

DEEPTI SINGH

Lamont-Doherty Earth Observatory
Columbia University
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Education

Stanford University, Stanford, California, USA

Ph.D., Environmental Earth System Science, Sep 2010 - Sep 2015

Dissertation Topic: “Climate Extremes in a Warming World: Historical Trends, Physical Causes, and Response to Increasing Anthropogenic Emissions”

Committee: Noah S. Diffenbaugh (**Primary Advisor**), Chris Field, Bala Rajaratnam, Leif Thomas, and Ken Caldiera

Purdue University, West Lafayette, Indiana, USA

M.S.E., Aeronautics and Astronautics, Sep 2008 - Aug 2010

Dissertation Topic: “Study of Surrogates for Conventional and Synthetic Aviation Jet Fuels”

Committee: Li Qiao (**Primary Advisor**), Jay Gore, and William Anderson

Pune University, Pune, Maharashtra, India

B.E., Mechanical Engineering (Distinction), Aug 2002 - Jul 2006

Research Interests

Climate and earth system dynamics, tropical dynamics, global hydrological cycle, human-climate interactions, human vulnerability and adaptation, sustainable and alternative energy solutions, science education.

Professional Appointments

Lamont Doherty Earth Observatory, Columbia University, NY, USA
Lamont Postdoctoral Research Fellow, 2015-present

Stanford University, Stanford, CA, USA
Research Assistant, 2010-2015

Stanford University, Stanford, CA, USA
Teaching Assistant, Fall 2011, Fall 2012, Winter 2014, Summer 2015

Department of Aeronautics and Astronautics, Purdue University, IN, USA
Research Assistant, 2008-2010

Aerospace Engineering Department, Indian Institute of Technology, Bombay, India
Research Engineer, 2007-2008

Forbes Marshall, Pune, India *Research and Development Engineer, 2006-2007*

Honors and Awards

Postdoctoral Fellowship, *Lamont Doherty Earth Observatory*, 2015-2017
 Kavli Fellow, U.S. National Academy of Sciences, 2015
 Postdoctoral Fellowship, *Earth Institute, Columbia University*, (declined)
 Visiting Scholars Fellowship, *NOAA CIRES*, (declined)
 Gerald J. Lieberman Fellowship, *Stanford University*, 2014-2015
 Graduate Student Award for Scholarly and Research Achievement, Department of Environmental Earth System Science, *Stanford University*, 2014
 Wagner Memorial Award for Women in Atmospheric Sciences (2nd Place), *Desert Research Institute*, 2014
 Best Presentation, Stanford School of Earth Sciences Research Review, *Stanford University*, 2014
 Rising Environment Leaders Program Fellow, Woods Institute for the Environment, *Stanford University*, 2012
 Donath Honors Fellowship, *Stanford University*, 2011-2013
 Best Poster, Stanford School of Earth Sciences Research Review, *Stanford University*, 2011
 Best B.E Thesis, Society of Automotive Engineers, *Western India Section*, 2006
 Subroto Memorial Scholarship for Undergraduate Education, *Indian Air Force Benevolent Association*, 2002-2006

Research Grants

Cross-Cutting Initiative Grant, Earth Institute, *Columbia University*, 2015-2016 (23,000 USD)
 McGee Research Grant, School of Earth Sciences, *Stanford University*, 2014 (4,000 USD)

Publications

S. Lebel, D.P.S Bekaert, D.E. Horton, P.M. Forster, L. Fleskens, L., **D. Singh**, “The future of rainfed agriculture: adaptation planning for intra-seasonal rainfall variability in a warming world”, (*In Revision*)

N.S. Diffenbaugh, **D. Singh**, J. S. Mankin, B. Rajaratnam, A. Charland, M. Haugen, D. E. Horton, D. L. Swain, D. E. Touma, M. Tsiang, “Quantifying the influence of observed global warming on the probability of historically unprecedented extreme climate events”, (*In Revision*)

D. Singh, Bollasina, M., Ting, M., and N.S. Diffenbaugh, “Anthropogenic aerosols influenced trends in South Asian Monsoon subseasonal characteristics”, (*Under Review at Nature Climate Change*)

