Dev Niyogi
Professor, Purdue University with Joint appointments in Department of Agronomy- Crops, Soils, Air and Water Sciences, and Department of Earth, Atmospheric, and Planetary Sciences, also with Division of Ecological and Environmental Engineering (Courtesy), West Lafayette, IN 47907-2054, Indiana State Climatologist (2005- 2018)
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Dev Niyogi obtained his PhD in 2000 from North Carolina State University conducting research on understanding land - atmosphere interactions using multiscale observations and models. His research seeks to significantly contribute to our understanding of the Earth system particularly the urban and agricultural landscapes, and the dynamic role of coupled land surface processes on weather and regional meteorological extremes. An important ongoing and emerging focus of his research is to translate the scientific work undertaken into decision tools and portals with particular focus on hydroclimatology and sustainable climate-ready/resilient cities.

Examples of current research questions being studied in Niyogi's group include: How to represent the land surface changes and feedbacks into predictive environmental models? How to best use the myriad of new datasets to develop efficient tools for agricultural and urban regions? How to help design next generation climate resilient cities? What is a City in a complex network framework? How to help sustainable regional development with effective tools and human practices? How can we develop predictive models, decision tools, and next generation scientists and thinkers that can help manage resources and complex feedbacks in Earth system, especially under extreme conditions? How to improve the post landfall characteristics, especially rainfall characteristics of tropical cyclones over the Atlantic and Indian Ocean environments using antecedent land state? How can we use Machine Learning and other data driven approaches to improve process-scale models for land – atmosphere interactions? Thus the research questions are both fundamental and process study based as well as highly applied, and driven by issues and problems to be solved.

Dr. Niyogi currently teaches an undergraduate Weather and Climate course for applied climatology and non-meteorology majors and an advanced Land Surface Modeling graduate course at Purdue. He has also co-taught an interdisciplinary Environmental Sciences and Engineering course on Urban Complex Systems, and taught graduate courses on Atmospheric Boundary Layer, Atmospheric Turbulence, and Air Quality Modeling, and as a State Climatologist (for North Carolina and then for Indiana, until 2018) has been actively engaged in helping decision-makers work with different water, climate and resiliency related issues. A total of 11 Ph D and 16 MS students have graduated with Dr Niyogi as their advisor or coadviser.

Dr. Niyogi has coauthored over 170 papers for peer – reviewed international journals, 17 book chapters, and over 150 conference proceedings or abstracts for professional conferences such as the AMS and AGU annual meetings. According to Google Scholar, his research has been cited over 9600 times (h-index > 50; i-index >150) and his work has been read over 26,700 times per Research Gate statistics. His work has been highlighted in various media outlets including in the popular press such as Yahoo!, MSNBC, Wired, CNN, LiveScience, National Geographic, Tedx Talk, NASA press releases, and recently for NPR following urbanization impacts on Hurricane Harvey rainfall.

Dr. Niyogi's research is funded through a variety of competitive federal grants- NSF (Atmospheric and Geosciences, Hydrology, Cyberinfrastructure, Computer Sciences, Geoscience Education, International Programs, RAPID, and CAREER), NASA (Hydrology, Interdisciplinary Sciences), Joint Center for Satellite Data Assimilation, DOE, NOAA, and USDA/NIFA. He has developed over 30 successful research projects which have led to a total award of $100.49 millions to Purdue ($ 5.64 millions as individual share) through grants. Since 2009, Dr. Niyogi received Purdue 'Seeds for Success' award, Million Dollar research award, and the University Faculty Scholar recognition, the NSF's CAREER award, the USDA NIFA Partnership Award, and has been part of the 2018 Governor's Award for Environmental Excellence- amongst other.

Dr. Niyogi is the chair of the American Meteorological Society (AMS) Board of Urban Environment and the elected advisory board member of the International Association of Urban Climate. He has been a member of the AMS Committees on Agriculture and Forest Meteorology, AMS Committee on Applied Climatology, invited member FGDC Spatial Climate Working Group, Member of the Weather Research and Forecast (WRF) model WG-14 (land surface models), and Member of the AGU Biogeochemistry meetings group / spring meeting student awards chair. He has provided invited testimonies to National Academy study group, planning summer meetings, and Senate Working groups. He also has a robust international network of research projects with currently active collaborators, joint students, or funded projects in India, China, Germany, Ireland, Zimbabwe, Luxembourg, and France.

He is currently serving as an Editorial Board member for the journal Urban Climate, and Helios published by Elsevier and for a the journal Remote Sensing, and has been a Review Editor for Climate Research, an Associate Editor for Water Resources Research and the AMS Journal of Applied Climatology and Meteorology. He has also been a Guest Editor of five special issues on Land use Land Cover impacts on weather and climate for International Journal of Climatology (twice), Boundary-Layer Meteorology, Global Planetary Changes, Remote Sensing, and a Volume Editor for Elsevier, Major Reference Work on Climate Vulnerability (Agriculture) published in 2013.

Select Representative Publications (* indicates Dr. Niyogi's graduate student):

Freitag, B.M., Nair, U.S., and **Niyogi, D.**, 2018. Urban modification of convection and rainfall in complex terrain. Geophysical Research Letters, 45(5), 2507-2515.

Paul, S., Ghosh, S., Mathew, M., Devanand, A., Karmakar, S. and **Niyogi, D.**, 2018. Increased Spatial Variability and Intensification of Extreme Monsoon Rainfall due to Urbanization. Scientific Reports, 8(1), 3918 (https://www.nature.com/articles/s41598-018-22322-9)

Ching, J., Mills, G., Bechtel, B., See, L., Feddema, J., Wang, X., Ren, C., Brousse, O., Martilli, A., Neophytou, M., Mouzourides, P., Stewart, I., Hanna, A., Ng, E., Foley, M., Alexander, P., Aliaga, **D., Niyogi**, D., Shreevastava, A., Bhalachandran, P., V. Masson, J. Hidalgo, J. Fung, M. Andrade, A. Baklanov, W. Dai, G. Milcinski, M. Demuzere, N. Brunsell, M Pesaresi, S. Miao, Q. Mu, F. Chen, and N. Theeuwes, 2018: World Urban Database and Access Portal Tools (WUDAPT), an urban weather, climate and environmental modeling infrastructure for the Anthropocene. *Bulletin of the American Meteorological Society*. ISSN 1520-0477 (In Press)

Niyogi, D., Lei*, M., Kishtawal, C., Schmid, P*. and Shepherd, M., 2017. Urbanization impacts on the summer heavy rainfall climatology over the eastern United States. Earth Interactions, 21(5), 1-17.

Garcia-Dorado, I., Aliaga, D.G., Bhalachandran*, S., Schmid, P*. and **Niyogi, D.**, 2017. Fast weather simulation for inverse procedural design of 3D urban models. ACM Transactions on Graphics (TOG), 36(2), 21.

Niyogi, D., Jacobs*, E.M., Liu*, X., Kumar, A., Biehl, L., Rao, P.S.C., 2017. Assessment of a Long-Term High-Resolution Hydroclimatic Dataset for the US Midwest. Earth Interactions, 21, 1-31.

Osuri K., R. Nadimpalli, U.C. Mohanty, F. Chen, M. Rajeevan, and **D. Niyogi**, 2017. Improved prediction of severe thunderstorms over the Indian Monsoon region using high-resolution soil moisture and temperature initialization, Scientific Reports, 7, 41377, doi:10.1038/srep41377

Zhang*, X., Chen, N., Li, J., Chen, Z. and **D. Niyogi**, 2017. Multi-sensor integrated framework and index for agricultural drought monitoring. Remote Sensing of Environment, 188, 141-163.

Liu*, X., Chen, F., Barlage, M., Zhou, G. and **D. Niyogi**, 2016: Noah-MP-Crop: Introducing Dynamic Crop Growth in the Noah-MP Land-Surface Model. Journal of Geophysical Research.

Kellner*, O., D. Niyogi, and Marks, F.D., 2016: Contribution of landfalling tropical system rainfall to the hydroclimate of eastern US Corn Belt 1981–2012. Weather Climate Extremes, 13, 54-67.

Niyogi D., X. Liu*, J. Andresen, Y. Song, A. K. Jain, O. Kellner*, E. S. Takle, and O. C. Doering, 2015: Crop models capture the impacts of climate variability on corn yield, Geophysical Research Letters, DOI: 10.1002/2015GL06384.

Liu Y., Z. Pan, Q. Zhuang, D. G. Miralles, A. J. Teuling, T. Zhang, P. An, Z. Dong, J. Zhang, D. He, L. Wang, X. Pan, W. Bai, and **D. Niyogi**, 2015: Agriculture intensifies soil moisture decline in Northern China, Nature Scientific Reports, Article no. 11261, DOI: 10.1038/srep11261.

Shepardson D., A. Roychoudhury, A. Hirsch, **D. Niyogi**, S.M. Top, 2014: When the atmosphere warms it rains and ice melts: Seventh grade students' conceptions of a climate system, Environmental Education Research, 20, 333-353.

Kellner O*, and **D. Niyogi,** 2014: Land-surface Heterogeneity Signature in Tornado Climatology? An Illustrative Analysis over Indiana 1950-2012, Earth Interactions, 18, 1-32.

Aliaga D.G., C. A. Vanegas, M. Lei*, **D. Niyogi,** 2013: Visualization-based Decision Tool for Urban Meteorological Modeling, Environment and Planning B, 40 (2), 271-288.

Niyogi, D, P. Pyle, Ming Lei*, S. Pal Arya, C M. Kishtawal, M. Shepherd, F. Chen, B. Wolfe, 2011: Urban Modification of Thunderstorms: An Observational Storm Climatology and Model Case Study for the Indianapolis Urban Region. Journal of Applied Meteorology Climatology, 50, 1129-1144.

Niyogi, D., C. Kishtawal, S.Tripathi, R.Govindaraju, 2010: Observational evidence that agricultural intensification and land use change may be reducing the Indian summer monsoon rainfall, Water Resources Research, 46, W03533, doi:10.1029/2008WR007082

Kishtawal, C.M., **Niyogi, D.,** Tewari, M., Pielke Sr, R.A. and Shepherd, J.M., 2010. Urbanization signature in the observed heavy rainfall climatology over India. International Journal of Climatology, 30(13), pp.1908-1916.

Chang*, H.I., **Niyogi, D**., Kumar, A., Kishtawal, C.M., Dudhia, J., Chen, F., Mohanty, U.C. and Shepherd, M., 2009. Possible relation between land surface feedback and the post-landfall structure of monsoon depressions. Geophysical Research Letters, 36(15).

Chang, H.I., Kumar, A., **Niyogi, D.,** Mohanty, U.C., Chen, F. and Dudhia, J., 2009. The role of land surface processes on the mesoscale simulation of the July 26, 2005 heavy rain event over Mumbai, India. Global and Planetary Change, 67(1-2), pp.87-103.

Other top cited papers:

Pielke, R. A., Pitman, A., **Niyogi, D.**, Mahmood, R., McAlpine, C., Hossain, F., Goldewijk, K. K., Nair, U., Betts, R., Fall, S., Reichstein, M., Kabat, P., de Noblet, N., 2011: Land use/land cover changes and climate: modeling analysis and observational evidence. Wiley Interdisciplinary Reviews: Climate Change. doi: 10.1002/wcc.144 (Co-lead on invited review).

Pielke Sr., R.A., G. Marland, R.A. Betts, T.N. Chase, J.L. Eastman, J.O. Niles, **D. Niyogi**, S. Running, 2002: The influence of land-use change and landscape dynamics on the climate system - Relevance to climate change policy beyond the radiative effect of greenhouse gases. Philosophical Transactions of the Royal Society (London) A. Special Theme Issue, 360 , 1705-1719.

Niu, G.Y., Yang, Z.L., Mitchell, K.E., Chen, F., Ek, M.B., Barlage, M., Kumar, A., Manning, K., **Niyogi, D.,** Rosero, E., Tewari, M., 2011. The community Noah land surface model with multiparameterization options (Noah-MP): 1. Model description and evaluation with local-scale measurements. Journal of Geophysical Research: Atmospheres, 116(D12).

Chen, F., Manning, K.W., LeMone, M.A., Trier, S.B., Alfieri, J.G., Roberts, R., Tewari, M., **Niyogi, D.,** Horst, T.W., Oncley, S.P., Basara, J.B., 2007. Description and evaluation of the characteristics of the NCAR high-resolution land data assimilation system. Journal of applied Meteorology and Climatology, 46(6), pp.694-713.

Holt, T.R., **Niyogi, D**., Chen, F., Manning, K., LeMone, M.A., Qureshi, A., 2006. Effect of land–atmosphere interactions on the IHOP 24–25 May 2002 convection case. Monthly Weather Review, 134(1), pp.113-133.

Medina, S., Houze Jr, R.A., Kumar, A., **Niyogi, D.,** 2010. Summer monsoon convection in the Himalayan region: Terrain and land cover effects. Quarterly Journal of the Royal Meteorological Society: A journal of the atmospheric sciences, applied meteorology and physical oceanography, 136(648), pp.593-616.

Shepardson, D.P., **Niyogi, D.,** Choi, S. , Charusombat, U., 2009. Seventh grade students' conceptions of global warming and climate change. Environmental Education Research, 15(5), 549-570.

EDUCATIONAL BACKGROUND

Ph.D. Atmospheric Sciences, North Carolina State University, Dissertation on ***Biosphere Atmosphere Interactions coupled with CO_2 and Soil Moisture Changes***, Fall 2000.

