, D.W.**; M.A.E. Bhuiyan ; Zhang, X.; Yang, J.; Frediani M.E.B.; Anagnostou, E. N., 2019: “The Predictability of Power Outages from a New Representation of Weather and Vegetation Impacts in Non-Parametric Modeling”, IEEE Access. Accepted. February 2019. DOI: 10.1109/ACCESS.2019.2902558.
2. Walsh, T., Layton, T., **Wanik D. W.**, Mellor J., 2018: Agent Based Model to Estimate Time to Restoration of Storm-Induced Power Outages, Infrastructures Volume 3(3), Page 33. DOI: 10.3390/infrastructures3030033
3. **Wanik, D. W.**, Anagnostou, E. N., Astitha, M., Yang, J., Hartman, B. M., Frediani, M.E., Lackmann, G. M., 2018: “A Case Study on Power Outage Impacts from Future Hurricane Sandy Scenarios”, Accepted – Early Release Online. DOI:10.1175/JAMC-D-16-0408.1.
4. **Wanik, D. W.**, He, J., Layton, T., Anagnostou, E. N., Hartman, B. M., 2017: Estimated Time of Restoration (ETR) Guidance for Electric Distribution Networks, Journal of Homeland Security and Emergency Management, Accepted November 2017.
5. Pardakhti M., Moharrer E., **Wanik D. W.**, Suib S., Srivastava R., 2017: Predictive Modeling of Methane Adsorption on Hypothetical Metal Organic Frameworks, ACS Combinatorial Science. DOI: 10.1021/acscombsci.7b00056.
6. Cole, T. A., **Wanik, D. W.**, Molthan, A. L., Román, M. O., Griffin, R. E., 2017: Synergistic Use of Nighttime Satellite Data, Electric Utility Infrastructure, and Ambient Population to Improve Power Outage Detections in Urban Areas, Remote Sens. Volume 9, Page 286. DOI: 10.3390/rs9030286
7. **Wanik, D. W.**, Parent, J. R., Anagnostou, E. N., 2017: Using Vegetation Management and LiDAR-Derived Tree Height Data to Improve Outage Predictions for Electric Utilities, Electric Power Systems Research, Volume 146, May 2017, Pages 236–245. DOI: 10.1016/j.epsr.2017.01.039.
8. He, J., **Wanik, D. W.**, Hartman, B. M., Anagnostou, E. N., 2016: Nonparametric Tree- Based Predictive Modeling of Storm Damage to Power Distribution Network, Risk Analysis. DOI:10.1111/risa.12652.

9. **Wanik, D. W.**, Anagnostou, E. N., Hartman, B. M., Frediani, M. E., Astitha, M., 2015: Storm Outage Modeling for an Electric Distribution Network in Northeastern USA, *Natural Hazards*, Vol 79, p. 1359. DOI:10.1007/s11069-015-1908-2.

UNRELEASED WORK

PATENTS

1. Provisional Application Entitled "SYSTEMS AND METHODS FOR OUTAGE PREDICTION" (Application No. 62/363,156 - July 15, 2016).

REFEREED JOURNAL ARTICLES - UNDER REVIEW

1. Alpay B.A., **Wanik D.W.**, Watson P., Liang G., Anagnostou E.N., 2019: "Dynamic Modeling of Power Outages Caused by Thunderstorms", *IEEE Transactions on Smart Grid*. Under review beginning January 2019. Returned for revision in March 2019.
2. Yang F., **Wanik D.W.**, Cerrai D., Bhuiyan M.A.E, Anagnostou E., 2019: "The Importance of Training Data Representativeness in Modeling Weather-Related Power Outages with Machine Learning", *IEEE Transactions on Smart Grid*. Under review beginning February 2019.
3. Watson P., Cerrai D., **Wanik D.W.**, Anagnostou E.N., 2019: "The Effects of the Structure of the Training Regime on a Machine Learning-Based Power Outage Model", *IEEE Transactions on Power Systems*. Submitted March 2019.

