

SUKANTA BASU

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EDUCATION

- 2004 Ph.D. (Civil Engineering)
University of Minnesota, Minnesota, USA
Dissertation: Large-eddy simulation of stably stratified atmospheric boundary layer turbulence: a scale-dependent dynamic modeling approach
- 2000 Master of Applied Science (Environmental Engineering)
University of Windsor, Ontario, Canada
- 1998 Bachelor of Technology (Honors) (Civil Engineering)
Indian Institute of Technology (IIT), Kharagpur, India

PROFESSIONAL EXPERIENCE

- September, 2005 – Present Assistant Professor
Atmospheric Science Group, Department of Geosciences
Texas Tech University, Texas, USA
- May, 2008 – June, 2008 Visiting Scientist
Meteorology and Air Quality Group,
Wageningen University, The Netherlands
- January, 2005 – June, 2005 Post-doctoral Research Associate
University of Minnesota, Minnesota, USA

RESEARCH INTERESTS

Atmospheric boundary layer processes, wind power meteorology, turbulence modeling (large-eddy simulation), scintillometry, numerical weather prediction, Antarctic meteorology, dispersion modeling, and nonlinear time series analysis.

SELECTED AWARDS

- 2008 CAREER Award, National Science Foundation.
- 2005 Best Ph.D. dissertation in Civil Engineering, awarded by the Department of Civil Engineering, University of Minnesota.
- 2005 NOAA Climate and Global Change Postdoctoral fellowship awarded by UCAR and NOAA (declined).
- 2003 Doctoral dissertation fellowship awarded by the Graduate School, University of Minnesota.
- 2002 Travel grant awarded by the Grand Combin Summer School on Physics and Predictability of Rainfall and Floods, St. Oyen, Aosta, Italy.

- 2000 Sommerfeld fellowship awarded by the Department of Civil Engineering, University of Minnesota.
- 2000 Ontario graduate scholarship awarded by the selection board of Ministry of Training, Colleges and Universities, Ontario, Canada (declined).
- 1998 Best final year project in Civil Engineering, awarded by the Indian Institute of Technology, Kharagpur, India.

PROFESSIONAL ACTIVITIES

Convener of a session at the 2008 American Geophysical Union (AGU) Fall Meeting (A47: *Wind Power Meteorology: The Decade Ahead*; Co-conveners: Dr. J. K. Lundquist and Dr. J. McCaa), San Francisco, USA.
<http://www.agu.org/meetings/fm08/?content=search&show=detail&sessid=50>

Chair of the 3rd GEWEX Atmospheric Boundary Layer Study (GABLS) Large-Eddy Simulation Intercomparison (2008). <http://www.atmo.ttu.edu/basu/GABLS3/>

Participant of the Bushland Evapotranspiration and Agricultural Remote Sensing Experiment 2008 (BEAREX08)

Editorial board member for *The Open Atmospheric Science Journal* (since 2007)

Convener of a session at the 2007 American Geophysical Union (AGU) Joint Assembly (NG03: *Atmospheric Turbulence Scaling Mechanisms and Their Meteorological Effects*; Co-conveners: Prof. J. J. Castro and Prof. A. A. Carsteanu), Acapulco, Mexico.

TEACHING EXPERIENCE

- ATMO 1300 Introduction to atmospheric science (Fall 2005, 2006, 2007, 2008)
- ATMO 5301 Atmospheric dispersion modeling (Spring 2006, 2008)
- ATMO 5332 Regional-scale numerical weather prediction (Spring 2007)
- ATMO 5319 Boundary-Layer Meteorology (Fall 2007)
- ATMO 5301 Wind Power Meteorology (Spring 2009)

SPONSORED RESEARCH

NSF: Polar Science Program	2006-2009	\$ 173,000
Texas Advance Research Program (co-PI: Xiaoning Kathleen Gilliam)	2006-2009	\$ 86,000
Research Development Grant, TTU (one of 5 PIs)	2006-2009	\$1,000,000
NSF: CAREER Award	2008-2013	\$ 505,060
Norman Hackerman Advanced Research Program (lead PI: Lance Manuel, UT-Austin)	2008-2010	\$ 128,940

CURRENT GRADUATE ADVISEES

Padriac Fowler (Ph.D. – IGERT Wind Science and Engineering Fellow). Dissertation topic: Short-term forecasting of wind energy.

Suraj Harshan (Ph.D. – Atmospheric Science). Dissertation topic: Modeling of Antarctic boundary layer.