D. Singh, Swain, D.L., Mankin, J.S., Horton, D.E., Thomas, L., and N.S. Diffenbaugh, “Recent amplification of the North American winter temperature dipole”, *JGR-Atmospheres*, 121, 2016, doi:10.1002/2016JD025116

R. DeFries, Mondal, P., **Singh, D.**, Agrawal, I., Fanzo, J., Remans, R., and Wood, S. , “Synergies and Trade-offs for Sustainable Agriculture: Nutritional Yields and Climate-Resilience for Cereal Crops in Central India, *Global Food Security*, 2016, doi: 10.1016/j.gfs.2016.07.001.

D.L. Swain, Horton, D.E., **Singh, D.**, and N.S. Diffenbaugh , “Trends in atmospheric patterns conducive to seasonal precipitation and temperature extremes in California”, *Science Advances*, 2, 4, 2016

Deepti Singh, “South Asian Monsoon: Tug of war on rainfall changes”, *Nature Climate Change*, 6, 2016

J.S. Mankin, Viviroli, D., **Singh, D.**, Hoekstra, A., and N.S. Diffenbaugh, “The potential for snow to supply human water demand in the present and future”, *Environmental Research Letters*, 10, 114016, 2015

D.E. Horton, Johnson, N.C., **Singh, D.**, Swain, D.L., Rajaratnam, B., and N.S. Diffenbaugh, “Contribution of changes in atmospheric circulation patterns to extreme temperature trends”, *Nature*, 522, 465-469, 2015

D. Singh, Horton, D.E., Tsiang, M., Haugen, M., Ashfaq, M., Mei, R., Rastogi, D., Johnson, N., Charland, C., Rajaratnam, B., and N.S. Diffenbaugh, “Severe Precipitation in Northern India in June 2013: Causes, Historical Context, and Changes in Probability”, [in Explaining Extreme Events of 2013 from a Climate Perspective] *Bulletin of the American Meteorological Society*, 95(9), 2014

D.L. Swain, Tsiang, M., Haugen, M., **Singh, D.**, Charland, A., Rajaratnam, B., and N.S. Diffenbaugh, “The Extraordinary California drought of 2013-2014: Character, Context and Role of Climate Change”, in [Explaining Extreme Events of 2013 from a Climate Perspective] *Bulletin of the American Meteorological Society*, 95(9), 2014

D.E. Horton, Skinner, C.B., **Singh, D.**, and N.S. Diffenbaugh, “Occurrence and persistence of future atmospheric stagnation events”, *Nature Climate Change*, 4: 698-703, 2014

ISI “Highly Cited Paper”, Horton et al. *Nature Climate Change*, 2014

D. Singh, Tsiang, M., Rajaratnam, B., and N.S. Diffenbaugh, “Observed Changes in Extreme Wet and Dry Spells in the South Asian Summer Monsoon Season”, *Nature Climate Change*, 4(6): 456-461, 2014

ISI “Highly Cited Paper”, Singh et al. *Nature Climate Change*, 2014

D. Singh, Tsiang, M., Rajaratnam, B. and N.S. Diffenbaugh, “Precipitation extremes over the continental United States in a transient, high-resolution, ensemble climate model experiment”, *Journal of Geophysical Research Atmospheres*, 118 (13), 7063-7086, 2013

D. Singh, Nishiie, T., Tanvir, S., Qiao, L., “Flame Speed and Kinetics Analysis of Syngas Flames at Elevated Temperatures and with Water Addition”, *Fuel*, 94, 448-456, 2012

D. Singh, Nishiie, T., Qiao, L., “Experimental and Kinetic Modeling Study of the Combustion of n-Decane, Jet-A, and S-8 in Laminar Premixed Flames”, *Combustion Science and Technology*, 183, 1002-1026, 2011

Conference Proceedings

D. Singh, Nishiie, T., and Qiao, L., “Laminar Burning Velocity of Syngas Flames at Elevated Temperatures”, *Spring Technical Meeting of the Central States Section of the Combustion Institute, Champaign, Illinois, USA, March 21-23, 2010*