M.S. Atmospheric Sciences, North Carolina State University, Thesis on ***Soil Vegetation Atmosphere Transfer Processes***, Fall 1996.

B. Civil Engineering, University of Poona, India, 1994.

FACULTY APPOINTMENTS

08/2014 – present	Professor
08/2014 – 06/2018	State Climatologist for Indiana
03/2017 – present	Faculty Ambassador for Purdue University
05/2016- present	Visiting Professor in Climate Program, Indian Institute of Technology, Bombay
03/2017- 05/2017	Visiting Scientist, Indian Institute of Tropical Meteorology/Ministry of Earth Sciences, Pune, India
08/10- 08/ 2015	University Faculty Scholar
08/09 – 07/2014	Associate Professor with tenure, Department of Agronomy and Department of Earth and Atmospheric Science, Purdue University

02/05 – 08/09	Assistant Professor and Indiana State Climatologist, Department of Agronomy and Department of Earth and Atmospheric Science, Purdue University
01/01 – 02/05	Research Assistant Professor, Department of Marine, Earth and Atmospheric Sciences, North Carolina State University
01/02 - 06/ 02	Acting State Climatologist and Director of State Climate Office of North Carolina, North Carolina State University
01/01 – 03/03	Associate State Climatologist for North Carolina (NC ECO Net), State Climate Office of North Carolina, North Carolina State University
02/98 – 12/00	Assistant State Climatologist (AgNet), State Climate Office of North Carolina, Department of Marine, Earth and Atmospheric Sciences, and Meteorologist, and Department of Horticulture Science, North Carolina State University
08/94 – 01/98	Graduate Research Assistant, Department of Marine, Earth and Atmospheric Sciences, North Carolina State University

Adjunct Appointments

2004 – 2007	Department of Atmospheric Sciences, Colorado State University
2003 – 2007	Department of Geography, Univ. of North Carolina at Chapel Hill
2005 – 2010	Department of Marine, Earth and Atmospheric Sciences, North Carolina State University
2016 -	Department of Environmental Sciences, Jawaharlal Nehru University, New Delhi, India
2017-	Department of Atmospheric Sciences, University of Alabama in Huntsville

Citations in biographical works

Marquis Who's Who In America

SELECT / RECENT PROFESSIONAL HONORS AND AFFILIATIONS:

- Indiana Governor's Team Award for Environmental Excellence (2018)
- Visiting Scientist, Ministry of Earth Sciences' Indian Institute of Tropical Meteorology, Pune, India, (Spring 2017)
- Advisor/Mentor for Information Technology Research Academy – Water (ITRA-Water) through Media Lab Asia/Ministry of Electronics and Telecommunication, India (2015- 2018)
- TedX Talk on Eroding Differences and Similarities, https://www.youtube.com/watch?v=-9t5pJQ644A, (2016)
- USDA NIFA Partnership Award (2015)
- Purdue agriculture TEAM Award for the USDA/NIFA project on Making Climate Information Useful to Usable- U2U (2015)
- Million Dollar Club – Purdue University (2009, 2011, 2012, 2013, 2014, 2015)
- NSF CAREER award (2009)
- Purdue 'Seeds for Success' award – recognizing "Million Dollar Researchers" (2009)
- University Faculty Scholar, Purdue University 2010-2015 *"recognizes outstanding faculty members … who are on an accelerated path for academic distinction"*

- Invited Participant/ presenter to variety of expert groups and meetings including NSF Atmospheric Sciences Committee of Visitors 2016, UNESCO, 2016; National Academies Summer Study on Urban Meteorology, Wodeshole, MA, Summer 2011
- Invited Participant World Meteorological Organization – Indian Ocean Tropical Cyclones and Climate Change Conference, New Delhi, India
- Editorial Board Member- Elsevier, Urban Climate, 2018-
- Volume Editor – Elsevier – Major Reference Works- Climate Vulnerability and Agriculture, 2010-2012- Published 2013
- Review Editor, Climate Research Journal 2006 –
- Associate Editor, American Meteorological Society- Journal of Applied Meteorology and Climatology 2008 -2012
- Associate Editor, American Geophysical Union - Water Resources Research, 2009 -2014
- Guest Editor – Global Planetary Change Special issue on land use land cover change biogeochemical feedbacks at multiple scales, 2007 – 2008 (published 2009).
- Guest Editor – International Journal of Climatology, Special issue on Detecting the impacts of land use land cover change on climate 2008-2010 (published 2011)
- Guest Editor – Boundary-Layer Meteorology, Special issue on Land Surface Impacts on Weather and Climate 2008 – 2009 (published 2009/10)
- Guest Editor – Remote Sensing, Special issue on Land Atmosphere Interactions (2017 – onwards)
- Excellence in Refereeing, American Geophysical Union J. Geophysical Research Editor's Citation for "consistently providing constructive and thoughtful reviews".
- Outstanding Service plaque for 1st Agricultural Air Quality workshop – Presented by C. Hefferan, CSREES administrator at the first workshop on agricultural air quality, Maryland, June 8, 2006.
- Invited Participant/ Presenter, NRC Board on Agriculture and Natural Resources, Gates Foundation Workshop on Animal Health, Soil, Water, & Energy, November 2007.
- Several press releases and citations in popular press including NASA Press release 'Tiny Air Particles Change How Much Carbon Plants Absorb', Earth and Sky Radio, CNN, Yahoo!, Herald Tribune, Urban Tornadoes, Land surface feedbacks, land use land cover change.
- Invited Member, AASC / NOAA Climate Reference Network Working Group (1999 – 2001)
- Invited Member, AMS Committee on Agriculture and Forest Meteorology 1999 – 2002
- Invited Member, AMS Committee on Applied Climatology 2002 - 2006
- Invited Member, Federal Geophysical Data Committee, Spatial Climate Group (2000 – 2010)
- Invited member of the Weather Research Forecasting – WG 14 (Noah Land Surface Model 2005 -).
- Invited Member and Chair, American Meteorology Society Board of Urban Environment
- Elected Board Member of the International Association of Urban Climatology (IAUC)
- Chair for American Geophysical Union Outstanding Student Awards (Biogeoscience section) – Spring Meeting 2001, 2002; Fall meeting 2004, 2005. AGU Biogeosciences meetings subcommittee 2006, 2005, 2004, Fall and Spring.
- Organizing Session Co-Chair/Co-Convener for number of AMS and AGU sessions and meetings on Land Use Land Cover Change impacts, Droughts, Monsoons. AMS Technical Program committee – Applied Climate conferences 2004, 2005, Urban Conference 2012, 2013, 2015, 2017.
- Ad-Hoc reviewer, panel member for grant proposals for: NSF EPSCOR Sites, NSF Hydrology, NSF Mesoscale Dynamics, NSF Large Scale Climate Dynamics, NSF CAREER, NSF Geography and

Spatial Sciences, NSF ENG, DOE Atmospheric Radiation Measurement (ARM) Program, DOE/ NE National Institute for Climate Change Research Panel, BSF (Israel), Qatar National Foundation, Ireland Science Foundation, NERC Panel, Royal Netherlands Research Foundation, NASA ad hoc and review panels, NOAA ad hoc and review panels.

- Reviewer of manuscripts on land surface feedbacks for the following professional journals: Science, PNAS, Nature Geosciences, Nature Scientific Reports, QJRMS, Journal of Climate, AMS – Applied Meteorology and Climatology, AMS - Monthly Weather Review, Climate Research, AGU's Journal of Geophysical Research, New Phytologist, EGU's Atmospheric Chemistry and Physics Discussions, Royal Meteorological Society's Meteorological Applications, Meteorology and Applied Physics, Atmospheric Environment, Climate Dynamics, Agricultural and Forest Meteorology.

TEACHING AND RELATED EXPERIENCE

- Weather and Climate (undergraduate, for agricultural and arts/humanities majors, approx 30 students per class, Spring 2006-2018).
- Land Surface Modeling (graduate course at Purdue, enrollment 5-10, Fall 2006 – 2013, 2016).
- Urban Complex Systems – Fall 2015, 2016 (co-teaching as part of Interdisciplinary Environmental Science and Engineering program; 30 students).
- Atmospheric Turbulence and Air Quality (undergraduate/graduate course, enrollment 7, Fall 2013).
- Current Topics in Climate Change (graduate course at Purdue, enrollment 3-5, Fall 08, 09)
- Atmospheric Boundary Layer (graduate course at Purdue, enrollment 7, Spring 09, 10)
- Meteorological Instrumentation (Spring 02, 03, 04; Class size 15, course cross listed for undergraduate and graduate students at NC State)
- Global Climate Change (Fall 2004, NC State) (Class size: 40 students, undergraduates)
- Developed AMS Short Course on Model Evaluation and Statistics (joint with AMS Applied Climate and AMS Statistics committees), AMS Annual Meeting 2004.
- Assisted in designing and working with term projects and giving guest lectures for Micrometeorology (Fall 1998, Fall 2000), and Planetary Boundary Layer (Fall 1999, Fall 2001); Guest Lectures to Global Environmental Problems class (Fall 1999, Fall 2000); Aerosol class (7 lectures, Fall 2002)
- Various community, extension lectures, presentations for community groups, training workshops, various professional presentations and seminars to a wide variety of audience ranging from town hall meetings to science panel meetings.
- Three NSF Geoscience Education grants (one on Meteorological Instrumentation, two more on Climate Change Education Modules); and NOAA Education projects (On Water in urban areas)
- One NSF Informal Science grant (with Lawrence Hall of Science – UC Berkeley) on Water and Ocean, One Education Discovery grant on Physics of Climate Change for middle school teachers.

PUBLICATIONS

Invited Book Chapters (Peer Reviewed)

BC1. **Niyogi D**., Raman S., 2001: Numerical modeling of gas deposition and bi-directional surface – atmosphere exchanges in mesoscale air pollution systems, *Mesoscale Dispersion Modeling*, Ed. Z. Boybeyi, WIT Publications, Southampton, UK p.424.

BC2. **Niyogi D.,** R. A. Pielke Sr., K. Alapaty, J. Eastman, T. Holt, U. C. Mohanty, S. Raman, T. K. Roy, Y. K. Xue, 2002: Challenges of representing land surface processes in weather and climate models over Tropics: Examples over the Indian subcontinent, *Weather and Climate Modeling*, S.V. Singh, Swati Basu & T.N.Krishnamurti (Eds.), New Age International (P) Ltd. Publishers, New Delhi, pp. 132-145.

BC3. Pielke, R.A. Sr., J. Adegoke, A. Beltran-Przekurat, C.A. Hiemstra, J. Lin, U.S. Nair, **D. Niyogi**, and T.E. Nobis, 2006: Impacts of regional land use and land cover on rainfall - An overview. *IAHS Red Book - Proc. 5th FRIEND World Conference*, Water Resource Variability: Processes, Analyses and Impacts, Havana, Cuba. IAHS Publ. 308.

BC4. Rochon G. L., **D. Niyogi**, A. Chaturvedi, R. Arangarasan, K. Madhavan, L. Biehl, J. Quansah and S. Fall, 2008: Adopting Multisensor Remote Sensing Datasets and Coupled Models for Disaster Management, in *Remote Sensing and GIS Technologies for Monitoring and Prediction of Disasters*, Springer Berlin Heidelberg, DOI:10.1007/978-3-540-79259-8, ISBN: 978-3-540-79258-1 (Print) 978-3-540-79259-8 (Online)p. 75-99

BC5. Pielke Sr. R.A., and **D. Niyogi,** 2010: The role of landscape processes within the climate system. In: J.-C. Otto, R. Dikau (eds.), *Landform . Structure, Evolution, Process Control*, Lecture Notes in Earth Sciences 115, DOI 10.1007/978-3-540-75761-0_5, Springer-Verlag Berlin Heidelberg, 67-85

BC6. Beltrán-Przekurat, A., R.A. Pielke Sr., J.L Eastman, G.T. Narisma, A.J. Pitman, M. Lei, and **D. Niyogi**, 2011: Using the Factor Separation Method for land-use land-cover change impacts on weather and climate process with the Regional Atmospheric Modeling System. In: *The Factor Separation Method in the Atmosphere-Applications and Future Prospects*, Cambridge University Press, 67-86.

BC7. **D. Niyogi**, Robert Mera, Yongkang Xue, Gail Wilkerson, Fitz Booker 2011: Interaction explicit analysis of the role of land atmosphere interactions using biophysical models In: *The Factor Separation Method in the Atmosphere-Applications and Future Prospects*, Cambridge University Press, 171-183.

BC8. **Niyogi D.,** V. Mishra, 2013: Climate - Agriculture Vulnerability Assessment for the Midwestern United States, in *Climate Change in the Midwest – Impacts, Vulnerability and Adaptation*, Ed. S. Pryor, Indiana University Press, 69 – 81.

BC9. Pielke R. A. Sr., R. Wilby, **D. Niyogi**, F. Hossain, K. Daruku, J. Adegoke, G. Kallos, T. Seastedt, K. Sudig, 2013, Dealing with Complexity and Extreme Events Using a Bottom-up, Resource-based Vulnerability Perspective, Book Chapter in *AGU Monograph on Complexity and Extreme Events in Geosciences*, Geophysical Monograph Series, 196, 345-359.