REFEREED JOURNAL ARTICLES – UNDER PREPARATION

1. Cosby A.G., **Wanik D.W.**, Lebukala V., Rose A.N., 2019: "Modern Coastal Population Build-Up and Natural Hazards (working title)", *Journal TBD*. In preparation to be submitted in 2019.
2. Udeh K., **Wanik D.W.**, and Bassill N., 2019: "Power Outage Prediction with Deep Learning for the New York State Mesonet", *IEEE Transactions on Industrial Informatics*. In preparation to be submitted in 2019.
3. **Wanik D.W.**, Cosby A.G., 2019: "Predicting US county-level populations from VIIRS Nighttime Light Imagery", *Sensors*. To be submitted in 2019.
4. **Wanik D.W.** and Lebukala V., 2019: "Temporal Aspects of VIIRS Nighttime Light Monthly Composite Data", *Remote Sensing*. To be submitted in 2019.
5. Cheng, C., Nowakowski, C., Astitha, M., **Wanik, D. W.**, Vlahos, P., Garcia, V., Cooter, E., Tang, Chunling 2019: Analysis of Harmful Water Quality Parameters Combining Weather, Air Quality and Ecosystem Models with In-Situ Measurements, *Journal of Great Lakes Research*. In preparation to be submitted in 2019.

GRANT SUPPORT & PROPOSALS

I have been a PI, co-PI or senior personnel on research grants totaling over \$4M in funded projects.

GRANT HISTORY

1. DTN, "DTN Outage Modeling Enhancements"; **David W. Wanik** (PI, 50%), Emmanouil N. Anagnostou; \$550,000, August 2016 – July 2020. PI. Funded.
2. Eversource Energy Center, "Evaluation of Grid Resilience Activities with a Total System Performance Assessment Model informed by Optimization and Economic Methodologies", R. Bagtzoglou (PI), Wei Zhang, Paul Borochin, Maria Chrysochoou, **David W. Wanik** (5%); \$450,000, October 2016 – December 2019. Co-PI. Funded.

3. Eversource Energy Center, “Expanding the UConn Predictive Storm and Outage Model to Include MA and NH”, E. Anagnostou (PI), **David W. Wanik** (30%) and Marina Astitha, \$500,000, August 2016 – December 2019. Co-PI. Funded.
4. Eversource Energy Center, “Next Generation Predictive Storm & Damage Modeling Enhancements for Preparedness and Emergency Response Support”; Emmanouil N. Anagnostou (PI), Marina Astitha and **David W. Wanik** (20%); \$2.37M, September 2015 – December 2019. Senior Personnel. Funded.
5. United Illuminating Company, “Phase 2 of the United Illuminating Outage Prediction Model for Preparedness and Emergency Response Support”, E. Anagnostou (PI), **David W. Wanik** (30%) and Marina Astitha \$275,000, July 2016 – December 2018. Co-PI. Funded.
6. Eversource Energy Center, “Evaluation of Airborne and Mobile LiDAR Technologies for Monitoring Roadside Vegetation and Utility Infrastructure”; Jason R. Parent (PI), John C. Volin, Emmanouil N. Anagnostou, **David W. Wanik** (5%), Tom Meyer, and Wei Zhang; \$338,000, September 2015 – December 2016. Senior Personnel. Funded.

UNFUNDED PROPOSALS

1. National Science Foundation, Big Data Regional Innovation Hubs: Establishing Spokes to Advance Big Data Applications (“BD Spokes”), Southern Region: “Building Big Data Capacity and Community for Emergency Management”; \$500K. Senior Personnel. Unfunded.
 - Project proposal was endorsed by Duke Energy, Eversource Energy, Oklahoma Gas and Electric and AVANGRID/United Illuminating.
2. NASA CT Space Grant Consortium: “Towards a Global, Space-Based Power Outage Monitoring Network: Connecticut Leads the Way”; \$30K. PI. Unfunded.
 - Project proposal was endorsed by NASA’s Marshall Space Flight Center.

