

## CURRICULUM VITAE

Melissa Ree Allen  
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Oak Ridge, TN 37830  
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**EDUCATION:** PhD in Energy Science and Engineering, University of Tennessee, August, 2014.  
With Interdisciplinary Graduate Minor in Computational Science  
And Applied Statistical Strategies Certificate

Master's Degree in Environmental Engineering, University of Tennessee,  
Knoxville, Tennessee, August, 2011.

Bachelor of Music Education, University of Northern Colorado  
Greeley, Colorado, Graduated with Honors, 1989.

University of Illinois Urbana-Champaign, 2001 – 2004.  
Calculus I, II, III, Linear Algebra I, II, Vectors, Differential Equations

Pellissippi State Technical Community College, 2008 – 2009.  
General Chemistry I, II; Calculus Based Physics I, II

Knoxville Flight Training Center, Knoxville Downtown Island Airport  
Private Pilot Certificate, May 1997  
Instrument Pilot Rating, August 1998

### RELATED PROFESSIONAL EXPERIENCE:

Post-Doctoral Researcher, Oak Ridge National Laboratory, 2015 - present  
Oak Ridge National Laboratory, Research Assistantship, 2008-2014  
Drs. Joshua Fu, David Erickson, Steven Fernandez and Thomas Wilbanks, Mentors

### PUBLICATIONS:

Allen, M.R., S.J. Fernandez, J.S. Fu, M. Olama (2016). Impacts of climate change on sub-regional electricity demand and distribution, *Nature Energy*, In Review.

Guiang, M. and Allen, M.R. (2016), Assessment of aquifer vulnerability to saltwater intrusion due to climate change in Casco Bay, Maine, *Hydrogeology Journal*, In Review.

Fernandez, S.J., M.R. Allen, J.D. Cohn, G.L. Toole, V.C. Tidwell, E. Yan (2016). Impacts of Climate, Population and Technology Changes on Electricity Consumption and Generation, *Renewable and Sustainable Energy Reviews*, In Review.

Allen, M.R., V.C. Tidwell, G.L. Toole, T.J. Wilbanks (2015), Exploring Scientific Capacities to Assess Potentials for Infrastructure Adaptation, ORNL Technical Report ORNL/TM-2015/659.

Fu, K.S.; Allen, M.R.; Archibald, R.K. (2015). Evaluating the Relationship between the Population Trends, Prices, Heat Waves, and the Demands of Energy Consumption in Cities. *Sustainability*, **7/11**, 15284-15301.

Bradbury, J., M. Allen, R. Dell (2015), *Climate Change and Energy Infrastructure Exposure to Storm Surge and Sea-Level Rise*, US Department of Energy Report to Congress. <http://www.energy.gov/epso/downloads/climate-change-and-energy-infrastructure-exposure-storm-surge-and-sea-level-rise>

Wilbanks, T.J., S.J. Fernandez, and M.R. Allen (2015). Extreme Weather Events and Interconnected Infrastructures: Toward More Comprehensive Climate Change Planning, *Environment Science and Policy for Sustainable Development*, **57/4**, doi: 10.1080/00139157.2015.1048134.

Park, B.H., M.R. Allen, D.A. White, E.M. Weber, J.T. Murphy, M. North, P. Sydelko (2015). MIRAGE: A framework for data-driven collaboration, *Proceedings of the 13<sup>th</sup> International Conference on GeoComputation Geospatial Information Sciences*, May 20-23, Richardson, Texas, USA.

Allen, M.R. (2014). *Impacts of Climate Change on the Evolution of the Electrical Grid*, Doctoral Dissertation, University of Tennessee.

Allen, M.R., S.J. Fernandez, J.S. Fu, K.A. Walker (2014). Electricity Demand Evolution Driven by Storm Motivated Population Movement, *Journal of Geography and Natural Disasters*, **4/126**, doi:10.4172/2167-0587.1000126.

Allen, M.R., S.J. Fernandez, O.A. Omitaomu, K.A. Walker (2014). Application of Hybrid Geo-Spatially Granular Fragility Curves to Improve Power Outage Predictions, *Journal of Geography and Natural Disasters*, **4/127**, doi:10.4172/2167-0587.1000127.

Fernandez S, Allen M, Walker K (2014) Perspective: The Climate-Population-Infrastructure Modelling and Simulation Fertile Area for New Research, *J Climatol Weather Forecasting*, **2/116**, doi:10.4172/2332-2594.1000116.

Wilbanks, T., S.J. Fernandez, G.Backus, P. Garcia, K. Jonietz, P. Kirshen, M. Savonis, B. Solecki, L. Toole, M.R. Allen, R. Bierbaum, T. Brown, N. Brune, J. Buzier, J. Fu, O. Omitaomu, L. Scarlett, M. Susman, E. Vugrin, R. Zimmerman (2012). *Climate Change and Infrastructure, Urban Systems and Vulnerabilities*: Technical Report to the U.S. Department of Energy in Support of the National Climate Assessment, 29 February.