BC10. Krishnamurti T.N., A. Simon, A. Thomas, A. Mishra, D.R. Sikka, **D. Niyogi**, A. Chakraborty, and L. Li, 2012, Modeling of forecast sensitivity on the march of monsoon isoschrones from Kerala to New Delhi, the first 25 days, *India Meteorological Department Monograph*, 35 p.

BC11. Fall S., R. A. Pielke Sr., **D. Niyogi**, G. Rochon, 2014: Moist Enthalpy Climatology and Long Term Anomaly Trends, in *Encyclopedia of Natural Resources*, edited by Dr. Yeqiao (Y.Q.) Wang, CRC Press, NY, ISBN 9781439852583 - CAT# K12418.

BC12. Logan, L. H., E. M. Karlsson, H. E. Gall, J. Park, N. Emery, P. Owens, **D. Niyogi**, and P. S. C. Rao, 2013: Freshwater Wetlands: Balancing Food and Water Security with Resilience of Ecological

and Social Systems. *Climate Vulnerability: Understanding and Addressing Threats to Essential Resources*. Elsevier Inc., Academic Press, 105–116.

BC13. **D. Niyogi** and O. Kellner, 2014: Agroclimatology, in *Encyclopedia of Natural Resources*, edited by Dr. Yeqiao (Y.Q.) Wang, CRC Press, NY, ISBN 9781439852583 - CAT# K12418.

BC14 **D. Niyogi**, Subramanian, S. and Osuri, K.K., 2016: The Role of Land Surface Processes on Tropical Cyclones: Introduction to Land Surface Models. In *Advanced Numerical Modeling and Data Assimilation Techniques for Tropical Cyclone Prediction*, Springer Netherlands, 221-246.

BC15 **D. Niyogi**, Osuri, K.K., Subramanian, S. and Mohanty, U.C., 2016: The Role of Land Surface Processes on Extreme Weather Events: Land Data Assimilation System. In *Advanced Numerical Modeling and Data Assimilation Techniques for Tropical Cyclone Prediction*, Springer Netherlands, 247-266

BC16. **D. Niyogi**, 2017: Agroclimatology, in *International Encyclopedia of Geography*, 1-8, Wiley Press, DOI: 10.1002/9781118786352.wbieg1130.

BC17 **D. Niyogi**, Subramanian, S,. Mohanty, U.C, Osuri, K., Kishtawal, C.M., Ghosh, S., Nair, U.S., Ek, M. and Rajeevan, M., 2018: The Impact of Land Cover and Land Use Change on the Indian Monsoon Region Hydroclimate, in *Land Atmospheric Research Applications in South and Southeast Asia*, Eds. K. Vadrevu. T. Ohara, C. Justice, Springer, Netherlands.

BC18. **D. Niyogi**, 2019: Land Surface Processes, in *Current Trends in the Representation of Physical Processes in Weather and Climate Models*, Eds.: D.A. Randall, J. Srinivasan, R. A. Nanjundiah, P. Mukhopadhyay, Springer, in press, DOI:10.1007/978-981-13-3396-5_17.

Refereed Journal Publications: (Manuscripts/ published copies at http://landsurface.org)
Contributions listed for those paper where Dr. Niyogi's lab (graduate student 'G' or postdoc 'P') is not the lead, or if Dr. Niyogi is not the corresponding author.

Papers Published – Contributions listed for those paper where Dr. Niyogi's lab (graduate student 'G' or postdoc 'P') is not the lead, or if Dr. Niyogi is not the corresponding author (marked as C). Additional updates are continuously available at Google Scholar https://scholar.google.com/citations?user=devniyogi

181. Tian, Q., G. Huang, K. Hu, and **D. Niyogi,** 2019: Observed and global climate model based changes in wind power potential over the Northern Hemisphere during 1979–2016, *Energy*, 167 , 1224-1235.

180. Bhowmik, U., S. M. Deshpande, S. K. Das, G. Pandithurai, and **D. Niyogi,** 2019: Observed Vertical Structure of Convection during Dry and Wet Summer Monsoon Epochs Over the Western Ghats, *Journal of Geophysical Research*, online first.

179. Nayak, H. P., K. K. Osuri, P. Sinha, R. Nadimpalli, U. C. Mohanty, F. Chen, M. Rajeevan, and **D. Niyogi**, 2019: High-resolution gridded soil moisture and soil temperature datasets for the Indian monsoon region. *Scientific Data* 5 (2018): 180264. https://www.nature.com/articles/sdata2018264

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Contribution: *Helped design the study, developed the hypothesis, and assisted in analysis and writing of the results*.

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Contribution: *Diagnostics of the model design and analysis and interpret the future urban network design requirements*.

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Contribution: *Co-conceived the study and guided the efforts with the authors visiting Purdue.*

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Contribution: *Colead the development of the concept of a fast weather model that reacts to changes in urbanization. This is the first study to use videogaming for developing datasets needed for running realistic weather models over urban areas in near real time.*

164. Osuri, K., R. Nadimpalli, U.C. Mohanty, F. Chen, M. Rajeevan, and **D. Niyogi[C]**, 2017: Improved prediction of severe thunderstorms over the Indian Monsoon region using high-resolution soil moisture and temperature initialization. *Nature Scientific Reports*, 7, Article no. 41377, doi:10.1038/srep41377
Contribution: *Worked with the lead authors (OK, RN) in writing the paper, interpreting the model results, the paper builds off DN's NSF and Monsoon Mission project and is central part of research activities with India. The paper was conceived and submitted when the lead three authors were visiting Purdue.*

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Contribution: *Work builds of my prior work on this topic and has evolved off series of discussions and visit to IIT Bombay to work with this group; writing parts of papers, interpreting results, developing synthesis with the team. (Purdue Press Release).*

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Contribution: *Worked with YL, DGM, and AJT in writing parts of the paper, interpreting the conceptual model and graphics of the analysis, YL developed this paper as a postdoc at PNNL and was a PhD student at Purdue (not with my group but I was in her committee).*

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Contribution: *Worked with the lead authors (AR and KKO) in writing the paper, interpreting the model results, developing the analysis as part of the visits to the institute.*

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Contribution: *Worked with the lead authors (AC and APD) in writing the paper, interpreting the model results, mentoring the student and postdoc (AK) working on the project.*

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Contribution: *Worked closely with the lead author and DGM and AJT in developing synthesis, analysis, writing, editing, revising the manuscript and the rebuttal.*

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Contribution: *Co-lead on the manuscript; initiated the idea working with the lead author; co-wrote majority of the manuscript, conducted analysis, with the lead and the third author.*

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Contribution: *This is a synthesis developed by the ASCE study group on climate resiliency issues. Contributed in the design of the study, writing of the feedback sections, editing, revising the manuscript and responding to the reviews.*

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Contribution: *This is a summary paper developed as part of the NIFA U2U project PIs about the process over the three-year period. Contributed discussions on the process, reviewed and revised drafts.*

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Contribution: *Worked closely with the lead author who was the graduate student in my land surface modeling class to synthesize the results, write and oversee the development of the manuscript and response to reviewers.*

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Contribution: *Co-designed the study, worked with the lead author in writing the manuscript and developing the analysis.*

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Contribution: *Co-lead with U.C. Mohanty on the study advising the graduate student Prasad at IIT. Designed the experiments, helped synthesize the results, write and oversee the development of the manuscript with the lead author.*

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Contribution: *Climatology subject expert and coPI for the project. Contributed to the data interpretation, coding, and presentation of the results.*

133. Smith N.G., V. L. Rodgers, E. R. Brzostek, A. Kulmatiski, M. L. Avolio, D. L. Hoover, S. E. Koerner, K. Grant, A. Jentsch, S. Fatichi, **D. Niyogi,** 2014: Toward a better integration of biological data from precipitation manipulation experiments into Earth system models, *Reviews of Geophysics*, 52, 412 – 434.
Contribution: *Led the ESM integration aspects in the manuscripts. Lead author graduate student at Purdue who took my Land Surface Modeling course and developed components of the review building off the course. Co-wrote the manuscript with the lead author.*

132. Kumar[P] Anil, **D. Niyogi**[C], F. Chen, M. Barlage, M. B. Ek, 2014: Assessing impacts of integrating MODIS vegetation data in the Weather Research Forecasting (WRF) model coupled to two different canopy- resistance approaches, *Journal of Applied Meteorology and Climatology*, 53, 1362- 1380. (Postdoc lead; Corresponding)

131. Mahmood, R., R. A. Pielke Sr., K. Hubbard, **D. Niyogi,** P. Dirmeyer, C. McAlpine, A. Carleton, R. Hale, S. Gameda, S., A. Beltrán-Przekurat, B. Baker, R. McNider, D. Legates, M. J. Shepherd, J. Du, P. Blanken, O. Frauenfeld, U.S. Nair, and S. Fall, 2014: Land Cover Changes and their Biogeophysical Effects on Climate, *International Journal of Climatology*, 34, 929 - 953.
Contribution: *Co-lead with Mahmood, Pielke, Hubbard, and Dirmeyer on this state of the art review. Wrote the parts of urban and tropical landuse impacts. Codeveloped the structure, manuscript write up.*

130. Kellner O.[G], and **D. Niyogi**, 2014: Land-surface Heterogeneity Signature in Tornado Climatology? An Illustrative Analysis over Indiana 1950-2012, *Earth Interactions*, 18, 1-32. (Graduate Student Lead; Corresponding)
This is the "most read" article for past 12 months for the journal (as of Jan 5, 2015).

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Contribution: Working closely with the lead author helped with the formulation, and validation and synthesis of the model versus observed results, manuscript revisions.

128. Schmid[G] P., and **D. Niyogi**, 2013: Impact of city size on precipitation-modifying potential, *Geophysical Research Letters*, 40, 5263–5267.

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Contribution: *Design, and analysis of data analysis and synthesis work, and to manuscript development. Codeveloped the initial idea as a NSF RAPID grant that funded the work.*

126. Kishtawal, C. M., **D. Niyogi**, B. Rajagopalan, M. Rajeevan, N. Jaiswal, N., U.C. Mohanty, 2013: Enhancement of inland penetration of monsoon depressions in the Bay of Bengal due to prestorm ground wetness. *Water Resources Research*, 49(6), 3589-3600.
Contribution: *Proposed the concept, invited lead author to Purdue and led the observational analysis, data synthesis, manuscript development, help with the hydrodynamic methodology.*

125. Osuri, K. K., Mohanty, U. C., Routray, A., Mohapatra, M., and **D. Niyogi**, 2013: Real-Time Track Prediction of Tropical Cyclones over the North Indian Ocean Using the ARW Model. *Journal of Applied Meteorology and Climatology*, 52(11).
Contribution: Codesigned the experimental analysis, wrote parts of the manuscript, analyzed results, hosted the lead author at Purdue.

124. Takle E.S., C. J. Anderson, J. Andresen, J. Angel, R. W. Elmore, B. M. Gramig, P. Guinan, S. Hilberg, D. Kluck, R. Massey, **D.Niyogi**, J. M. Schneider, M. D. Shulski, D. Todey, M. Widhalm, 2013: Climate Forecasts for Corn Producer Decision-Making, *Earth Interactions*, dx.doi.org/10.1175/2013EI000541.1
Contribution: Worked with the lead author on the manuscript, climate decision graphic, and providing feedback in an ongoing basis as part of a larger USDA project. This is the 8th most downloaded article for this journal in the past 12 months.

123. Mallick, K., A. Jarvis, J. Fisher, K. Tu, E. Boegh, **D. Niyogi**, 2013: Latent heat flux and canopy conductance based on Penman- Monteith and Bouchet's complementary hypothesis, *Journal of Hydrometeorology*, 14, 419-442.
Contribution: Codesign the canopy conductance algorithm, build off the stomatal conductance/ transpiration modeling approach I developed in 2009; data synthesis, manuscript development.