D. Singh, Nishiie, T., and Qiao, L., “Laminar Flame Speeds and Markstein Lengths of n-Decane/Air, n-Decane/O₂/He and MCH/Air flames”, *Spring Technical Meeting of the Central States Section of the Combustion Institute, Champaign, Illinois, USA, March 21-23, 2010*

D. Singh, Nishiie, T., and Qiao, L., “Laminar Burning Speeds and Markstein Lengths of n-Decane/air, n-Decane/O₂/He, Jet-A/air and S-8/air flames”, AIAA-2010-951, *48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Orlando, Florida, USA, Jan 4-7, 2010*

T. Nishiie, **Singh, D.**, and Qiao, L., “Laminar Burning Velocity and Markstein Length of Decane/Air, Jet-A/Air and S-8/Air flames”, *Sixth U.S. National Combustion Meeting, Ann Arbor, MI, May 17-20, 2010*

D. Singh, Nishiie, T., and Qiao, L., “Laminar Burning Velocity of Syngas/Air Flames with Water Vapor and Ammonia at Elevated Temperatures”, *Sixth U.S. National Combustion Meeting, Ann Arbor, MI, May 17-20, 2010*

Select Talks and Conference Presentations

D. Singh, M. Bollasina, and N.S. Diffenbaugh, “Imprint of Historical Anthropogenic Emissions on the Subseasonal Variability of the Indian Summer Monsoon”, *AGU Fall Meeting, San Francisco, December 14-18 2015*

D.E. Horton, J.S., Mankin, **D. Singh**, D.L. Swain, N. Johnson, and N.S. Diffenbaugh, “Probability of Atmospheric Circulation Pattern Occurrence in Pre-Industrial, Historical, and Future Climates”, *AGU Fall Meeting, San Francisco, December 14-18 2015*

D.L. Swain, D.E. Horton, **D. Singh** and N.S. Diffenbaugh, “Trends in persistent seasonal-scale atmospheric circulation patterns responsible for precipitation and temperature extremes in California”, (*Invited*), *AGU Fall Meeting, San Francisco, December 14-18 2015*

N.S. Diffenbaugh, **D. Singh**, J. S. Mankin, D. E. Horton, D. L. Swain, and D. E. Touma, “Using Atmospheric Circulation Patterns to Detect and Attribute Changes in the Risk of Extreme Climate Events”, (*Invited*), *AGU Fall Meeting, San Francisco, December 14-18 2015*

D. Singh, “Historical Trends in the Characteristics of the Indian Summer Monsoon”, (*Invited*), *Sixth Indo-American Frontiers of Science Symposium, Irvine, California, August 12th 2015*

D. Singh, “Climate Extremes in a Warming World: Historical Trends, Physical Causes, and Response to Increasing Anthropogenic Emissions”, *Stanford University, Stanford, California, August 7th 2015*

D. Singh, “Changing Characteristics of Extreme Events in a Warming World”, (*Invited*), *Department of Geology and Geophysics Seminar, Yale University, New Haven, February 5th 2015*

D. Singh, “Changing Characteristics of Extreme Events in a Warming World”, (*Invited*), *Lamont Doherty Earth Observatory, New York, February 4th 2015*

D. Singh, D.E. Horton, and N.S. Diffenbaugh, “Influence of Anthropogenic Warming on extremes in the Indian Summer Monsoon using cluster Analysis”, *95th AMS Annual Meeting, Phoenix, January 4-8 2015*

D. Singh, D.E. Horton, and N.S. Diffenbaugh, “Understanding the Dynamic and Thermodynamic Causes of Historical Trends in the Intraseasonal Variability of the South Asian Summer Monsoon”, *AGU Fall Meeting, San Francisco, December 15-19 2014*

D.E. Horton, **D. Singh**, D.L. Swain, and N.S. Diffenbaugh, “Surface Temperature Extremes and Detectable Trends in Northern Hemisphere Mid-Tropospheric Planetary Wave Pattern Occurrence and Persistence”, *AGU Fall Meeting*, San Francisco, December 15-19 2014