Kodra, E., D. Das, A.R. Ganguly, D.J. Erickson III, M.R. Allen (2012), *Data and Methodology for Probabilistic Precipitation Modeling*, prepared for Division of Risk Analysis, Office of Nuclear Regulatory Research, US Nuclear Regulatory Commission.

Allen, M.R., D.J. Erickson, W. Kendall, J.S. Fu, L.E. Ott, and S. Pawson (2012), The influence of internal model variability in GEOS-5 on interhemispheric CO<sub>2</sub> exchange, *J. Geophys. Res.*, **117**, D10107, doi:10.1029/2011JD017059.

Kendall, W., J. Wang, M.R. Allen, T. Peterka, J. Huang, D.J. Erickson (2011), Simplified Parallel Domain Traversal, *Supercomputing Conference*, Seattle, Washington, USA, Awarded Best Student Paper of SC11.

Allen, M.R. (2011), *The Effects of Varying Physical Parameterizations and Initial Conditions on Tracer Transport in the National Aeronautics and Space Administration's Goddard Earth Observation System Model, Version 5*, Master's Thesis, University of Tennessee.

Erickson, D.J., J. Daniel, M.R. Allen, A. Ganguly, F. Hoffman (2009), *Data Mining Geophysical Content from Satellites and Global Climate Models*. A contribution to the "FIRST WORKSHOP ON KNOWLEDGE DISCOVERY FROM CLIMATE PREDICTION, EXTREMES, AND IMPACTS (Climate-KDD)", IEEE International Conference in Data Mining, Miami, FL, December 6-9.

## ABSTRACTS:

Sylvester, Linda M., Melissa R. Allen, Thomas J. Wilbanks, December 17 (2015). "Multi-Model Framework for Investigating Potential Climate Change Impacts on Interdependent Critical Infrastructure." Abstract PA43A-2180 presented at 2015 Fall Meeting, American Geophysical Union (AGU), San Francisco, California, USA.

Lu, W., Allen, M.R., Kaiser, D.P. (2015), "Vulnerability Assessment of Critical Transportation Networks in Response to Extreme Precipitation Events: A Case Study of the 2013 Colorado Floods," presented at the First International Conference on Surface Transportation System Resilience to Climate Change and Extreme Weather Events, Washington, D.C., September 16-18.

Park, B.H., M.R. Allen, D.A. White, E.M. Weber, G. Mascaro (2015), "Data-driven high-resolution simulation through collaborative ensemble runs of heterogeneous models," presented at the European Conference on Complex Systems, Complexity and Global Security session, Tempe, Arizona, USA, Sep 28 - Oct 2.

Jones, T., J. Archuleta, D.A. White, B.H. Park, M.R. Allen (2015), "Enabling Complexity Research at Scale: A Foresight Initiative Example," presented at the European Conference on Complex Systems, Complexity and Global Security session, Tempe, Arizona, USA, Sep 28 - Oct 2.

Allen, M.R., J.S. Fu, H. Bozdogan (2013), "Statistical Downscaling of Intensity and Frequency Predictions of Local and Regional Extreme Precipitation." Abstract GC41C-1025 presented at 2013 Fall Meeting, AGU, San Francisco, California, 9-13 December.

Allen, M.R., J.S. Fu, Y. Gao, J.B. Drake, J.-F. Lamarque (2012). "Multi-Scale Statistical Evaluation of CMIP5 Predictions of Extreme Precipitation Events." Abstract G21F-1029 presented at 2012 Fall Meeting, American Geophysical Union (AGU), San Francisco, California, USA, 3-7 December.

Allen, M.R., Y. Gao, W.J. Kendall, J.S. Fu, D.J. Erickson, December 7 (2011). "21<sup>st</sup> Century Changes in Regional Species Transport Due to Climate Change in RCP 4.5 and 8.5 Scenarios." Abstract GC33A-1056 presented at 2011 Fall Meeting, American Geophysical Union (AGU), San Francisco, California, USA.

Erickson, David J., Melissa R. Allen, Michael Long, Marcia L. Branstetter, December 7 (2011). "Regional and local greenhouse gas and reactive atmospheric chemistry and the evolving physical climate system." Abstract GC31E-08 presented at 2011 Fall Meeting, American Geophysical Union (AGU), San Francisco, California, USA.