122. Mallya G., L. Zhao, X. C. Song, **D. Niyogi**, R.S. Govindaraju, 2013: On the 2012 Drought in Midwest, USA, *ASCE Journal of Hydrologic Engineering*, 8, 737-745.
Contribution: *Synthesis of drought data, drought monitoring needs, manuscript development.*

121. Aliaga D.G., C. A. Vanegas, M. Lei[G], **D. Niyogi**, 2013: Visualization-based Decision Tool for Urban Meteorological Modeling, *Environment and Planning B*, 40 (2), 271-288.
Contribution: *Designed the coupling framework, led the meteorological work, manuscript development, sections on meteorological model runs and interpretation of results/discussion.*

120. Park, J.Y., H. Gall, **D. Niyogi**, P.S.C. Rao, 2013: Temporal trajectories of wet deposition across hydro-climatic regimes: Role of urbanization and regulations at U.S. and East Asia sites, *Atmospheric Environment*, 70, 280-288. http://dx.doi.org/10.1016/j.atmosenv.2013.01.033. (Press/Media release)
Contribution: *Urbanization and hydroclimatic analysis, manuscript codevelopment, synthesis.*

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Contribution: *Codeveloped the concept, manuscript writing, synthesis of results.*

118. Kumar S., P. A. Dirmeyer, V. Merwade, T. DelSole, J. M. Adams, and **D. Niyogi,** 2013: Land Use/Cover Change Impacts in CMIP5 Climate Simulations –A New Methodology and 21st Century Challenges, *Journal of Geophysical Research- Atmospheres*, 118, 6337-6353.
Contribution: *Design of experiments, analysis of data synthesis work, and to manuscript development. Codeveloped the initial idea as a NSF RAPID grant that funded the work.*

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Contribution: *Codeveloped the water management perspective, helped write sections in the manuscript, concept developed when the lead authors student (Degu) visited Purdue.*

116. Kishtawal C., N.Jaiswal, R.Singh, **D.Niyogi**, 2012: Tropical cyclone intensification trends during satellite era (1986-2010), *Geophysical Research Letters*, 39, L10810 (Media Highlight)
Contribution: *Codeveloped the idea with the lead author during a WMO Cyclone meeting in New Delhi; Purdue lead; synthesis of the cyclone data patterns; collaboratively wrote the manuscript.*

115. Schmid P.[G], **D. Niyogi**[C], 2012: A Method for estimating Planetary Boundary Layer Heights and its Application over the ARM Southern Great Plains Site, *Journal of Atmospheric and Oceanic Technology*, 29, 316-322 (Graduate Student Lead; Corresponding)

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113. Krishnamurti T. N., A. Simon, A. Thomas, A. Mishra, D. R. Sikka, **D. Niyogi**, A. Chakraborty, L. Li, 2012: Modeling of forecast sensitivity on the march of monsoon isochrones from Kerala to New Delhi- The first 25 days, *Journal of Atmospheric Sciences*, 69, 2465 – 2487.
Contribution: *Purdue lead contributor; codesigned experiments for the land feedbacks within the model; analysis of the model results for soil moisture changes; manuscript development.*

112. Mohanty U., **D. Niyogi**, J. Potty, 2012: Recent developments in tropical cyclone analysis using observations and high resolution models, *Natural Hazards*, 1-3 (Editorial)
Contribution: *Special issue coeditor; wrote the editorial and synthesis.*

111. Kellner O.[G], **D. Niyogi**[C], M. Lei[G], A. Kumar[P], 2012: The role of anomalous soil moisture on the inland reintensification of Tropical Storm Erin (2007), *Natural Hazards- Tropical Cyclones of 21st Century Special Issue*, 63, 1573 – 1600 (Graduate Student Lead; Corresponding)

110. Wu Z., X. Wang, A. A. Turnipseed, F. Chen, A. B. Guenther, T. Karl, L. G. Huey, **D. Niyogi**, B. Xia, K. Alapaty, 2011: Evaluation and improvements of two community models in simulating dry deposition velocities for peroxyacetyl nitrate (PAN) over a coniferous forest, *Journal of Geophysical Research*, 117, D04310, http://dx.doi.org/10.1029/2011JD016751.
Contribution: *Purdue lead contributor; provided results from one of the two models used in the study; analysis of the model results and synthesis; manuscript development*.

109. Bozeman L.M.[G], **D. Niyogi**, S. Gopalakrishnan, F. D. Marks Jr., X. Zhang, and V. Tallapragada, 2011: An HWRF-based Ensemble Assessment of the Land Surface Feedback on the Post–Landfall Intensification of Tropical Storm Fay (2008), *Natural Hazards*, DOI 10.1007/s11069-011-9841-5 (Graduate Student Lead; Corresponding)

108. Charusombat, U.[G] and **D. Niyogi**[C], 2011: A Hydroclimatological Assessment of Regional Drought Vulnerability: A Case Study of Indiana Droughts. *Earth Interactions*, 15, 1–65. doi: http://dx.doi.org/ 10.1175/ 2011EI343.1 (Graduate Student Lead; Study used by Indiana Water Shortage Task Force to redo Drought Classification for Indiana)

107. Kishtawal C. M., **D. Niyogi**, A. Kumar[P], M. Laureano[G], O. Kellner[G], 2011: Observed sensitivity of inland decay of tropical cyclones to soil surface characteristics, *Natural Hazards- Tropical Cyclones of 21st Century Special Issue*, DOI: 10.1007/s11069-011-0015-2.

Contribution: *Study developed when lead author visited Niyogi lab; design of experiments; provided the initial idea; analysis framework; synthesized results; wrote sections of manuscripts.*

106. Shepardson D., A. Roychoudhury, A. Hirsch, and **D. Niyogi**, 2011: Conceptualizing Climate Change in the Context of a Climate System: Implications for Climate and Environmental Education, *Environmental Education Research*, http://dx.doi.org/10.1080/13504622.2011.622839
Contribution: *Helped develop the concept as the climatologist on the project; wrote parts of the manuscript; provided feedback on the design and helped evolve the concept.*

105. Pielke, R. A., Pitman, A., **Niyogi, D.,** Mahmood, R., McAlpine, C., Hossain, F., Goldewijk, K. K., Nair, U., Betts, R., Fall, S[G]., Reichstein, M., Kabat, P. and de Noblet, N., 2011: Land use/land cover changes and climate: modeling analysis and observational evidence. *Wiley Interdisciplinary Reviews: Climate Change*. doi: 10.1002/wcc.144 (Co-lead on invited review).
Contribution: *Colead on invited review with Pielke, Pitman and Mahmood. Wrote the section on urbanization, developed synthesis for the overall LCLUC impacts; presented initial work as part of a NASA invited talk to the landuse/cover change science meeting.*

104. Pijanowski B., N. Moore, D. Mauree, and **D. Niyogi**, 2011: Evaluating error propagation in coupled land-atmosphere models, *Earth Interactions*, 15, 1-25
Contribution: *Worked with the visiting student Mauree in designing the experiments, analyzing the results and help write sections of the manuscript*.

103. Kumar[P] A., J. Done, J. Dudhia, and **D. Niyogi**, 2011: Simulations of Cyclone Sidr in the Bay of Bengal with a high-resolution model: sensitivity to large-scale boundary forcing, *Meteorology and Atmospheric Physics*, DOI 10.1007/s00703-011-0161-9 (Postdoc is the lead author)

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Contribution: *Purdue lead on the community effort that spanned over two years of collaborative discussions; helped write sections of the manuscript and analysis of the verification results.*

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Contribution: *Purdue lead on the community effort that spanned over two years of collaborative discussions; helped write sections of the manuscript and analysis of the verification results.*

99. **Niyogi, D**[C], P. Pyle[G], Ming Lei[G], S. Pal Arya, C M. Kishtawal, M. Shepherd, F. Chen, B. Wolfe[U], 2011: Urban Modification of Thunderstorms: An Observational Storm Climatology and Model Case Study for the Indianapolis Urban Region, *Journal of Applied Meteorology and Climatology*, 50, 1129-1144. doi: 10.1175/2010JAMC1836.1

98. Hossain F., **D. Niyogi**, J. Adegoke, G. Kallos, and R. A. Pielke Sr., 2011: Making Sense of the Water Resources That Will Be Available for Future Use, *AGU Eos*, 90, 144 – 145 (Commentary)
Contribution: *Colead on the synthesis; wrote sections of the manuscript.*

97. Wu Z., X. Wang, F. Chen, A. A. Turnipseed, A. B. Guenther, **D. Niyogi**, U. Charusombat[G], B. Xia, J. W. Munger, K. Alapaty, 2011: Evaluating the calculated dry deposition velocities of reactive nitrogen oxides and ozone from two community models over a temperate deciduous forest, *Atmospheric Environment*, 45, 2663-2674. doi:10.1016/j.atmosenv.2011.02.063
Contribution: *Purdue lead on the project; developer of one of the models being used in the study; data synthesis and model analysis, manuscript development.*

96. Kumar A.[P], F. Chen, **D. Niyogi**, J. Alfieri[G], M. Ek, and K. Mitchell, 2011: Evaluation of a photosynthesis-based canopy resistance formulation in the Noah land surface model, *Boundary-Layer Meteorology*, 138, 263 - 284. Doi: 10.1007/s10546-010-9559-z
Contribution: *Developed model formulations; lead author postdoc with Niyogi and Chen; manuscript development; analyzed model results, and model refinements.*

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Contribution: *Cowrote manuscript; colead on the synthesis; Degu is Hossain's graduate student who visited Purdue which led to the initial study design and analysis.*

94. Montandon, L.M., S. Fall[G], R.A. Pielke Sr., and **D. Niyogi**, 2011: Distribution of landscape types in the Global Historical Climatology Network. *Earth Interactions*, 15, 1- 24.
Contribution: *Colead on the GIS analysis; graduate student Fall worked with lead author who was the graduate student with Pielke; developed sections of the manuscript.*

93. Shepardson D., S. Choi, **D. Niyogi**, U. Charusombat[G], 2011: Seventh Grade Students Mental Models of the Greenhouse Effect, *Environmental Education Research*, 17,1-17. ("Most Read")
Contribution: *Colead with Shepardson; cowrote sections of manuscript; climate lead; synthesis of student images and links with climate perspective published in the literature.*

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Contribution: *Colead on the NSF project with Shepardson; cowrote sections of manuscript; analysis of conception maps and link with the climatic processes; climate lead.*

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Contribution: *Work developed when the lead author visited Purdue; model data analysis; manuscript development; work proposed in NSF CAREER grant with Niyogi as the PI.*

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Contribution: *Colead on the workshop follow up synthesis, Purdue lead, developed several sections of the manuscript particularly on the urban area feedbacks and extremes.*

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Contribution: *Experimental design; synthesis of model experimental results, manuscript development.*

87. Mishra, V., Cherkauer, K. A., **Niyogi, D**., Lei, M.[G], Pijanowski, B. C., Ray, D. K., Bowling, L. C. and Yang, G., 2010: A regional scale assessment of land use/land cover and climatic changes on water energy cycle in the upper Midwest US. *International Journal of Climatology*, 30, 2025–2044.
Contribution: *Initiated the study as a paper for Land Surface Modeling class the lead author took as a student; designed experiments; synthesized results and cowrote the manuscript.*

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Contribution: *Study initiated with lead author visiting Niyogi lab; colead on the idea/synthesis of the datasets; cowrote the manuscript.*

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Contribution: *Coeditor on the special issue; cowrote the synthesis, manuscript.*

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Contribution: *Led the modeling effort; designed and analyzed numerical results; help write sections of the manuscript.*

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Contribution: *Wrote sections of the manuscript; analyzed cases to be used for data assimilation; helped analyze the dynamical response; hosted lead author visit to Purdue through NSF grant.*

79. Charusombat U.[G], **D. Niyogi[C]**, A. Kumar[P], X. Wang, F. Chen, A. Guenther, A. Turnipseed, K. Alapaty, 2010: Evaluating a new Deposition Velocity Module in the Noah land surface model, *Boundary-Layer Meteorology*, 137, 271 - 290. (Graduate Student Lead; Corresponding)

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Contribution*: Initiated the idea with the lead author after a tornadic storm impacted Atlanta; obtained funding from NASA Hydrology; coanalyzed the dataset.*

77. Yang G., L.C. Bowling, K. A. Cherkauer, B. C. Pijanowski, and **D. Niyogi,** 2009: Hydroclimatic Response of Watersheds to Urban Intensity- An Observational and Modeling Based Analysis for the White River Basin, Indiana, *Journal of Hydrometeorology*, 11, 122- 138
Contribution: *Helped analyze model results; modify sections of manuscripts with focus on urban intensity needed for discernible impact on hydroclimatology; lead authors graduate committee.*

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Contribution: *Initiated the idea with Chandrasekar's visit to Purdue; integrate the assimilation approach within model for India region; analyzed results and wrote sections of manuscript.*

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Contribution: *Helped write the response to the comment.*

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32. YingChun Wang, J. Li, Fei Chen, Jianyi Chen, Xuejiao Deng, Weimei Jiang, Kaihon Lau, Donald Lenschow, **Dev Niyogi**, Jielun Sun, Guoan Ting, Dui Wu, Xiande Xu, Chaolin Zhang, Xiaolin Zhang, MingYu Zhou, 2005, Challenges and Opportunities in Urban Meteorology Research and Forecast, Science Foundation in China, *Bulletin of National Natural Science Foundation*,13, 13 - 20.

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30. **Niyogi D.**, H. Chang[G], V. K. Saxena, T .Holt, K. Alapaty, F. Booker, F. Chen, K.J. Davis, B. Holben, T. Matsui, T. Meyers, W.C. Oechel, R. A. Pielke Sr., R. Wells, K. Wilson, Y.K. Xue, 2004, Direct observations of the Effects of Aerosol loading on Net Ecosystem CO2 Exchanges over Different Landscapes, *Geophysical Research Letters*, 31, L20506, doi:10.1029/2004GL020915.

29. Gilliam R., Raman S., **Niyogi D.**, 2004, Observational and numerical study on the Influence of Large-Scale Flow Direction and Coastline shape on Sea - Breeze Evolution, *Boundary-Layer Meteorology*,111, 275 – 300, doi: 10.1023/ B:BOUN.0000016494.99539.5a.

28. **Niyogi D.**, Alapaty K., Raman S., 2003, A Photosynthesis-based dry deposition modeling approach, *Water, Air, and Soil Pollution*, 144, 171 – 194.

27. Pielke R. A. Sr., **D. Niyogi**, T. N. Chase, J. Eastman, 2003, A new perspective on climate change and variability: A focus on India, Invited paper to the Advanced in Atmospheric and Oceanic Sciences, *Proceedings of the Indian National Science* Academy, 69, 107 – 123. (Invited Paper)

26. Marland G., R. A. Pielke Sr., M. Apps, R. Avissar, R. A. Betts, K.J. Davis, P.C. Frumhoff, S.T. Jackson, L. Joyce, P. Kauppi, J., Katzenberger, K.G. MacDicken, R. Neilson, J. O. Niles, **D. Niyogi** , R. J. Norby, N. Pena, N. Sampson, Y. Xue, 2003, The climatic impacts of land surface change and carbon management, and the implications for climate -change mitigation policy, *Climate Policy*, 3, 149 – 157, doi:10.1016/S1469-3062(03)00028-7.