FORMER GRADUATE ADVISEES

William Anderson (M.S. – Civil Engineering). M.S. Thesis: *A localized dynamic model for large-eddy simulation of the neutrally buoyant atmospheric boundary layer*. Currently doing a Ph.D. in the Department of Mechanical Engineering, Johns Hopkins University;

Julie Phillipson (M.S. – Atmospheric Science). M.S. Thesis: *Bursting events in the stable atmospheric boundary layer*. Currently at the National Weather Service, St. Louis, Missouri;

Rachel Rogers (M.S. – Atmospheric Science). M.S. Thesis: *Forecast verification: A dispersion modeling perspective*. Currently doing a Ph.D. in the Department of Civil Engineering, Texas Tech University;

Brandon Storm (Ph.D. – IGERT Wind Science and Engineering Fellow). Ph.D. Dissertation: *Modeling of low-level jets over the Great Plains: Implications for Wind Energy*. Currently at EAPC Architects Engineering, Grand Forks, North Dakota.

KEY COLLABORATORS

Alain Arnéodo (Ecole Normale Supérieure de Lyon, France); Stefano Galmarini (European Commission - DG Joint Research Centre, Italy); Xiaoning Kathleen Gilliam (Texas Tech University); Prasanna Gowda (USDA-ARS, Bushland, Texas); Bert Holtslag (Wageningen University, The Netherlands); Christopher Letchford (University of Tasmania); Lance Manuel (University of Texas at Austin); Gunilla Svensson (Stockholm University, Sweden); Andrew Swift (Texas Tech University); Joe Touma (Air Resources Laboratory, NOAA); Jean-François Vinuesa (European Commission - DG Joint Research Centre, Italy).

PUBLICATIONS

In Peer Reviewed Journals

Storm, B., Dudhia, J., Basu, S., Swift, A., and Giammanco, I. (2008). "Evaluation of the Weather Research and Forecasting (WRF) model on forecasting low-level jets: Implications for wind energy." Wind Energy, (in press).

Basu, S., Vinuesa, J.-F., and Swift, A. (2008). "Dynamic LES modeling of a diurnal cycle." Journal of Applied Meteorology and Climatology, 47, 1156-1174.

Basu, S., Holtslag, A. A. M., van de Wiel, B. J. H., Moene, A., and Steeneveld, G.-J. (2007). "An inconvenient 'truth' about using sensible heat flux as a surface boundary condition in models under stably stratified regimes." Acta Geophysica (Special Issue: Recent Topics in Boundary-Layer Meteorology - 10.2478/s11600-007-0038-y), 56, 88-99.

- Basu, S., Fofoula-Georgiou, E., Lashermes, B., and Arnéodo, A. (2007). “Estimating intermittency exponent in neutrally stratified atmospheric surface layer flows: A robust framework based on magnitude cumulant and surrogate analyses.” Physics of Fluids, 19, 115102.
- Vinuesa, J.-F., Basu, S., and Galmarini, S. (2007). “The diurnal evolution of ^{222}Rn and its progeny in the atmospheric boundary layer during the Wangara experiment.” Atmospheric Chemistry and Physics, 7, 5003-5019.
- Anderson, W., Basu, S., and Letchford, C. (2007). “Comparison of dynamic subgrid-scale models for simulations of neutrally buoyant shear-driven atmospheric boundary layer flows.” Environmental Fluid Mechanics, 7, 195-215.
- Basu, S., and Porté-Agel, F. (2006). “Large-eddy simulation of stably stratified atmospheric boundary layer turbulence: a scale-dependent dynamic modeling approach.” Journal of the Atmospheric Sciences, 63, 2074-2091.
- Vinuesa, J.-F., Porté-Agel, F., Basu, S., and Stoll, R. (2006). “Subgrid-scale modeling of reacting scalar fluxes in large-eddy simulations of atmospheric boundary layers.” Environmental Fluid Mechanics, 6, 115, doi: 10.1007/s10652-005-6020-9.
- Basu, S., Porté-Agel, F., Fofoula-Georgiou, E., Vinuesa, J.-F., and Pahlow, M. (2006). “Revisiting the local scaling hypothesis in stably-stratified atmospheric boundary layer turbulence: an integration of field and laboratory measurements with large-eddy simulations.” Boundary-Layer Meteorology, 119, 473-500.
- Venugopal, V., Basu, S., and Fofoula-Georgiou, E. (2005). “A new metric for comparing precipitation patterns with an application to ensemble forecasts.” Journal of Geophysical Research – Atmospheres, 110, D08111, doi: 10.1029/2004JD005395.
- Basu, S., Fofoula-Georgiou, E., and Porté-Agel, F. (2004). “Synthetic turbulence, fractal interpolation and large-eddy simulation.” Physical Review E, 70, 026310.
- Basu, S., Fofoula-Georgiou, E., and Porté-Agel, F. (2002). “Predictability of atmospheric boundary-layer flows as a function of scale.” Geophysical Research Letters, 29(21), doi:10.1029/2002GL015497.
- Basu, S., and Fofoula-Georgiou, E. (2002). “Detection of nonlinearity and chaoticity in time series using the transportation distance function.” Physics Letters A, 301, 413-423.
- Basu, S., Henshaw, P. F., Biswas, N., and Kwan, H. K. (2002). “Prediction of gas-phase adsorption isotherms using neural nets.” The Canadian Journal of Chemical Engineering, 80(3), 506-512.
- Basu, S., Henshaw, P. F., and Biswas, N. (1999). Discussion on “Equilibrium gaseous adsorption at different temperatures” : by A. R. Khan, R. Atallah, and A. Al-Haddad. Journal of Environmental Engineering, ASCE, 126(11), 1068-1069.