Allen, M. R., Kendall, W. J., Gao, Y, Fu, J. S., and Erickson, D. J. (2011). "4D flow visualization and analysis for 21st century decadal wind." Fall Creek Falls Conference, Gatlinburg, TN, Sep 13-16, 2011 (Poster Presentation, by invitation only)

Allen, M. R., D. J. Erickson, R. J. Andres, F. M. Hoffman, and M. L. Branstetter. December 16 (2010). "Monthly Anthropogenic CO<sub>2</sub> Fluxes: Impacts on the Atmospheric CO<sub>2</sub> Seasonal Cycle and Implications for Models of the Terrestrial Biosphere." Abstract B41G-0391 presented at 2010 Fall Meeting, American Geophysical Union (AGU), San Francisco, California, USA.

Erickson, David J., S. Pawson, J. Daniel, M.R. Allen, L.E. Ott, A. Ganguly, J.E. Nielsen, and F.M. Hoffman. December 18 (2009). "Atmospheric CO<sub>2</sub> Simulation inside GEOS-5: Data Mining, Evaluation and Treaty Verification." *Eos Trans. AGU*, **90**(52), Fall Meet. Suppl., Abstract A51A-0078.

**PRESENTATIONS:** *Modeling Urban Energy Savings Scenarios using Earth System Microclimate and Urban Morphology*, Allen, M. R., A.N. Rose, M.L. Branstetter, J. Yuan, J.R. New, O.A. Omitaomu, T.J. Wilbanks, December 15 (2015). Abstract GC21-E08 delivered to American Geophysical Union (AGU) at Fall Meeting 2015, San Francisco, California, USA (USGCRP session).

*Assessing the Costs and Benefits of Investments in Climate Resilience: TVA Case Study, Stage 1*, delivered to the Partnership Workshop on Costs and Benefits of Climate Resilience Solutions, Washington, DC, November 19, 2015.

*Vulnerability Assessment of Critical Transportation Networks in Response to Extreme Precipitation Events: A Case Study of the 2013 Colorado Floods*, delivered to the First International Conference on Surface Transportation System Resilience to Climate Change and Extreme Weather Events, Washington, D.C., September 16-18, 2015.

*Climate Change and Urban Infrastructure* delivered to The American Meteorological Society, Smoky Mountain Chapter (AMS-SMC), Oak Ridge, TN, July, 20, 2015.

*Women in Computing*, delivered to the Computing and Computational Sciences Directorate (CCSD) Summer Interns Educational Event, Oak Ridge National Laboratory, Oak Ridge, TN, July 16, 2015.

*Investigating the Impacts of Climate Change on the Evolution of the Electrical Grid*, delivered to The Association of Large Distribution Cooperatives (ALDC), Nashville, Tennessee, May 14, 2015.

*Investigating the Impacts of Climate Change on the Evolution of the Electrical Grid* delivered to the Computational Science and Engineering Division, Oak Ridge National Laboratory, Oak Ridge, TN, December 19, 2014.

*Vulnerability of Casco Bay Aquifers to Salt Water Intrusion due to Sea Level Rise* as part of the overall presentation of Department of Homeland Security Regional Resiliency Assessment Program (RRAP) Capstone Meeting, Portland, ME, October 15, 2014.

*State of the Science on Regional Climate Modeling* as part of the overall presentation of Department of Homeland Security Regional Resiliency Assessment Program (RRAP) Workshop, Portland, ME, July 16, August 6, September 4, 2014.

*Statistical Modeling of Intensity and Frequency Predictions of Local and Regional Heavy Rainfall Occurrences Using Information Complexity Criteria*. Preparation of keynote presentation by Dr. Hamparsum Bozdogan for International Conference on Environmental Science and Technology, Side, Turkey, May 15, 2014.

*Critical Infrastructure Disruption Models* delivered to Homeland Infrastructure Foundation-Level Data (HIFLD) Working Group Meeting on Climate Data and Mapping for Infrastructure Resilience, Washington, DC, November 13, 2013.

*Effects of Climate Change on Coastal Population Migration and Changes in Regional Energy Demand* delivered to Carbon Management Technology Conference, Alexandria, VA, October 22, 2013.

*Statistical Downscaling of Coarse-scale Modeled Extreme Precipitation to Point-Specific Location Values* delivered to Air and Waste Management Annual Meeting and Technical Conference, Nashville, TN, July 12, 2013.

*The Influence of Internal Model Variability in GEOS-5 on Interhemispheric CO<sub>2</sub> Transport* delivered to Climate Change Science Institute, Oak Ridge National Laboratory (3x5), Oak Ridge, TN, June 21, 2011.

**SESSIONS  
CONVENED:**

American Geophysical Union 2015 Fall Meeting Session **PA31C**, *Urban Metabolism, Morphology, and Microclimate under Global Change*. Served as session chair.

International Conference on Complex Systems Satellite Session, *Complexity and Global Security*. Served as co-convenor.

