Anamika Shreevastava

NASA EARTH SCIENCE FELLOW, PURDUE UNIVERSITY

PURDUE UNIVERSITY

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Education

2016 – **Purdue University, IN, USA**
Ph.D. in Environmental Engineering
Interdisciplinary Graduate Program in Ecological Sciences and Engineering
Thesis: *Dynamics of intra-urban heat islets*
Advisor: Professor P. Suresh C. Rao

2014 – 2016 **Purdue University, IN, USA**
M.S. in Architectural Engineering
Research: *Estimating anthropogenic heat flux from building energy usage at city-scale*

2010 – 2014 **Indian Institute of Technology, Roorkee, India**
B. Tech. in Civil Engineering
Thesis: *Designing an intensive urban storm-water drainage network and a compact, cost-efficient wastewater treatment plant for the IIT Roorkee campus.*

Awards and certifications

NASA Earth and Space Science Fellowship 2017 – 2020

- Won the 3-year doctoral fellowship awarded to Future Investigators of NASA Earth and Space Science Technology.
- Member of NASA's Land Cover Land Use Change (LCLUC) Team.

American Meteorological Society's Best Student Presentation Award 2017

US Green Building Council's LEED Accredited Professional 2016 – 2018

- Specialized in the design and construction phases of green buildings serving the commercial, residential, education and healthcare sectors.

International Research Collaborations

NOAA Center for Remote Sensing and Earth System Technology (CREST) 2019 – ongoing

- Currently working in collaboration with NOAA CREST on understanding the impact of heat waves on intra-urban heat islets.

Synthesis of Complex Networks 2017 – ongoing

- Core member of the international research collaboration between Helmholtz Centre for Environmental Research (UFZ), Magdeburg; Technical University (TU), Dresden; University of Florida, Gainesville; Korea University, Seoul; University of Western Australia, Perth; and Purdue University, West Lafayette.
  https://www.ufz.de/cawr/index.php?en=43129
- Pursued parts of my doctoral research on **Fractal intra-Urban Heat Islets** in collaboration with the team through series of international workshops and meetings over the last 3 years.

World Urban Database and Portal Access Tool (WUDAPT) 2015 – 2017

- Worked with Prof. Jason Ching and Prof. Gerald Mills who lead WUDAPT to develop Local Climate Zone (LCZ) maps for Indian cities during Master's research.
- Studied the role of spatial heterogeneity in the correlation of remotely sensed Land Surface Temperature and LCZ. Research findings were presented by Prof. Jason Ching at the 3rd WUDAPT workshop in Hong Kong (Dec 2015) and published in Bulletin of the American Meteorological Society.

Journal Publications

1. **Shreevastava, A.**, Bhalachandran, S., McGrath, G., Huber, M. & Rao, P. (2019). Paradoxical impact of sprawling intra-urban heat islets: Reducing mean surface temperatures while enhancing local extremes. ***Scientific Reports*** *(in Review)*. https://eartharxiv.org/gxj9m
2. **Shreevastava, A.**, Rao, P. & McGrath, G. (2019). Emergent self-similarity and scaling properties of fractal intra-urban heat islets for diverse global cities. ***Physical Reviews E***. doi:10.1103/PhysRevE.100.032142
3. Bhalachandran, S., Chavas, D., Marks Jr, F., Dubey, S., **Shreevastava, A.** & Krishnamurti, T. (2019). Characterizing the energetics of multi-scale asymmetries during tropical cyclone rapid intensity changes. ***Journal of the Atmospheric Sciences*** *(in Review)*. https://arxiv.org/abs/1908.03618#
4. **Shreevastava, A.**, Rao, P. & McGrath, G. (2018). Spatial analysis of the surface urban heat island. ***Land Surface and Cryosphere Remote Sensing***, *10777*. doi:10.1117/12.2501441
5. Ching, J., Mills, G., Bechtel, B., ..., **Shreevastava, A.** et al. (2018). WUDAPT: An urban weather, climate, and environmental modeling infrastructure for the anthropocene. ***Bulletin of the American Meteorological Society***, *99*(9), 1907–1924. doi:10.1175/BAMS-D-16-0236.1

Conference Presentations

2018/12 **Shreevastava, A.**, Rao, P.S.C., and McGrath, G.S. (2018, December). Fractal topography of the intra-urban thermal landscape. *Nonlinear Geophysics. AGU Fall Meetings, Washington, DC.*

2018/08 **Shreevastava, A.**, McGrath, G., Rao, P.S.C. (2018, September). Spatial analysis of the Surface Urban Heat Island. *SPIE Asia-Pacific Remote Sensing Conference, Honolulu, HI.*

2017/12 **Shreevastava, A.**, McGrath, G., Rao, P.S.C. (2017, December). Characterizing the intra-urban spatial structure of High Heat Stress Zones. *Global Environment Change. AGU Fall meetings, New Orleans, LA.*

2017/01 **Shreevastava, A.**, Bhalachandran, S., Garcia-Dorado, I., Aliaga, D., and Niyogi, D. (2017, January) Incorporation of urban form and function for improved correlation between Land Use Types and Land Surface Temperatures. *13th Symposium of the Urban Environment. 97th AMS Annual Meeting, Seattle, WA.*