25. Yadav A., Raman S., **Niyogi D.**, 2003, A note on estimation of eddy diffusivity and dissipation length in low winds over a tropical urban terrain, *Pure and Applied Geophysics*, 160 , 395 - 404.

24. Rhome J., **Niyogi D.**, Raman S., 2003, Assessing seasonal transport and deposition of agricultural emissions in eastern North Carolina, USA, *Pure and Applied Geophysics*, 160 , 117 – 141.

23. Childs P.[G], **Niyogi D.**, Raman S., Sims A †. Simpson M., 2002, Land surface parameterization effects in inland tropical storm simulations, *Bulletin of the American Meteorological Society*, 83 , 664 - 665. (Invited commentary for conference presentation)

22. Raman S., **Niyogi D.**, Simpson M., Pelon J. 2002, Dynamics of the elevated land plume over the Arabian Sea and the northern Indian Ocean during northeasterly monsoon (INDOEX), *Geophysical Research Letter*, 29, 641 – 644.

21. Pielke Sr., R.A., G. Marland, R.A. Betts, T.N. Chase, J.L. Eastman, J.O. Niles, **D. Niyogi**, and S. Running, 2002, The influence of land-use change and landscape dynamics on the climate system: relevance to climate change policy beyond the radiative effect of greenhouse gases. *Philosophical Transactions of the Royal Society (London) A.* Special Theme Issue, 360 , 1705-1719.

20. Sims A., **D. Niyogi**, Raman S., 2002, Adopting Drought Indices for Estimating Soil Moisture: A North Carolina case study, *Geophysical Research Letters*, 29 , 241 – 244.

19. **Niyogi D.** , Xue Y-K., Raman S., 2002, Hydrological Land Surface Response in a Tropical Regime and a Midlatitudinal Regime, *Journal of Hydrometeorology*, 3, 39-56

18. Alapaty K., Seaman N., **Niyogi D.**, Hanna A., 2001, Assimilating Surface Data to Improve the Accuracy of Atmospheric Boundary Layer Simulations, *Journal of Applied Meteorology*, 40, 2068-2082.

17. Satyanarayana A., Mohanty U., **Niyogi D.**, Raman S., Warrior H., Nelson S., 2001, A Study of Marine Boundary layer processes in the ITCZ and non – ITCZ regimes over Indian Ocean with INDOEX IFP-99 data, *Current Science* (INDOEX Special Issue), 80 , 39 – 45.

16. Roswintiarti O., Raman S., Mohanty U., **Niyogi D.**, 2001, Application of a three dimensional triple nested mesoscale model for assessing the transport and the boundary layer variability over the Indian Ocean during INDOEX, *Current Science* (INDOEX Special Issue), 80 , 69 – 76.

15. Roswintiarti O., Raman S., Mohanty U. , **Niyogi D.**, 2001, A study on the performance of a triple nested mesoscale model over tropical Indian Ocean during INDOEX, *Current Science* (INDOEX Special Issue), 80 , 77-84.

14. Mohanty U., **Niyogi D.**, Raman S., Sarkar A., 2001, Numerical study of the role of land-air-sea interactions for the northeasterly monsoon circulations over Indian Ocean during INDOEX, *Current Science* (INDOEX Special Issue), 80, 60 – 68.

13. Manghanani V. Raman S., **Niyogi D. ,** Parameshwara V., Morrison J., Ramana V., Sengupta K., Raju J., Ameenulla S., 2000, Marine Boundary Layer variability over Indian Ocean during Northeast Monsoon, *Boundary-Layer Meteorology*, 97 , 411 – 430.

12. Rhome J., **Niyogi D.**, Raman S., 2000, Mesoclimatic analysis of ENSO and severe weather in North Carolina, *Geophysical Research Letters*, 27 , 2269 – 2272.

11. **Niyogi D.** , Raman S., Alapaty K., 1999, Uncertainty in specification of surface characteristics, Part 2: Hierarchy of interaction explicit statistical analysis, *Boundary Layer Meteorology*, 91 , 341-366.

10. Roswintiarti O., **Niyogi D.**, Raman S., 1998, Teleconnections between the Tropical Pacific Sea Surface Temperature Anomalies and North Carolina Precipitation Anomalies During El Nino Events *Geophysical Research Letters*, 25 , 4201 – 4204.

9. Raman S., Reddy N., **Niyogi D**., 1998, Mesoscale analysis of a Carolina coastal front, *Boundary Layer Meteorology*, 8 , 125 – 145.

8. **Niyogi D.**, Raman S., Alapaty K., 1998, Comparison of four different stomatal resistance schemes using FIFE observations, Part 2: Analysis of Terrestrial Biosphere Atmosphere Interactions, *Journal of Applied Meteorology*, 37, 1301 – 1320.

7. Raman S., **Niyogi D.**, Prabhu A., Ameenulla S., Nagaraj S. T., Jayanna S., Udai Kumar, Joshi S., 1998, VEBEX: A Vegetation and Energy Balance Experiment for the Tropics Proc. *Indian Academy of Science.(Earth and Planetary Science)*, 107 , 97 – 105.

6. **Niyogi D.**, Raman S., Prabhu A., Udai Kumar , Joshi S., 1997, Direct Estimation of Stomatal resistance for meteorological applications, *Geophysical Research Letters*, 24, 1771 – 1774.

5. **Niyogi D.,** Raman S., 1997, Comparison of four different stomatal resistance schemes using FIFE observations, *Journal of Applied Meteorology*, 36, 903 – 917.9

4. Alapaty K., Raman S., **Niyogi D.,** 1997, Uncertainty in the specification of surface characteristics: A study of prediction errors in the Boundary Layer, *Boundary Layer Meteorology*, 82, 475 - 502.

3. **Niyogi D.**, Raman S., Alapaty K., 1997, A Dynamic Statistical Experiment for Atmospheric Interactions, *Environmental Modeling and Assessment*, 2 , 209 - 225.

2. Alapaty K., Pleim J., Raman S., **Niyogi D.**, Byun D., 1997, Simulation of Atmospheric Boundary Layer Processes using Local – and Nonlocal-Closure Schemes, *Journal of Applied Meteorology*, 36 , 214 - 233.

1. **Niyogi D.**, Patil R.S., 1994, Metrose: A Modified Windrose for Air Quality Management, *Atmospheric Environment*, 28, 1715-1717. (published while an undergraduate student)

Abstract and Nonreferred Presentations/Proceedings

Over 60 conference proceedings since being at Purdue in the last 5 years. Additionally, over 100 more before prior to the current position or before coming Purdue. Most were at the American Meteorological Society (AMS) and American Geophysical Union (AGU) annual meetings. A partial list is available from http://landsurface.org. *Ten representative examples are listed below.*

1. Gupta, Akhilesh, D. Niyogi, and U.C. Mohanty. National Network Research Program on Urban Climate for India, International Conference on Urban Climate and AMS Symposium on Urban Environment, New York City, NY, https://ams.confex.com/ams/ICUC10/meetingapp.cgi/Paper/3441082018/
2. Yang, Long, James Smith, Mary Lynn Baeck, and Dev Niyogi. The Hydroclimatology of Flash Flooding in the Urban Corridor of the Northeastern US. In EGU General Assembly Conference Abstracts, vol. 17, p. 7223. 2015.
3. J. Andresen, A. K. Jain; D. Niyogi; G Alagarswamy; L. Biehl; P. Delamater; O. Doering; A. Elias; R. Elmore; B. Gramig; C. Hart; O. Kellner; X. Liu; E. Mohankumar; L. Prokopy; C. Song; D. Todey; M. Widhalm, Assessing the Impact of Climatic Variability and Change on Maize Production in the Midwestern USA, AGU Fall Meeting, San Francisco, 9 – 13, 2013.
4. D. Niyogi; X Liu; J. Andresen; A. K. Jain; A. Kumar; O. Kellner; A. Elias, Can Crop Models Simulate the ENSO Impacts on Regional Corn Yield in U.S. Corn Belt?, AGU Fall Meeting, 9 – 13, 2013
5. Niyogi D., Urban Land use – land cover feedbacks on regional climate – Current Understanding, Future needs, Invited presentation and session chair for the Conference on the planned and inadvertent weather modification, AMS Annual Meeting, Austin, TX, Jan 2013.
6. Mallick K, Fisher JB, Jarvis, AJ, Boegh, E and Niyogi, D., 2013, LST based analytical solution of conductance and evapotranspiration, AMS 27th Hydrology Conference, Austin, 5 – 10 January, 2013.
7. Niyogi D., Neha Ganesh; D. Singh; X. Liu; D.P. Shepardson; A. Roychoudhury; A. Hirsch; C. Halversen, 2012, ED12A-07. Assessment of US, Indian and Chinese Middle School Students' Outlook on the Greenhouse Effect, 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec
8. J.W. Nielsen-Gammon; D.B. McRoberts; R. Boyles; R. Cumbie; D. Niyogi, 2012: H31L-03. A High-Resolution Drought Monitoring Tool for the US, 2012 Fall Meeting, AGU, San Francisco, 3-7 Dec.
9. Subashini Subramanian; Sundararaman G. Gopalakrishnan; Dev Niyogi; Frank Marks Jr., 2012: A41E-0033. Effect of Land and its Surface Characteristics on Tropical Cyclone Intensity and Structure – An idealized study using HWRF. 2012 Fall Meeting, AGU, San Francisco, 3-7 Dec.

10. D. Niyogi, M. J. Shepherd, M. Lei, A. Kumar, W. O. Shem, J. Entin, An observational and modeling study of a rare tornadic storm in a major central business district: Possible linkages to drought and urban land cover , 8th Symposium on Urban Environment and High Impact Weather, Urban Impacts Symposium, 89th AMS Meeting, Phoenix, AZ, 11- 15 Jan 2009. (NASA Press Release).

Recent Research grants

Typically involved with at least two proposal development activities every semester. Interdisciplinary partnerships with number of groups and centers. Funded through National Science Foundation CAREER, Geosciences/Large Scale Dynamics, NSF Hydrological Sciences, NSF Geoscience Education, NSF Cyber Infrastructure, DOE Atmospheric Science Program, NIFA- USDA Climate Change, USDA NRICGP – Agricultural Air Quality, Water Resources, Office of Naval Research/ Naval Research Lab, UCAR/ NSF (International Programs), NASA Radiation Science, Terrestrial Hydrology, Interdisciplinary Sciences), NOAA/NASA JCSDA.

According to Purdue Sponsored Program Office Dr. Niyogi has been involve in research projects that have led to over 100.49M $ of grant award to Purdue (5.64 M $ individual share)

Active Grants

1. The role of international trade in adapting US agriculture to increased climate variability, USDA/NIFA subcontract through Kansas State University, $119K, 1/15 – 1/20 (coPI with H. Zhang and P. Preckel) (No Cost Extension submitted)

2. Rainfall extremes in Urban Environments, PI (with J. Smith, Princeton), 7/15- 6/19, $280K.

3. Improved understanding and representation of land surface processes for short, medium, and long range prediction of monsoon rainfall, National Monsoon Mission- Indian Institute of Tropical Meteorology, 2/15 – 3/ 19, $400K. (No cost extension submitted and third supplement funding pending)

4. Elements: Data: U-Cube: A Cyberinfrastructure for Unified and Ubiquitous Urban Canopy Parameterization, NSF, 1/19- 12/21 (coPI with D. Aliaga and R. Kalyanam), $599K.

5. 2018 Hurricane Season: Assessing the Role of antecedent land state on Hurricane post-landfall rainfall, NSF RAPID, 1/19- 12/19 (sole PI) $130K.