**REVIEW  
PANELIST:**

Department of Energy Biological and Environmental Sciences CRA Review, May 2016

**REVIEWER:**

*Climate Risk Management*  
*Journal of the Air and Waste Management Association*  
*Bulletin of the American Meteorological Society*  
*Weather, Climate and Society (AMS)*  
*Baseline Report for the 2014 US Quadrennial Energy Review*  
*Sustainability*  
*PLOS ONE*

**COMPUTER  
SKILLS:**

Platforms: Linux, Unix, Macintosh, Windows  
Programming Languages: C++, Fortran, Matlab, MPI, Python, HTML/CSS, Shell scripts  
Data formats: Netcdf, hdf, bpch, dat, txt, csv, kml, dbf, shp  
Plot/Analysis Tools: NCO, NCL, IDL, ArcGIS, Ferret, VisIt, GAMAP, Excel, Stata, R  
Global/Regional Climate Models: GEOS-5, CESM, WRF  
Agent-based Modeling: NetLogo, ArcGIS, Repast HPC

**MENTEES:**

Matthew Guiang, 2015, graduate of Washington University, St. Louis  
Research: *Assessment of Aquifer Vulnerability to Saltwater Intrusion due to Climate Change in Casco Bay, Maine*  
Chris Buckman, 2015, rising junior, North Carolina State University  
Research: *Forecast of the Economic Risks of Climate Change for Hurricanes in the Atlantic Basin*  
Katherine Fu, 2015, rising senior, Farragut High School  
Research: *Using Stochastic Parameterization in CLM Urban to Determine Likelihood for Heat Waves and Consequent Impacts on Human Health in the Greater Chicago Region*

**ORGANIZATION  
MEMBERSHIPS  
AND ACTIVITIES:**

American Geophysical Union, 2009 - present  
American Meteorological Society, 2011- present  
Aircraft Owners and Pilots Association, 1997 – present

**HONORS  
AND AWARDS:**

Homeland Security Assistant Secretary of Infrastructure Protection (ASIP)  
Trailblazer Award as a contributor to the Maine Climate Change Adaptation RRAP  
(Regional Resiliency Assessment Program) Team, 2014

Extraordinary Professional Promise Award, 2013  
University of Tennessee, Knoxville

Bredesen Center Fellowship, 2011-2014  
University of Tennessee, Knoxville

Ginsburg String Scholarship Award, 1984-1989  
University of Northern Colorado

Outstanding Student Teacher, UNC, 1989

UNC School of Music Departmental Scholar Award for Academic Excellence, 1988

UNC Phi Kappa Lambda Honor Society, Inducted, 1988

Dean's List, UNC, 1984-1989

**COMMUNITY SERVICE:**

*Climate Change Impacts on Electricity Demand and Supply*, talk delivered to the Science Forum, University of Tennessee, Knoxville, TN, April 22, 2016.

*COP21: Climate Summit in Paris*, Science Café discussion led with the Spirit and Truth Fellowship of Knoxville, Ijams Nature Center, Knoxville, TN, March 10, 2016.

*Climate Change Overview*, talk delivered on behalf of the ORNL Climate Change Science Institute (CCSI) to the Oak Ridge League of Women Voters, Oak Ridge, TN, February 16, 2016.

*What Science Tells Us about Climate Change*, talk delivered to Robertsville Middle School Project Based Learning Classes, Oak Ridge, TN, January 12, 2016.

*Climate Change: Science and Model Capabilities and Limitations*, talk delivered to the Science Forum, University of Tennessee, Knoxville, TN, November 13, 2015.

*Climate Change: Science and Model Capabilities and Limitations* talk delivered to the Environmental Writing and Science & Medicine Writing classes, University of Tennessee, Knoxville, TN, January 27, 2015.

*Impacts of Climate Change on the Electrical Grid* delivered to the Technical Society of Knoxville, Knoxville, TN, September 29, 2014.

*Impacts of Climate Change on Energy Demand* talk delivered to Oak Ridge Institute for Continued Learning, November 6, 2013.

*Thinking Rationally about Climate Change* talk delivered to Rationalists of East Tennessee, Knoxville, TN, October 3, 2010.

**PREVIOUS EMPLOYMENT:**

Private Violin and Viola Teacher  
Maryville High School, Middle School, Intermediate School  
Maryville, Tennessee, 1996-2011

Office Manager, Sales, Shipping, Robertson Violin Shop  
Albuquerque, New Mexico, 1991-1995

Heath Junior High School Orchestra and Choral Teacher  
Greeley, Colorado, 1989-1991

Orchestral Violinist, Greeley Philharmonic, Fort Collins Symphony, Cheyenne Symphony, Colorado and Wyoming respectively, 1984 – 1991