WORK EXPERIENCE

Hartford Steam Boiler/Munich Re Group - Business Intelligence and Analytics Group, Hartford, CT, November 2017 – present. Senior Modeler.

- I am a senior data scientist leading research related to sensors/IoT, insurance and weather impact modeling.
 - Examples of projects include: anomaly detection for equipment breakdown/preventative maintenance; energy savings analyses; claims forecasting modeling; insurance pricing models; risk modeling for natural catastrophes; remote sensing and deep learning.
- Previously worked as a part-time consultant for HSB from March 2016 – October 2017.

University of Connecticut - Department of Civil & Environmental Engineering, Storrs, CT, August 2011-October 2017. Assistant Research Professor, Center Manager.

- Served as an Assistant Research Professor in the School of Engineering where I co-led storm outage modeling research activities and teach a graduate class on predictive analytics.
- Received >\$4M in funding on predictive modeling research for engineering applications, including storm outage modeling and grid resilience.
- Concurrently served as Manager of the Eversource Energy Center (www.eversource.uconn.edu/), a UConn center of excellence where I provided modeling expertise and guidance on 15 funded research projects related to storm outage forecasting, cyber/physical security, electric grid hardening, advancing renewables, LiDAR technologies for 3-D infrastructure, grid resilience improvements, and tree and forest management.

United Technologies Corporation - Corporate EH&S Department, Hartford, CT, November 2012 – June 2013. EH&S Leadership Program Associate.

- Rotational leadership program through UTC commercial, aerospace and corporate divisions.

Northeast Utilities System Company - Environmental and Property Management Department, Berlin, CT 06037, May 2009 – October 2012.

- Water compliance and GIS subject matter expert for the department, and served as a working team lead on distribution transformer lifecycle analysis for the Electric Utility Industry Sustainable Supply Chain Alliance (EUISSCA).

HONORS AND AWARDS

- Environmental Leadership Award (2016): Given by University of Connecticut's Environmental Policy Advisory Council, awarded to one graduate student every three years.
- Poster Competition Runner-Up (2015): "Storm Outage Modeling and Estimated Time Until Restoration Modeling" - UConn Engineering Graduate Student Poster Competition; Storrs, CT.
- Poster Competition Winner (2014): "Storm Outage Modeling for an Electric Distribution Network in Northeastern USA" - SAS Predictive Analytics Conference; Las Vegas, NV.
- Eagle Scout (2007) - Boy Scouts of America.

REVIEWER

- Stochastic Environmental Risk Assessment (2015 – present)
- Risk Analysis (2016 – present)
- Remote Sensing (2017 – present)
- PLOS One (2017 – present)
- Journal of Applied Meteorology and Climatology (2019 – present)
- Sensors (2018 – present)

GRADUATE STUDENT ADVISING

Associate PhD Advisor

- Christina Feng – PhD Candidate – Environmental Engineering (started Fall 2017)
- Kingsley Udeh – PhD Candidate – Computer Science (started Fall 2017)
- Peter Watson – PhD Candidate – Environmental Engineering (started Summer 2017)
- Feifei Yang – PhD Candidate – Environmental Engineering (started Fall 2016)
- Maryam Pardakhti – PhD Candidate – Chemical Engineering (graduated Spring 2019)
- Diego Cerrai – PhD Candidate – Environmental Engineering (graduated Spring 2019)

CERTIFICATIONS

- Engineer in Training, Environmental Engineering, State of Connecticut License EIT.11352, Expiration: 2014 – 2024

VOLUNTEER EXPERIENCE

- Fidelco Guide Dog Foundation, Guide Dog Puppy Raiser and Volunteer; 2016 – present.
 - Fitz (2016, F27 litter), Fern (2018, F28 litter), and Grace (2019, G28 litter).