N.S. Diffenbaugh, B. Rajaratnam, A. Charland, M. Haugen, D.E. Horton, **D. Singh**, D.L. Swain, and M. Tsiang, “Quantifying the influence of observed global warming on the probability of unprecedented extreme climate events”, *AGU Fall Meeting*, San Francisco, December 15-19 2014 (*Invited*)

D.L. Swain, M. Tsiang, M. Haugen, **D. Singh**, A. Charland, B. Rajaratnam, and N. S. Diffenbaugh, “The Extraordinary California Drought of 2013-2014: Character, Context, and the Role of Climate Change”, *AGU Fall Meeting*, San Francisco, December 15-19 2014

D. Singh, M. Tsiang, B. Rajaratnam, and N.S. Diffenbaugh, “Towards an Understanding of the Dynamics of Changing Rainfall Extremes in the Indian Summer Monsoon”, *Fourth workshop on Understanding Climate Change from Data*, National Center for Atmospheric Research (NCAR), Boulder, June 30-July 2 2014

D. Singh, M. Tsiang, B. Rajaratnam, and N.S. Diffenbaugh, “Observed Changes in the Characteristics of Active and Break Spells in the South Asian Summer Monsoon”, *AGU Fall Meeting*, San Francisco, September 9-13 2013

D. Singh, M. Tsiang, B. Rajaratnam, and N.S. Diffenbaugh, “Impact of increased radiative forcing on the Intraseasonal Variability of the South Asian Summer Monsoon”, *NCCR Climate Summer School*, Grindelwald, Switzerland, September 1-6 2013

D. Singh, M. Tsiang, B. Rajaratnam, and N.S. Diffenbaugh, “Increase in Extreme Precipitation over the Continental U.S. in the 21st century using High-resolution Climate Model Simulations”, *U.S. CLIVAR Workshop on Analysis, Dynamics and Modeling Large-Scale Meteorological Patterns Associated with Extreme Temperature and Precipitation*, Berkeley, CA, August 20-22 2013

D. Singh, M. Tsiang, B. Rajaratnam, and N.S. Diffenbaugh, “Observed Changes in the Intraseasonal Variability of the South Asian Summer Monsoon”, *Next Generation Climate Data Products Workshop*, NCAR Institute for Mathematics Applied to Geosciences, Boulder, CO July 15-19 2013

D. Singh, and N.S. Diffenbaugh, “Observed Intraseasonal Variability of the South Asian Monsoon and Evaluation of CMIP5”, *Berkeley Atmospheric Sciences Symposium*, Berkeley, February 8 2013

D. Singh, M. Tsiang, B. Rajaratnam, and N.S. Diffenbaugh, “Intraseasonal Variability of the South Asian Monsoon and Evaluation of the CMIP5 models”, *AGU Fall Meeting*, San Francisco, December 3-7 2012

Jordan Pratt, **D. Singh**, and N.S. Diffenbaugh, “Effects of Large-Scale Solar Installations on Dust Mobilization and Air Quality”, *AGU Fall Meeting*, San Francisco, December 3-7 2012

D. Singh, and N.S. Diffenbaugh, “Dynamics of Changing Precipitation Extremes over the Continental United States in a Transient, High-Resolution Ensemble Experiment of 21st Century Climate”, *Berkeley Atmospheric Sciences Symposium*, Berkeley, February 10 2012

D. Singh and N.S. Diffenbaugh, “Precipitation Extremes over the Continental United States in a Transient, High-Resolution Ensemble Experiment of 21st Century Climate”, *AGU Fall Meeting*, San Francisco, December 5-9 2011

D. Singh and N.S. Diffenbaugh, “High-resolution Modeling of Extreme Precipitation in the United States”, *Climate and Earth System Modeling PI Meeting*, Washington, DC, September 19-22 2011

Teaching Experience

EESS 41N: The Global Warming Paradox

Teaching Assistant, Prof. Noah S. Diffenbaugh, Environmental Earth System Science, Stanford University, CA, Fall 2011, Fall 2012, Summer 2015

EESS 246A: Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation

Teaching Assistant, Prof. Leif Thomas, Environmental Earth System Science, Stanford University, CA, Winter 2014