Projects Completed

1. CAREER: Assessing the Role of Land Surface Processes on the Climatic Changes in the Heavy Rain and Convection over the Indian Monsoon Region, NSF CAREER ATM-GEO, 2/09 – 1/18, 130K/year (sole PI).
2. Supplement to the NSF CAREER grant for NOAA-NSF Visitor Scientist Program R2O on land surface impacts on tropical cyclones, until Jan 2018, 100K.
3. U2U – Making climate information useful to usable for cereal crop producers, USDA NIFA, $1M/year, 2011 – 2017, (coPI with L. Prokopy, B. Gramig, O. Doering and collaborators).
4. Assessing threshold benefits of conservation tillage during drought years, USDA/NIFA through IUPUI, 1/15 – 12/17, 80K.
5. Integrating landsurface processes for improved simulation of landfalling tropical cyclones, NASA ESSF for Sai Prasanth Bhalachandran, 9/15 – 8/ 17, 30K/year.
6. STRONG CITIES: Simulation Technologies for the Realization Of Next Generation Cities, NSF CDS&E, 550K, 9/1/12-8/31/16 (copI with A. Aliaga/CompSci)

7. Urban Impacts on Thunderstorms, NASA Earth System Fellowship, 8/12 – 7/15, $30K/year (PI).
8. Development of a High-Resolution Drought Trigger Tool (HiDrTT) for the United States, USDA NIFA (through Texas A&M), $120K, 2011-14 (Purdue PI).
9. Development of Drought Triggers for Agricultural Applications, USDA NIFA, $500K, 2011 – 14 (coPI with I. Chaubey, R. Govindaraju, C. Song).
10. RAPID - Initial assessments of IPCC AR5 multi-model ensembles for hydroclimatic features at global and regional scales, $30K, 2011-12, 0 mo (coPI with V. Merwade) – invited rapid project for IPCC data analysis.
11. Assessing the Role of Land Conditions on the Rainfall Distribution of Landfalling Tropical Cyclones, NASA Earth System Science Fellowship, $30K/year, 2011- 2013 (Purdue PI).
12. FLOW: An Innovative Educational Toolkit for River Awareness, NOAA Education/Butler University, $14K, 2011- 2013 (Purdue PI)
13. Developing an Earth System Science Teacher Professional Development Tool Kit, NSF Geoscience Education, $150K, 2011 – 2013 (coPI with D. Shepardson).
14. Making Sense of Global Warming: Model of student learning via collaborative research, NSF Discovery Research K – 12 Education Program, 7/08- 6/12, 350K/year, (co-PI, PI: A. Roy Choudhury/Curriculum and Instruction)
15. INTEROP: A Community-based Drought Information Network for Multidisciplinary Applications, NSF Office of Cyber Infrastructure and NSF Hydrology, 7/08 – 7/11, $750K (co-PI, PI: C.Song/Computing).
16. Communicating Ocean Sciences Informal Education Network (COSIEN), Lawrence Hall of Sciences, Univ. of California at Berkeley (NSF Informal Science Program), 269K. (Purdue PI).
17. Indo-US Advanced Workshop and Colloquium on Modeling and Data Assimilation for Tropical Cyclone Predictions, 5/12 – 12/13, 17K, NSF Climate Dynamics (PI)
18. Role of Spatial Heterogeneity in Atmospheric Observation and Modeling, NASA ESSP, 9/07 – 8/10, 84K (graduate student fellowship).
19. Utilizing CLASIC Observations and Multiscale Models to Study the Impact of Improved Land Surface Representation on Modeling Cloud- Convection, DOE ARM, 6/08 – 5/10, 150K (PI).
20. Cyberinfrastructure for end-to-end environmental explorations, NSF – Cyber Infrastructure, $500K, 8/06 – 7/10, 1mo (co-PI, PI: B. Engel)
21. Multisensor/multiscale assessment of urban impacts in the Great Lakes region, NASA LCLUC coPI (with L. Bowling, K Cherkauer, and B. Pijanowski), 2006 – 10, $450K
22. Improved Representation of vegetation and land surface for operational Noah – WRF modeling system, Jt. Center for Satellite Data Assimilation, 450K, 12/06 – 2/10, awarded. (coPI with Fei Chen, NCAR; K. Mitchell/ M. Ek NCEP Collaborator; Purdue Share 170K)
23. An observational and modeling study of a rare tornadic storm in a major central business district: Possible linkages to drought and urban land cover, NASA Hydrology Program, 6/08 – 6/10,53K, (PI)
24. Integrated Climate Change Assessment using Landuse Landcover change, Radiation, and Carbon-Water Cycle, NASA Interdisciplinary Science, (coPI, with R. Pielke CSU as PI); 600K $160K (Purdue subcontract share). Ended 2009
25. Developing Activities for Conceptualizing Climate and Climate Change, NSF – Geoscience Education, $150K, (co-PI, PI: Dan Shepardson).

26. Estimation of Evapotranspiration and Crop Water Stress Over Large Areas Using Remote Sensing Observations, USDA NRI CGP, coPI, PI; S. Islam (Tufts Univ.); T. Carlson (coPI, Penn State), 2005 – 2009, $75K Purdue share

27. National Workshop on Agricultural Air Quality – USDA NRI CGP, Lead NCSU (collaborating: Duke University W. Schlesinger, Ecological Society of America: Cliff Duke), subcontract to Purdue 01/05 – 12/ 08 for $37K.

28. Center for Environment – Internal Competition Award 2006 – Preliminary Study on Mapping Aerosols Using Remote Sensed Datasets (PI, coPIs: M. Crawford, L. Biehl, G. Rochon, Harshvardhan), 01/07 – 07/08, 30K (no indirect cost)

29. From Sources to Sinks - A Novel Isotopic Analysis of Nitrate Loading in Groundwater and Surface Runoff in Indiana Watersheds, Showalter Foundation Grant (coPI with G. Michalski, PI, and B. Joern), 68K, 9/2006 – 5/2008

30. Impact of Transpiration Feedback on Land Atmosphere Water Vapor Exchange and Land Surface Memory, NOAA, PI (coPI Fei Chen, NCAR), 310K, THROUGH NASA/GWEC- Terrestrial Hydrology Program. Ended 2/2008.

31. Investigation of effect of land surface processes on QPF and convection initiation, NSF – ATM Mesoscale, (2003- 2008, PI) $400,000 (32K Purdue subcontract share, former PI).

32. Modeling aerosol effects in Numerical Models for Regional Climate Studies, NASA-Radiation Program (2003 – 2007), co-PI; PI- R. Pielke, M. Coughener, S. Kodrenawlis, all CSU; and W. Tao, NASA/GSFC), $450K (50K Purdue subcontract share)

33. Purdue Center for Environment, Agricultural Air Quality, 2005-07, $25K (no indirect cost)

34. Development and Operation of NC Agricultural Weather and Climate Observational Network (AgNet), NC Agricultural Research Services, 1999 – 2002 (Project Manager and co-Principal Investigator), 1998 – 2003. 50K/yr.

35. Surface – Atmosphere Exchanges for Hydrometeorological Models, NOAA, 1999 2002 35K.

36. Emergency Management Assistance in North Carolina (co- Investigator and Project Manager), NC Dept. Emergency Management, 2000-2001. 45K.

37. Analysis of Land Plume over Indian Ocean during INDOEX, (Collaborator), NSF Div. Atmos. Sci., 2000 – 2003. (coauthored the proposal).

38. NCAR- Travel Support for Participation in International H2O Project (IHOP) Field Program and Land Surface Workshop, (through RAP and MMM NCAR; P. LeMone) 5K.

39. Field Component of the Instrumentation Meteorology Course, NCSU- ETF, 2001-2002, 10K

40. Participation in the Environmental Monitoring at the World Trade Center Site (Project Manager) EPA contract to State Climate Office, 2002

41. Biophysical Measurements using Porometery and Canopy scaling, 2003, NCSU-ETF 10K.

42. Coupling and Validating Noah Land Surface Model in Navy's COAMPS, NRL – Monterey, (2002 – 2005, PI), $120K.

43. Agricultural Weather and Climate Atlas, PI (co-Is: K. Scheeringa, R. Grant, S.Fall), Rice Grant from Purdue Agricultural Research Center, 05/05 – 05/06, $7K,

44. Bisland Fellowships for Joseph Alfieri (2006), Souleymane Fall (2009), Elin Jacobs (2015).

45. Also involved as a coPI for following project at NCSU, Characterization and Fate of Ammonia and Hydrogen Sulfide from Animal Feeding Operations: Their Emissions, Transport,

Transformations, Deposition, and Impact on Fine Particulate Matter, USDA- Air Quality Initiative, V. Aneja (PI), co-PI, along with S.P. Arya, G. Jennings, J. Fountain, W. Gilliam, R. Mathur, W. Showers, P. Westerman, $480K.

Students

Current graduate students

1. Mr. Paul Schmid, Ph. D. Atmospheric Sciences, Dissertation on urban land atmospheric feedback, Expected Fall 2018. (NASA Earth System Science Fellow; Purdue PCCRC Lynn Fellowship)
2. Ms. Jie Liu, MS/student ESE/ Atmospheric Sciences, Thesis will be on World Urban Data Portal and Data Centric Causality analysis (co-advised with Hao Zhang, Statistics), Expected Fall 2018 (completed MS Atmospheric Sciences Fall 2017; continuing as a MS Statistics double major).
3. Ms. Judith Lorenz, Ph. D. student in Technical University, Dresden (joint Purdue – TU Dresden program), Dissertation on urban thunderstorms and rainfall fractal characteristics, Expected 2019 TU Dresden Advisor: Christian Bernhoff)
4. Ms. Madhavi Jain, Ph. D. student in Jawaharlal Nehru University, Dissertation on land use land cover change impacts, Expected 2017 (JNU Advisor: Ashok Dimri)

Students Graduated:
Ph.D.

1. Mr. Souleymane Fall, Ph. D., Impacts of land surface properties on temperature trends over the United States: Assessment using the US Historical Climate Network and North American Regional Reanalysis datasets (supported by NSF ATM, NSF OCI, NASA IDS, Bisland fellowship), Fall 2009. Currently faculty member at Tuskegee University, Alabama.

2. Ms. Hsin-I Chang, Ph. D., Dissertation: Land Surface Feedback and the Heavy Rains over Indian Monsoon Region (supported by NASA IDS, NSF CAREER), Fall 2009. Currently Research Faculty at University of Arizona.

3. Mr. Joseph Alfieri, Ph. D., Dissertation: Impacts of spatial heterogeneity on the measurement and modeling of land-atmosphere interactions (co-adviser, M. A. LeMone, NCAR) (Joseph received the 3-year NASA Earth System Science Fellowship in 2007), Fall 2009. Currently Research Scientist USDA ARS Beltsville, Maryland.

4. Mr. Ming Lei, Urbanization Impacts on Severe Weather Dynamical Processes and Climatology, Ph.D. dissertation, Department of Earth and Atmospheric Sciences, Purdue University, 2011. (Ming was on a NASA Earth System Science Fellowship in 2011). Currently Visualization Geoscientist with VSG FEI Houston, Texas.

5. Ms. Umarporn Charusambot, Ph.D., Atmospheric Sciences. Dissertation on impact of land atmosphere interactions. 2012. Currently working with Govt. of Thailand (as part of her J1 visa requirement – was a NRC Research Associate with NOAA Great Lakes Environmental Research Lab, now homemaker)

6. Mr. Angel Torres, Ph D candidate Atmospheric Sciences, Dissertation on land use impacts on the Caribbean climate, 2013 Coadviser with Dr. Jon Harbor, EAPS (Bisland Fellowship). Currently working at University of Puerto Rico Maya Guez as a visiting instructor.

7. Ms. Olivia Kellner, Ph D student, 2015. Dissertation will focus on applied climatology of the Midwest US. (NASA Earth System Science Fellow, currently regional climatologist with Midwest Regional Climate Center).

8. Ms. Elin Karlsson-Jacob, Ph D student, ESE/Agronomy/Civil. Dissertation on soil moisture dynamics. Coadviser Suresh Rao, 2016.

9. Ms. Yue Zheng, Ph D student Atmospheric Sciences, Dissertation on land atmosphere convection coupling, 2016 (Yue transferred from Univ of Kansas where she completed 2 years of her PhD; defended

dissertation September 2015, Was at University of New South Wales, Australia and Sen Yet Sun University, Guangzhou, China, now with Infrastructure Company in China).
10. Ms. Subashini Subramanian, Ph D student Atmospheric Sciences, Dissertation on post landfall interaction of tropical cycles, December 2016. (Now at Honeywell Systems, Arizona as a Data Scientist).
11. Ms. Xing Liu, Ph D student Agronomy, Thesis on integrating crops within Noah-MP land surface model, Summer 2017. (Now at Financial Institute in Geneva, Switzerland, will be returning to a remote sensing company in Boston)

MS with thesis.

16. Ms. Jie Liu, Impact of Urbanization on Precipitation from Meta-analysis and Causal Discovery, MS Thesis (D Niyogi, H. Zhang coChairs), 2018 (continuing MS in Data Sciences)
15. Ms. Xing Liu, Climate impacts on Midwest cereal crops, MS Agronomy, Purdue University (D. Niyogi- Chair), 2013 (Currently pursuing Ph.D.)
14. Ms. Bozeman, Monica Laureano, Land Surface Feedbacks On The Post-landfall Tropical Cyclone Characteristics Using The Hurricane Weather Research And Forecasting (HWRF) Modeling System, MS Thesis (D. Niyogi, M. Baldwin - Major Professors), Purdue University, 2011 (Currently working with National Hurricane Center as a Forecaster)

13. Ms. Kellner,Olivia, The role of anomalous soil moisture on the inland reintensification of of Tropical Storm Erin (2007), MS Thesis (D. Niyogi- Chair), Purdue University, 2011 (worked with National Weather Service for 2 years and returned for Ph.D.)

12. Mr. Lei, Ming, Effect of Urban and Agricultural Land Use Land Cover Change on Mesoscale Thunderstorms and Heavy precipitation, MS Thesis (D.Niyogi - Chair), 2008 (continued, and completed Ph.D.)

11. Ms. Ashley Brooks, M.S., Atmospheric Sciences. Thesis: Assessment of the Spatiotemporal Impacts of Land Use Land Cover Change on the Historical Climate Network Temperature Trends in Indiana. 2007 (Currently working with National Weather Service/NOAA Ohio office)
10. Mr. Jeffrey Lewitsky, MS Thesis NC State Univ (F.Semazzi Chair, D. Niyogi co-chair), Black carbon and aerosol characterization at an agricultural site in SE United States, March 2007 (working with National Weather Service/NOAA, Oxnard,California region).

9. Mr. Pyle, Patrick, Urban Land-Surface Impacts on Convective Thunderstorm and Precipitation Characteristics, MS Thesis NC State Univ (D. Niyogi - Chair, S. Pal Arya Co-chair), 2006 (working with WindEnergy, Houston TX).