Invited Presentations

- Basu, S. (2007). "NEW LES intercomparison case." Presentation at the GABLS Workshop, Stockholm, Sweden.
- Basu, S. (2007). "Looking beyond dynamic Smagorinsky models for atmospheric boundary layer simulations." Presentation at the Department of Atmospheric Sciences, University of Washington, Seattle, USA.
- Basu, S. (2004). "Understanding stably stratified atmospheric boundary-layer turbulence: integration of statistical and dynamical approaches with large-eddy simulations." Invited Presentation at the International Center for Theoretical Physics, April 24, Trieste, Italy.

Conference Papers and Oral Presentations

Presenters are indicated by asterisks

- Basu*, S., Holtslag, A. A. M., van de Wiel, B. J. H., Moene, A. F., and Steeneveld, G. J. (2008). "Fundamental limitations of using sensible heat flux as a lower boundary condition in stable boundary layer simulation and modeling", 18th Symposium of Boundary Layers and Turbulence, 9-13 June, Stockholm, Sweden.
- Basu*, S., Steeneveld, G. J., Holtslag, A. A. M., and Bosveld, F. C. (2008). "Large-eddy simulation intercomparison case setup for GABLS3", 18th Symposium of Boundary Layers and Turbulence, 9-13 June, Stockholm, Sweden.
- Phillipson*, J. A., Basu, S., and Gilliam, X. (2008). "Identifying differences in polar and mid-latitude turbulence bursting events", 88th American Meteorological Society Annual Meeting, 20-24 January, New Orleans, USA.
- Anderson*, W. C., Basu, S., and Letchford, C. W. (2007). "Next-generation subgrid-scale closures for large-eddy simulation of turbulent flow in the atmospheric boundary layer", 12th international conference on wind engineering, July 1-6, Cairns, Australia.
- Storm*, B., Dudhia, J., and Basu, S. (2007). "WRF PBL sensitivities and verification in forecasting low-level jet events." 8th Annual WRF user's workshop, June 11-15, Boulder, USA.
- Basu*, S., and Vinuesa, J.-F. (2007). "Dynamic LES modeling of observed diurnal cycles." American Geophysical Union Joint Assembly, May 22-25, Acapulco, Mexico.
- Foufoula-Georgiou*, E. and Basu, S. (2007). "Advances in precipitation forecast verification: The forecast quality index and a case study in assessing WRF model performance." American Geophysical Union Joint Assembly, May 22-25, Acapulco, Mexico.
- Basu*, S., Foufoula-Georgiou, E., Lashermes, B. and Arnéodo, A. (2007). "Estimating intermittency exponent in neutrally stratified atmospheric surface layer flows: A robust framework based on magnitude cumulant and surrogate analyses." American Geophysical Union Joint Assembly, May 22-25, Acapulco, Mexico.