Student Advising/Mentoring

Barsa, Barnard College, *Columbia University*, Fall 2015-Spring 2016

Jordan Pratt, *Stanford University*, Summer 2012

Alex Chong, *Purdue University*, Summer 2010

Other Awards

Travel Grant for Workshop on Understanding Climate Change from Data, *National Center for Atmospheric Research (NCAR)*, 2014

ThinkSwiss Travel Fellowship, *Swiss Government*, 2013

Travel Award for Community Earth System Model (CESM) tutorial, *NCAR*, 2011

Travel Award for Annual Community Climate System Model (CCSM) workshop, *NCAR*, 2011

Graduate Women in Engineering Travel Award, *Purdue University*, 2009

Academic Service

Peer Reviewer for: *Nature Scientific Reports, Geophysical Research Letters, Water Resources Research, Climate Dynamics, International Journal of Climatology, Journal of Climate, Journal of the American Water Resources Association, Journal of Environment and Agriculture Science and Quaternary International*

Session Co-convenor, Detecting and attributing climate change: trends, extreme events, and impacts, *EGU General Assembly 2016*

Session Chair, Identifying links between the large-scale atmospheric circulation and climate extremes, *AGU Fall Meeting 2015*

Mentor for undergraduate student researcher, Program for Mentoring Undergraduates in Interdisciplinary Research, Woods Institute for the Environment, *Stanford University*, 2012

Organizer for Women in Earth Sciences, *Stanford University*, 2011-present

College Bound Program Volunteer, Boys and Girls Club of the Peninsula, Menlo Park, 2010-present

EESS Representative, Graduate Student Advisory Committee, School of Earth Sciences, *Stanford University*, 2011-2012

Mentor for summer undergraduate research, Summer Undergraduate Research Fellowships Program, College of Engineering, *Purdue University*, 2010

Aeronautics and Astronautics Department Ambassador, Women in Engineering Graduate Mentoring Program, *Purdue University*, 2009-2010

Committee Member, Graduate Student Advisory Committee (AeroAssist), Aeronautics and Astronautics, *Purdue University*, 2009-2010

Programming Committee, Purdue Energy Club, *Purdue University*, 2009-2010

Executive Council Member, Purdue Pugwash, *Purdue University*, 2008-2009

Leader of Quality Circle Activities at Vishwakarma Institute of Technology, *Pune University*, 2003-2006

Public Outreach

Mentor for High School Interns at Lamont-Doherty Earth Observatory, July-August 2016

Panelist for Early Career Research Panel for High School and Undergraduate Visitors, Lamont-Doherty Earth Observatory, July 2016

Panelist for Early Career Research Panel for Columbia University's Environmental Science and Policy Graduate Students, Lamont-Doherty Earth Observatory, July 2016

Volunteer at Sun and Earth Day, American Museum of Natural History, NY, March 2016

Presentation for 6th Graders "Effect of Global Warming on Extreme Weather Events", Warm Springs Elementary School, CA, February 2016

Workshop Organizer for Girls Day, Boys and Girls Club of the Peninsula, CA, April 2015

Panelist on "Earth Matters: A Matter of Degrees", Continuing Studies Program and School of Earth, Energy and Environmental Sciences, Stanford University, February 2015

Volunteer with Stanford School of Earth Sciences, *Bay Area Science Festival Discovery Day*, San Francisco, CA, November 2014

"Observing and Modeling Climate", *Eclipse Nightlife*, California Academy of Sciences, San Francisco, CA, October 2014

"Indian Summer Monsoon and its changing characteristics", Science Circle for High School students, *Stanford University Pre-collegiate Studies Program*, Stanford University, CA, May 2014

"Generation Anthropocene-the age of human-induced changes in the Earth System", Science Circle for High School students, *Stanford University Pre-collegiate Studies Program*, Stanford University, CA, April 2014

"Weather going wild: Will global warming lead to more extremes?", *Connecting the Dots*, Stanford University, CA, April 2014

"Climate Change: Why its happening and how do we stop it", *Stanford Splash*, Stanford University, CA, April 2014