8. Mr. Konarik, Stephen, Trends in Agricultural Ammonia Emissions and Ammonium Concentrations in Precipitation over the Southeast and Midwest United States, MS Thesis NC State Univ (V.P. Aneja - Chair, D. Niyogi, Co-chair), 2006 (working with National Weather Service, Florida region).

7. Mr. Occhipinti, Chris, Nitrate Isotopic Composition in Rainfall and Fine Particulate Matter: Back Trajectory Analysis and Source - Receptor Relationships, MS Thesis NC State Univ (V. P. Aneja - Chair, D. Niyogi, Co-chair), 2006.

6. Mr. Mera, Roberto J., The effect of multiple environmental changes on crop model response and potential improvements of dynamical land surface, MS Thesis NC State Univ (D. Niyogi - Chair, F. Semazzi Co -chair), 2006.

5. Ms. Qureshi, Aneela Laurel,The effects of land-atmosphere interactions on convection initiation and quantitative precipitation forecasts during the international H2O project (IHOP2002), MS Thesis NC State Univ (D. Niyogi - Chair, S. Raman - Co-chair), 2005.

4. Mr. Palmieri Richard, Development and evaluation of a weather-based epidemiological model for the prediction of brown patch in creeping bentgrass, MS Thesis NC State Univ (D. Niyogi – Chair, L. Tredway Co-Chair), 2005

3.Ms. Tiffanee Jones, A cross-comparison of reference evapotranspiration models using field observations, MS Thesis NC State Univ, (D. Niyogi – Chair), 2004.

2. Ms. Chang, Hsin-I Observations of the effects of aerosol loading on carbon and water cycles over various landscapes, MS Thesis NC State, 2004, (D. Niyogi- Chair; V. Saxena Co-chair).

1. Mr. Souleymane Fall, Spatiotemporal Climate Variability over Senegal and its relationship with Global Climate, MS Thesis NC State Univ, 2003, (D. Niyogi – Chair; F.Semazzi Co-chair).

Staff Supervised:

Postdoctoral Research Associates

Dr. Krishna Osuri (2017), Ph.D. Andhra University (visitor during summers under India National Monsoon Mission)

Dr. Palash Sinha (2015), Ph.D. IIT Delhi and Penn State, now at IIT Bhubaneshwar.

Dr. Yang Long (2014), Ph.D. Tsinghua University

Dr. Ani Anna Elias (2013-2014) Ph.D. Purdue University

Dr. Anil Kumar Post-doc (2005 – 2009, 2013-2014) Ph D. University of Poona, India, jointly with National Center for Atmospheric Research, Boulder, CO. Research Scientist at NASA GSFC, now at NCEP

Dr. Adam Houston Post-doc (2005) Ph.D. University of Illinois. Currently Associate Professor, University of Nebraska – Lincoln.

Undergraduate Researchers

18 undergraduates have worked with Dr. Niyogi. Many of them working for typically 2 to 3 year duration. Three of the undergraduates (J. Steinweg-Wood, B. Wolfe, and S. Cole) have been coauthors on three different papers published in peer reviewed journals: Journal of Geophysical Research; Journal of Environmental Quality, Journal of Applied Meteorology and Climatology; and one (Neha Ganesh) has given oral presentation at AGU Fall Meeting. The undergraduates have background in computer technology, environmental sciences, agronomy, civil engineering, meteorology, aeronautics. Four have been from different institutions (Penn State; Valparaiso; Prairie View A&M; Virginia Commonwealth). One student (Ashley Brooks) eventually completed her MS with Dr. Niyogi and is working with National Weather Service in Ohio as a forecaster.

Zachary Payne	LaPorte Weather Anomaly an Update (2005), went to work with IT industry
Brian Wolfe	Indianapolis thunderstorm climatology (2005), went to work in TV Broadcast
Cassie Hasket	Indiana Significant Weather Events (2005), went to work with a seed company
Gino Liu	Climate Database for Indiana (2005), went to work with a graphics company
Ashley Brooks	Indiana Historical Climate Network Metadata and Quality Control (2005) joined group as a MS student and eventually worked with NWS
Sherry Smith	MARC-AIM undergrad, Crop Modeling and Climate Change (2005)
Tosha Richardson	MARC- AIM undergrad, Urban Impacts on Regional Climate (2006)
Shawn Cole	Agricultural Air Quality (2006) went to work with state environmental division
Ryan Knutson	Indiana climate analysis (2010-12) preparing for graduate school
Gianna Hartmann	El Nino and Indiana Climate (2010 -11) went to work with defense company
Jesse Steinweg	Land atmosphere interactions/PBL changes (summer 2009,10,11,12) went to graduate school at Colorado State University
Austin Pearson	Wind climatology for Great Lakes region (2010-13) continued for PhD at Purdue

Kayla Hudson	Weather impacts in Midwest (2010-13) went to work with county extension
Neha Ganesh	Climate change education and sustainability (2012- 2014) went to Columbia Univ for graduate school
Steven Chung	Northern Indiana rainfall climatology (2012-2014) applying for graduate school
Mary Rose Mangan	ET mapping using models and insitu and remote sensed datasets
Nicole Shebesh	Climate synthesis for decision making
Logan Downing	Using social media data for climatic and extreme event analysis

Technicians, Programmers

Kenneth Scheeringa	Associate State Climatologist (2005 onwards)
Manish Gupte	Scientific Programmer (2005), Ph.D. AgEconomics, Purdue University
Lalit Rastogi	System Administrator (2005-6), MBA Krannert, Purdue University, working with Goldman Sachs Financial Services
Bryn Takle	Project Scientist (2005-6), BS, Univ. of Tennessee, Currently working with State of Kansas.
Meredith Evans	Tech (2005-6), MS Aeronautics, Purdue University
Mary Maxine Browne	Technical Editor (2005 -2010) Ph.D. English Purdue University
Natasha Duncan	Program Manager (2005 -2010), Ph.D. Political Science, Purdue University
Patrick Pyle	Tech (2005-08), MS Atmospheric Sciences, NC State University
Arnab Das	System Administrator (2006-8) MBA Krannert, Purdue University
Susmit Pal	System Administrator (2006-8) MBA Krannert, Purdue University
Selvakumaran V.	Database Manager (2006- 2015) Electrical Engg., Purdue University
Mohneet Singh	Database and web design (2013-14) MS Statistics, Purdue University
Gaurav Aggarwal	Database and web design (2015) MS Computer Science, Purdue University

Visiting Scientists Hosted:

A. Chandarasekar Distinguished Professor	Professor Indiana Institute of Technology (IIT) Kharagpur, Summer 2005, Indian Institute of Space Technology, Summer 2018
U. C. Mohanty	Professor IIT Delhi / IIT Bhubaneswar, annualy since 2006 – 2017, approx 1 mo
C.M. Kishtawal	Sr. Scientist, Indian Space Research Organization June – Dec 2009, 2014
Kanishka Mallick	Research Scientist, Lancaster Environmental Center, October 2010.
Krishna Osuri	Research Associate, IIT Delhi, April - each summer from 2011
Rabindra Pathadia	Scientist, Indian Agriculture Research Institute, Fall 2013
Fanuel Tagwira	Vice Chancellor, Africa University, Zimbabwe, July 2014 – June 2015
Oscar Brousse	WUDAPT researcher, France and Spain October 2015
Xiang Zhong	PhD Researcher, Wuhan University, 2016-2016
Ila Chawla	PhD Student, IISc Bangalore, Fall 2016
Haraprasad Nayak	Research Scientist, IIT Bhubaneswar, Fall 2017
Judith Lorenz	Ph S student, Dresden University, Summer and Fall 2016
Alka Tiwari	Research Scientist, IIT Kanpur and IISc, Bangalore Spring 2018
Sajed Jamshedi	PhD researcher, Shiraz University, 2018
Rajesh Mall	Professor, BHU Varanasi, Summer 2018 (1 week)

Tian Qun Ph.D. student, Chinese Academy of Sciences, Oct 2018 – Sep 2019.

Select Invited Lectures

International Invitations

Since 2009, Dr. Niyogi has been invited for 18 different lectures to international venues including countries such as India (multiple occasions- Indo US Science Forum; WMO; NOAA International Program; Collaborative meetings), China (multiple occasions – mostly Tsinghua Univ; Chinese Academy), France, Ireland, Greece, Nepal, Turkey, Singapore, Taiwan, and Sweden. Five representative/ examples are listed here.

1. Urban Haze and Thunderstorm in Beijing, Chinese Meteorological Agency and Tsinghua University, Beijing, Workshops in 2013, 2014, 2015, 2016, 2018.
2. Complex Networks workshop and synthesis at Dresden University, Germany, 3 weeks, 2016 summer.
3. 9th International Conference on Urban Climatology, Toulouse, France. International Committee, July 2015. (Co-organizing the 10th International Conference in New York City, August 2018).
4. Invited participation by the ICIMOD- International Centre for Integrated Mountain Development, Author's Workshop for the Report on Climate Change in the Hindu Kush Himalayan region - State of Current Knowledge, Kathmandu, Nepal, August 2011.
5. Role of land surface processes on landfalling tropical cyclones, WMO Invited Participant, Indian Ocean Tropical Cyclones and Climate Change – IOTCCC, February 2012.

National Meetings/ Institutional Seminars

Dr. Niyogi has been invited typically for one university/departmental colloquiums and about four to six workshops every year; however, most of the invites have to be declined due to schedule conflicts. Five representative / examples of national meetings/seminars are listed here.

1. Presentation to the Indo – US Secretary level NOAA Workshop in Washington DC – led to the signing of an Interagency Agreement. This was in preparation of President Obama's visit to India related to Monsoons. MOA has NOAA Hurricane Research Division/ AOML and Purdue from US side, and India Meteorological Department and IIT Delhi from India side.
2. Keynote NOAA Great Lakes Environmental Research Lab, Muskegon, MI Workshop on Reconciling Alternative Approaches to projecting hydrologic impacts of climate change, Aug 2012.
3. Invited participation and presentation at NSF sponsored Workshop to Define Student Collaborative Climate Research, November 17-19, 2010, NOAA, Silver Spring, Maryland.
4. Invited presentation on Urban processes, future direction, AMS Symposium, Austin, TX, Jan 2013.
5. Invited presentation on Estimating Corn Yields Regionally across Midwest using a Land Data Assimilation System, 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.

Invited Testimonies/ National Committee Presentations (Five sample/ examples)

1. Remote sensing technology and climate/ hydrological monitoring for Subsahara Africa and southeast Asia, National Academies Workshop on Animal Health, Soils, Water, and Energy Technologies- Gates Foundation, NRC Committee to Study Technologies to Benefit Farmers in Sub-Saharan Africa and South Asia, Washington, DC, Keck Center of the National Academies (October 2007).
2. Water resources vulnerability under climate change, Invited testimony to the Indiana Senate Water Resources Study Committee (August 2007).
3. Drought triggers and drought mapping for Indiana, Invited hearing presentation to the Indiana Water Shortage Task Force (October 2007). Replacing Palmer with SPI as a Drought Trigger for Indiana, Testimony to the Water Shortage Task Force Indiana (March and May 2008).
4. Urban Meteorology- Forecasting, Monitoring and Meeting Users' Needs, National Academies Board of Atmosphere Science and Climate, Summer study workshop, Woods Hole MA (May 2011).
5. Climate Environmental Interactions, Invited Presentation to the Indiana Sustainable Natural Resources Task Force (April 2012).

EXTENSION, SERVICE AND OUTREACH ACTIVITIES

Dr. Niyogi has a partial Extension appointment in his capacity as the State Climatologist for Indiana. He has integrated Extension, Teaching and Research into his program with each building off the other. For example, Extension provides the broader impact avenue for the research topics such as droughts; and working with the stakeholders allows identifying research and teaching topics that are responsive to the societal needs and can have good impact. He has strived to obtain scholarship in both teaching and extension activities in addition to his active research program dealing with weather and climate models and analysis. This scholarship can also be noted by the successful funding he has obtained from external grants and peer reviewed publications.

Example of Departmental Committees

1. 2014-2016 AGRY Department Diversity Committee and Visiting Postdocs/scientists Committee
2. 2013 – EAS Climate Faculty Search Committee (recruited Dr. Yutian Wu from Columbia Univ.)
3. 2010: Member, Agronomy Department Head Search Committee (recruited Dr. Joe Anderson from ARS/USDA/Purdue)
4. 2010-2015: Chair, Agronomy Dept Diversity Committee
5. 2012 – PCCRC Regional Climate Modeler Faculty search committee
6. 2005-2010: Chair / Cochair/Member, Agronomy Dept Seminar Committee
7. 2007-2008: Member, Agronomy Department Head Advisory Committee
8. 2006-7: Member, Agronomy Awards Committee.
9. 2006-2010: Member, EAS High Performance Computing Committee.
10. 2006-present: Member, EAS Outreach Committee.
11. 2005- 6: EAS search committee for extreme weather (resulted in recruiting Dr. Michael Baldwin).
12. 2005 – 6: EAS search committee for atmospheric statistics (recruited Dr. Alex Gluhovsky).
13. 2006 –present AGRY Research Faculty Search Ad Hoc Committee (recruited Dr. Jianxin Ma).