- Basu*, S., and Foufoula-Georgiou, E. (2007). "Spatial forecast verification methods intercomparison project: Forecast Quality Index", Verification Method Intercomparison Meeting, 19-24 February, Boulder, USA.
- Basu*, S., and Vinuesa, J.-F. (2006). "Dynamic LES modeling of a diurnal cycle." American Geophysical Union Fall Meeting, December 11-15, San Francisco, USA.
- Basu*, S., Lashermes, B., Foufoula-Georgiou, E., and Arnéodo, A. (2006). "Does atmospheric stability affect inertial-range properties of boundary layer turbulence?" American Geophysical Union Fall Meeting, December 11-15, San Francisco, USA.
- Basu*, S., Anderson, W., and Vinuesa, J.-F. (2006). "Dynamic LES modeling of diurnal cycles." 17th Symposium on Boundary Layers and Turbulence, May 22-25, San Diego, USA.
- Gilliam, X., and Basu*, S. (2006). "Identifying intermittent structures in stable boundary layer flows." 17th Symposium on Boundary Layers and Turbulence, May 22-25, San Diego, USA.
- Basu*, S. (2006). "Large-eddy simulation of stable boundary layers: a case study." 1st iLEAPS Science Conference, January 21-26, Boulder, USA.
- Mehta, K., Peterson, R., Basu*, S., and Swift, A. (2006). "Doctoral degree in Wind Science and Engineering", 3rd National Conference on Wind Engineering, January 5-7, Calcutta, India.
- Basu*, S. (2006). "Large-eddy simulation of stable boundary layer turbulence." 3rd National Conference on Wind Engineering, January 5-7, Calcutta, India.
- Porté-Agel*, F., Foufoula-Georgiou, E., Stoll, J. R., Basu, S., and Venugopal, V. (2005). "Surface heterogeneity effects on land-atmosphere fluxes from tuning-free large-eddy simulations." 5th International Scientific Conference on the Global Energy and Water Cycle, June 20-24, Orange County, USA.
- Basu*, S., Porté-Agel, F., and Foufoula-Georgiou, E. (2004). "Development of stable boundary layer parameterizations in numerical weather prediction models: a scale-dependent dynamic LES modeling approach." 16th Symposium on Boundary Layers and Turbulence, American Meteorological Society, August 9-13, Portland, USA.
- Basu*, S., Porté-Agel, F., and Foufoula-Georgiou, E. (2004). "Revisiting a few outstanding issues related to the stably stratified atmospheric boundary layer turbulence research." European Geosciences Union General Assembly, April 25-30, Nice, France.
- Basu*, S., and Foufoula-Georgiou, E. (2001). "Information theoretic approach to questions of precipitation predictability." American Geophysical Union Fall Meeting, December 10-14, San Francisco, USA.
- Basu*, S., and Foufoula-Georgiou, E. (2001). "A framework for the detection of nonlinearity and chaoticity: application to high frequency storm rates." 7th International Conference on Precipitation, June 30-July 3, Rockport, USA.
- Basu*, S., Henshaw, P. F., and Biswas, N. (2000). "Perspectives of adsorption in the new millennium." Canadian Society for Civil Engineering, 6th Environmental Engineering Specialty Conference, June 8-10, London, Canada, pp. 408-413.

Basu*, S., and Henshaw, P. F. (2000). "Correlations of relative adsorbability with physical and structural properties of VOCs - application of an artificial neural network." Canadian Society for Civil Engineering, 6th Environmental Engineering Specialty Conference, June 8-10, London, Canada, student competition paper.

Poster Presentations

Presenters are indicated by asterisks

Rogers*, R., and Basu, S. (2008). "Does the Weather Research and Forecasting (WRF) model reproduce the characteristics of atmospheric surface layers accurately?" 88th American Meteorological Society Annual Meeting, 20-24 January, New Orleans, USA.

Ho, C., Gilliam, X., Phillipson*, J. A., and Basu, S. (2008). "The empirical mode decomposition and intermittent turbulence", 88th American Meteorological Society Annual Meeting, 20-24 January, New Orleans, USA.

Storm*, B., Dudhia, J., and Basu, S., (2007). "Sensitivities of the Weather Research and Forecasting (WRF) model in forecasting low-level jet events and the impact on forecasting severe weather." 22nd conference on weather analysis and forecasting/18th conference on numerical weather prediction, June 25-29, Park City, USA.

Storm*, B., Basu, S., and Dudhia, J. (2007). "Advanced Research WRF (ARW) modeled low-level jet climatology compared to observed climatologies." 22nd conference on weather analysis and forecasting/18th conference on numerical weather prediction, June 25-29, Park City, USA.

Storm*, B., Basu, S., and Dudhia, J. (2007). "WRF modeled low-level jet climatology compared to observed climatologies: weakness and strengths." 8th Annual WRF user's workshop, June 11-15, Boulder, USA.

Storm*, B., Basu, S., and Dudhia, J. (2007). "Sensitivities of the WRF model in forecasting low-level jet events." Windpower 2007, June 3-6, Los Angeles, USA.