Shreevastava, A., Bhalachandran, S., Krueger, E., Rao, P.S.C., Modak, P., and Niyogi, D. (2017, January) A Resilience Analysis of 100 Climate Proofing Strategies of the C-40 Cities. *97th AMS Annual Meeting, Seattle, WA.*

Invited Talks and Seminars

2019/08 **Centre for Advaced Spatial Analysis (CASA), University College London (UCL)**, London, UK. *Spatial correlation of inequalities in building energy usage and regions of extreme heat.*

2019/04 **NASA Land Cover Land Use Change (LCLUC) Science Team meeting**, Rockville, MD, USA. *Characterizing the spatial complexity of the intra-urban heat islets.*

2018/08 **Colorado State University**, Fort Collins, CO, USA. *Fractal topography of the intra-urban thermal landscape.*

2018/06 **NASA Ames, Mountainview**, CA, USA. *Fractal topography of the intra-urban thermal landscape.*

2018/02 **University of Florida, Gainesville**, FL, USA. *Fractal topography of the intra-urban thermal landscape.*

Invited Talks and Seminars (continued)

2017/08 **Technische Universitat (TU) Dresden**, Dresden, Germany. *Optimizing Thermal Comfort in Fractal Cities.*

2016/08 **Helmholtz Centre for Environmental Research (UFZ)**, Magdeburg, Germany. *A resilience analysis of 100 climate proofing strategies by 56 global cities.*

2016/06 **Environmental Management Centre (EMC)**, Mumbai, India. *A resilience analysis of 100 climate proofing strategies by 56 global cities.*

Relevant Graduate Courses

Complex Systems	Introduction to Complex Networks, Perspectives of Complex Systems: Theory and Application, Resilient Hybrid Infrastructure Networks.
Atmospheric Sciences	Land Surface Modeling, Environmental Informatics, Boundary Layer Meteorology, Global Change Modeling.
Remote Sensing and GIS	Geographical Information Systems, Geospatial Modeling and Analysis.
Architectural Engineering	Building Envelop Design and Thermal Load, Lighting in Buildings, HVAC and Electrical Design, Sustainable Building design.
Smart Cities	Smart Cities Analytics (Machine Learning algorithms for urban applications), Urban Ecosystem Services.

Relevant Projects

Data-driven clustering of 100 cities based on patterns of Urban Heat Island — Fall 2018

- A data driven analysis of detecting similar spatial patterns of Urban Heat Island for 100 cities was conducted using a modified K-means clustering algorithm followed by Decision Tree classifier. A simple Neural Network classifier was also implemented to compare results.
- Classes of cities based on characteristics such as mono-centricity vs polycentricity, area, and diversity of Urban Land Use Land Cover classes were detected.

System-scale analysis of Houston's renovated metro transit network — Spring 2017

- The rail transit network of Houston was examined from the four lenses of systems thinking.
- Impact of changes made in transportation system on the inter-related systems such as building density, net carbon emission (environmental systems), and the city's economic system were explored.

Geospatial twitter data mining and clustering to find student hotspots — Fall 2016

- Geospatially tagged twitter data for the Purdue University campus was used to find the most popular locations of "Fuels that drive Purdue – Coffee and Beer".
- Latent Dirichlet Allocation (LDA) was used to identify relevant tweets, and spatial Kernel density plots were evaluated to find the hotspots. Popular locations were found to be clustered together indicating the influence of Hoteling's Law of market aggregation.

Network analysis of road network of Indianapolis — Spring 2016

- Road networks of Indianapolis were studied to compare the network characteristics of different network layout types.
- Network metrics such as Modularity, Assortativity, Node-degree-distribution, and Search Information were evaluated to delineate the difference between Commercial and Residential road networks.

Energy Efficiency analysis comparison for different city layouts — Fall 2015

- An energy efficiency analysis of an urban neighborhood for different urban layouts within fixed area and population was done using Simergy (software based on EnergyPlus).
- Energy consumption offsets by using Photo Voltaic rooftop solar panels were evaluated as well.
- Large Low-Rise building types displayed a distinct advantage over the other layouts in terms of energy usage owing to an optimal balance between the perimeter zone loads and core zone loads.

Teaching Experience

Graduate Instructor, Purdue University **Spring 2016**

- Worked as a mentor for an interdisciplinary graduate class on designing cities resilient to climate change.
- Taught the workflow of Local Climate Zones mapping - a random-forest based supervised classification for Urban Form and Function using Google Earth and SAGA GIS.

Graduate Teaching Assistant, Purdue University **Fall 2014, Spring 2015**

- Taught two courses on Principles of Geomatics, and Applied Statics over the span of two semesters.
- Responsibilities included Demonstrations, field work, designing lab experiments, holding tutorial sessions and grading.

Technical Skills

Programming	R, Python, MATLAB, LaTeX, Bash, JavaScript, HTML, Github.
Geospatial Analysis	R (using rgeos, rgdal, raster, etc.), ArcGIS, SAGA-GIS, Google Earth Engine.
Computational methods	Weather Research Forecast (WRF) modeling, Statistical modeling, Networks Modeling, Machine Learning algorithms using Python (using scikit-learn, matplotlib, pandas, etc.)