University Interdisciplinary Programs

1. 2005-2013 Member Executive Committee, Purdue Climate Change Research Center.
2. 2006 Search Committee for Purdue Climate Change Center Director (recruited Dr. Paul Shepson).
3. 2006 Search Committee for Director, Center for the Environment (recruited Dr. John Bickham).
4. 2005 Search Committee, Hydrology, College of Engineering (recruited Drs. Cary Troy, V. Merwade).
5. 2006, 2007 Member Internal Advisory Committee DP Center for the Environment.

College of Agriculture/ College of Science Committees

6. 2015 – Diversity Action Team in Agriculture (DATA)
7. 2013 Sustainability Committee
8. 2006 Member Search Committee for Agricultural Air Quality.
9. 2007 – 2009 Agriculture College Web Committee.

State/ National Committees

1.	2005 - 2010	Internal Advisory Committee Indiana Water Resources Institute.
2.	2007 – present	Advisory Member, Indiana Water Shortage Task Force.
3.	2000 - 2010	Federal Geographic Data Committee, Spatial Climate Group.
4.	2004 - present	Weather Research Forecasting Model Working Group 14.
5.	2011 – present	American Meteorological Society Board on Urban Environments (Chair)
6.	2016-	International Association of Urban Climate (Elected Board Member)

Extension Highlights

The extension efforts in which Dr. Niyogi has active engagement are of two types. The first is through the Indiana State Climate Office and other is the professional/ international outreach.

For the Indiana State Climate Office, the day to day operations of the Climate Office are supervised and delegated to the Associate Climatologist (Scheeringa). Example of some activities Dr. Niyogi leads are:

- development of large project activities such as educational modules and curriculum
- data products under cyber interoperability framework and visualization platform such as Google Earth
- data network planning such as the development and funds for rain network, ET network, soil moisture,

- development of tools and research products e.g. ET mapper, GDD analysis, Indiana climate atlas, ElNino/LaNina Climate Viewer, Drought Regional Network (driNET), Crop Modeling products, etc.
- overall direction of the climate office efforts such as decisions on archival, data retention
- development of biweekly drought advisories for the US Drought monitor, seasonal climate outlooks
- mentoring undergraduate and graduate students research
- identify time-sensitive products to be disseminated such as chances of white Christmas, review of information before crop weather calls, severe weather outbreak statistics, floods or damaging weather
- interactions with media as possible (majority delegated to Ken Scheeringa) and policy makers.

Branding Indiana State Climate Office/ Iclimate.org - Dr. Niyogi led the development and branding of the iclimate.org – the Indiana State Climate office portal as the first location for obtaining weather and climate information related to Indiana. A significant number of staff hours and his own time and program efforts have been directed in making this site functional, and designing the products. He has also actively pursued projects that can hel products and information development and would be of relevance to the community.

Prior to Dr. Niyogi's arrival at Purdue, the State Climate Office was a focused operation providing weather and climate information on demand, primarily to the Indiana and neighboring agricultural communities. To supplement the good base of Indiana weather data and community contacts, he built a team of undergraduate and graduate students and staff members. The office now deals with a broad range of extension activities that have led to a more visible, accessible, and proactive engagement of media, local and state agencies, and the engagement of the community as a whole. This involves making routinely-timed press releases about weather in Indiana, developing localized studies in anticipation of extreme events such as drought, frost, flooding, and integrating education with lab research activities.

The impact of Dr. Niyogi's extension work was particularly felt during the 2012 drought.

Dr. Niyogi developed the state climate service team concept and coordinated the statewide drought mapping efforts. Through this initiative, Dr. Niyogi created a conduit for bidirectional information on drought status and updates and provided the state recommendations for the US Drought Monitor. The drought monitor map is used in developing disaster relief and assessing economic impacts in the region.

Because droughts are more than simply lack of rainfall, Dr. Niyogi led the efforts to develop joint research projects to quantify droughts working with climatologists in Texas and North Carolina and they collectively obtained USDA NIFA funding to assess drought triggers and changes.

Dr. Niyogi also developed plans and idea of evapotranspiration measurements to be undertaken for better drought mapping, and directed efforts to develop gridded soil moisture/temperature fields using land data assimilation systems that were used in his research projects.

Finally, working with the climate office staff, Dr. Niyogi and his team developed series of media releases, presentations, status updates and outlooks that could be transmitted for broadly educating the community on the drought and its changing nature. Dr. Niyogi and his staff were actively in media contact providing updates. Dr. Niyogi was interviewed, for example, by national TV networks such as the Weather Channel and outlets such as the CNN (July 9, 2012).

The leadership provided by Dr Niyogi was recognized in a formal letter of appreciation by the Purdue acting president Dr. Tim Sands.

CoCoRaHS Development with Nearly 1500 Rainfall Observers across Indiana - Dr. Niyogi has developed a strategic partnership with the NOAA's National Weather Service offices and Colorado State University to develop an Indiana collaborative rain network called CoCoRaHS (Collaborative Community Rain Hail and Snow Network). This network consists of nearly 1500 rain observers throughout Indiana. This effort has helped develop active collaborations with the Cooperative Extension Services, and a number of local organizations, TV, newspaper, and media offices. This initiative provides daily rainfall data for drought, flood, and hydrometeorological assessments. These data are particularly useful during flood situations but have also been used for droughts and forest fire assessments.

Working with School Teachers for Middle School Climate Change Curriculum - An example of integration between research, education, and extension activity that Dr. Niyogi has achieved is a joint project with a Purdue Department of Curriculum and Instruction faculty members (Shepardson and Roy-Choudhury). Together they have developed a series of projects through NSF GeoEd program, NSF DRK-12 program, NSF CAREER, and NOAA Education to create class room modules that can be integrated within middle and high school curriculum. These modules have been co-developed and field tested by middle school teachers and has been downloaded for instruction through the Climate Change Curriculum portal at the Indiana State Climate Office. These activities and materials have also been presented to middle school teachers at the Hoosier Annual Science and Teachers of Indiana (HASTI) annual meetings, and part of an invited Shell Lecture by Dr. Niyogi at the National Science Teachers Association annual meeting. Activities are also underway working with N. Carroll (Youth Development) to create material for state fair exhibits and the 4H building using this curriculum. This was supported through a seed funding through a competitive Discovery Learning Center grant and NSF Informal Science grant with UC Berkeley-Lawrence Hall of Science. Dr. Niyogi has worked closed with the Agriculture State Fair exhibit in having climate change exhibit which had a theme of a life scale cartoon characters discussing different aspects of weather and climate features and changes in Indiana.

Information Source for Indiana Weather and Climate and Stakeholder Partnerships - Climate and climate change topics continue to dominate the news. Consequently, the State Climate Office and Dr. Niyogi as state climatologist continue to address media questions, with an emphasis on balanced, scientific view on this topic. Recognizing the role undertaken by the State Climate Office, Purdue Extension awarded IBAT (Issue Based Action Team) funding to Dr. Niyogi and an extension educator (Hans Schmidt). This IBAT developed FactSheets for educators to work with local communities for items related to weather and climate change. The IBAT project created and released these Weather and Climate FAQs and responses following series of focus group meetings, and interactions with peers.

Dr. Niyogi has led/ convened several key stakeholder conferences, workshops and short courses. Examples include the NOAA sub-regional climate applications workshop developed and hosted together with the NOAA- national weather service central region. His workshops formed the basis for the development of what then got funded by NIFA as the U2U (useful to useable climate information) project, and the NSF INTEROP driNET project for drought information using systems approach. An initiative referred to as INACTS- Indiana Assessment of Climate, Tools, and Sustainability Solutions, is underway with focus on hydrological extremes and hydroclimatic resiliency with focus on agriculture and urban droughts and floods, and long term urban planning and cities framework for climate adaptation strategies.

International Outreach

1. Developed robust partnerships with number of Indian research and operational communities on weather and climate studies. Involved with a number of large national and international initiatives. Recognized as a Purdue University Faculty Ambassador through Office of Corporate and Global Partnerships.
2. Invited Chair for the International Society of Photogrammetric and Remote Sensing – WG VIII/3: Weather, Atmosphere and climate studies – 2012 – 2016 – Terms of References / Planning underway.
3. Co-developed a joint MOA with NOAA Hurricane Research Division, NCEP, NOAA International Programs, Indian Institute of Technology Delhi, India Meteorology Department for studying tropical cyclone, land falling monsoon depressions, and heavy rain processes, 2011.
4. Academic/Purdue PI for IndoUS Virtual Network Center on Land-Ocean-Atmosphere Modeling of Landfalling Tropical Cyclones –with NOAA NCEP, NOAA HRD, IIT Bhuvneswar, INCOIS.
5. Developed joint sessions with international teams on monsoons as part of Asia Oceanic Geophysical Society (AOGS), 2009- 11.
6. Co-organizer of International Workshop on Agricultural Air Quality under USDA, NSF support. Workshop attended by over 500 scientists from 15 countries, in 2006.

7. Invited session chair for Indo-US forum High performance computing in Weather and Climate meeting in Boulder, CO 2006.
8. Hosted visiting scientists from Indian Institute of Technology Delhi (one visitor each year since 2005 with duration from 1 to 6 months), Indian Institute of Technology Kharagpur (1 mo visit), Indian Institute of Tropical Meteorology (1 month), Indian Space Research Organization (6 month visitor), Indian Agriculture Research Institute (1 month), Wuhan University, China (1 year), Dresden University, Germany (6 months). Developed joint researcher visit to India from Purdue (four graduate students, one undergraduate student). Developed visitor research visits with NOA
9. A international programs and the National Center for Atmospheric Research (2007), and the competitive Purdue Asian Initiative Grant program (2006).

Dr. Niyogi has various international collaborations and projects with academic institutions and research labs as well as governmental organizations. Examples of active collaborations and projects include teams in India, China, El Salvador, France, Germany, Ireland, Austria, Thailand, Luxembourg, Zimbabwe, the Netherlands, Spain, Ireland and the UNESCO.

- The projects with India involve using computational tools and information technology to improve hazard mitigation and management and is part of an ongoing, multiyear activity supported through the Indian Ministry of Telecommunication and Information Technology (MIETY). This involves working with or advising established and newly emerging Indian Institute of Technology (IITs) on water / hydroclimatic curricula and research, urban climate research, and improve hazard mitigation and response approaches. This includes advising and evaluating the programmatic progress each year through site visits, and webinars for the different projects supported under this initiative.
- Since 2015, Dr. Niyogi worked with a research and state hazard response team on Urban Flood prediction and management (in Bangalore, India), and helped co-ordinate a monsoon school on urban floods with nearly 50 participants from India and surrounding countries annually (with UNESCO).
- Another project funded through the Indian's National Monsoon Mission is supporting the improvements to the operational weather models for seasonal climate outlook including development of enhanced monsoon outlooks using coupled models. This is one of the select instances where Indian funds have come to Purdue directly as a research grant.
- A third set of activities under the auspices of the IndoUS Forum for Science and Technology continues hosting scientific visitors from India for research towards improving the landfalling tropical cyclones forecasts and response. These activities are closely coordinated with the NOAA Hurricane Research Division, and the US National Centers for Environmental Prediction.
- India has started plans for 100 future smart cities. Part of the ongoing activities included working with policy makers and infrastructure management groups in discussions related to future cities. A series of high level meetings on the IT to urban planning and governance issues on this topic were conducted. A plan to work with MBA schools is evolving to use urban resiliency and smart cities as knowledge base.
- Similar activities are now in planning stages with the government of El Salvador. Visits past year with the Ministers and the Director-General there have led to the creation of a high impact weather forecast, and climate communication collaborative activity. Dr. Niyogi is advising the Distance Education efforts as well using Climate Change and Variability in the MesoAmerica region as the theme.
- Work with China continues as a research collaborator and adviser to the Institute of Urban Meteorology in Beijing for design of a field experiment on Urban Haze and Thunderstorms. Visits included reviewing the experimental plans, initial results, and developing research communications. A large urban field experiment was planned summer of 2016 as part of these meetings to understand the nature of haze and poor air quality in Beijing during winter months, and the flood hazards due to summer thunderstorms.

- Collaboration with the French scientists over the past year was in form of being part of a convening team for the International Conference on Urban Climate (ICUC9)in Toulouse, France. Recent meeting hosted more than 500 international participants from more than 30 countries and had a special relevance due to the 21st session of the UN Conference of Parties on Climate Change Policies and Practice (COP21) held in Paris. This meeting and the projects , thereafter focused on providing state of the recent scientific advances as they pertain to climate impacts of urbanization – its detection, attribution, impacts and representation in multi scale studies; global datasets, and also in transferring the knowledge on climate change adaptation and mitigation in urban environments, to different stakeholders, planners, and practitioners. Dr. Niyogi was one of the speakers for the inaugural event.
- Dr. Niyogi is one of the conveners of the ICUC10 recently hosted in New York City.
- A series of ongoing collaborative activities have been underway with research groups from France, Luxembourg, Spain, and Ireland through visits and online collaborations as part of a world urban dataset and portal tool that is being developed. This data tool and portal called WUDAPT is being used as an international research and educational collaboratory for work related to urban climate.
- Activities with Zimbabwe involve collaboration with the Africa University and were initiated as part of a year-long visit by its former Vice-Chancellor, hosted by Dr. Niyogi. Current activities included a survey on climate change understanding amongst school children, and development of a curricula for climate assessment. Project activities are underway to scale up the efforts at the regional level.

A number of additional projects, research papers, presentations, media interactions, and class room and invited institutional lectures have been part of this vibrant on-going international collaboration.