Phillipson, J., Basu*, S., and Gilliam, X. (2007). "Identifying differences in polar and mid-latitude turbulent bursting events in the stably stratified atmospheric boundary layer flows." American Geophysical Union Joint Assembly, May 22-25, Acapulco, Mexico.

Gilliam, X., Ho, C., and Basu*, S. (2007). "Detection of intermittent turbulence in stable boundary layer using empirical mode decomposition." American Geophysical Union Joint Assembly, May 22-25, Acapulco, Mexico.

Storm, B., Basu*, S., and Dudhia, J. (2007). "Advanced Research WRF (ARW) modeled low-level jet climatology compared to observed climatologies." American Geophysical Union Joint Assembly, May 22-25, Acapulco, Mexico.

Fowler*, P., and Basu, S. (2006). "Effects of land-surface heterogeneity on the evolution of low-level jets: A numerical study." International Conference on Water in Arid and Semiarid Lands, November 15-17, Lubbock, USA.

- Anderson*, W. C., and Basu, S. (2006). "Large-eddy simulation of the neutrally buoyant atmospheric boundary layer using two subgrid-scale closures: A comparative assessment." American Geophysical Union Fall Meeting, December 11-15, San Francisco, USA.
- Fowler*, P., and Basu, S. (2006). "Effects of land-surface heterogeneity on the evolution of low-level jets: A numerical study." American Geophysical Union Fall Meeting, December 11-15, San Francisco, USA.
- Basu, S., Porté-Agel*, F., and Foufoula-Georgiou, E. (2005). "Large-eddy simulation of stably stratified atmospheric boundary layer turbulence: a locally-averaged scale-dependent dynamic modeling approach." European Geosciences Union General Assembly, April 24-29, Vienna, Austria.
- Basu, S., Stoll, R., and Porté-Agel*, F. (2005). "Large-eddy simulation of the early evening boundary layer transition." European Geosciences Union General Assembly, April 24-29, Vienna, Austria.
- Stoll*, R., Basu, S., and Porté-Agel, F. (2005). "Surface heterogeneity and atmospheric stability effects on land-atmosphere interactions from large-eddy simulations with dynamic subgrid models." European Geosciences Union General Assembly, April 24-29, Vienna, Austria.
- Basu*, S., Porté-Agel, F., and Foufoula-Georgiou, E. (2004). "Large-eddy simulations of very stable atmospheric boundary layers: a scale-dependent dynamic modeling approach." European Geosciences Union General Assembly, April 25-30, Nice, France.
- Basu*, S., Foufoula-Georgiou, E., and Porté-Agel, F. (2004). "Large-eddy simulations of the stochastic Burgers equation and the chaotic Kuramoto-Sivashinsky equation: a comparative study." European Geosciences Union General Assembly, April 25-30, Nice, France.
- Basu*, S., and Foufoula-Georgiou, E., Porté-Agel, F., Vuruputur, V., and Dodov, B. (2003). "Synthetic turbulence, fractal interpolation and large-eddy simulation." American Geophysical Union Fall Meeting, December 8-12, San Francisco, USA.
- Basu*, S., and Foufoula-Georgiou, E., and Porté-Agel, F. (2003). "Statistical characterization of stably stratified atmospheric boundary layer turbulence." American Geophysical Union Fall Meeting, December 8-12, San Francisco, USA.
- Basu*, S., and Foufoula-Georgiou, E. (2003). "Multiscale noise removal of chaotic geophysical signals." EGS-AGU-EUG Joint Assembly, April 6-11, Nice, France.

REVIEWING ACTIVITIES

Papers reviewed for: ASME wind energy symposium (1); Boundary-Layer Meteorology (3); Environmental Fluid Mechanics (2); Geophysical Research Letters (2); Journal of Applied Meteorology and Climatology (1); Journal of Fluid Mechanics (1); Journal of Geophysical Research (1); Journal of the Atmospheric Sciences (3); Journal of Hydrometeorology (1); Journal of Turbulence (2); Nonlinear Processes in Geophysics (2); Physics Letters A (1); Tellus B (1); The European Physical Journal B (1); The Open Atmospheric Science Journal (1); Water Resources Research (1); Wind Energy (1).

Proposals reviewed for: National Science Foundation (3)

PROFESSIONAL AFFILIATIONS

American Association for Wind Engineering; American Geophysical Union; American Meteorological Society; International Association for Hydrological Sciences (UK).