CURRICULUM VITAE

Peter P. Sullivan

EDUCATION

1984	Ph.D. in Civil Engineering, Colorado State University thesis: *"Vorticity Amplification in Viscous Flow Around a Body"*
1977	M.Sc. in Mechanical Engineering, University of British Columbia thesis: *"Aeroelastic Galloping of Tall Structures in Simulated Winds"*
1975	B.Sc. in Civil Engineering, Colorado State University

PROFESSIONAL RECORD

2010-present	Boundary Layer & Turbulence Section Head Mesoscale & Microscale Meteorology Division (MMM) National Center for Atmospheric Research (NCAR)
2009-present	Scientist IV, NCAR
2003-2009	Scientist II-III, NCAR
1997-2003	Project Scientist II, NCAR
1994-present	Affiliate Faculty, Department of Civil Engineering, CSU
1991-1997	Associate Scientist III-IV, NCAR
1988-1991	Senior Specialist Engineer, Aerodynamics Research, Boeing Co.
1985-1988	Specialist Engineer, Aerodynamics Research, Boeing Co.

COMMUNITY SERVICE

2011-present	PhD thesis committee, Adrean Webb Applied Mathematics CIRES, University of Colorado
2009-present	PhD thesis committee, Scott Waggy Department of Aerospace Engineering, University of Colorado
2009	Panel member, Ocean Studies Board of The National Academies *"Oceanography in 2025"*
2008-present	PhD thesis committee, Jun Hong Liang Department of Atmospheric and Oceanic Sciences, UCLA
2008	PhD thesis committee, Thijs Heus Department of Multi-Scale Physics, Technical University of Delft, The Netherlands
2008-present	PhD thesis committee, Nobuhiro Suzuki, Department of Oceanography, University of Rhode Island

2008	Co-PI field program, Advective Horizontal Array Turbulence Study *(AHATS)*
2008	Lecturer, *Atmospheric Boundary Layers*, International Summer School, Les Houches, France
2007-present	Planning committee, High Resolution Air-Sea Interaction *(HiRes)* Office of Naval Research field campaign
2007	Planning committee, *5th International Symposium on Environmental Hydraulics* Session covenor
2007-present	PhD thesis committee, Rica Enriquez, Department of Civil Engineering, Stanford University
2007	Co-PI field program, Canopy Horizontal Array Turbulence Study *(CHATS)*
2006	Planning committee, Geophysical Turbulence Program workshop *"Turbulence and Scalar Transport in Roughness Sublayers"*
2005	Lecturer, *From Microscale to Mesoscale*, International Summer School, Lecce, Italy
2004	Panel member, National Academy of Sciences workshop *"Challenges in Representing Physical Processes in Coupled Atmosphere-Ocean-Land Models"*
2004	PI, Ocean Horizontal Array Turbulence Study *(OHATS)*
2004-present	Editorial Board, *Dynamics of Atmospheres and Oceans*
2003-2008	Associate Editor, *Journal of the Atmospheric Sciences*
2003	Co-PI, Coupled Boundary Layers Air-Sea Transfer *CBLAST* Office of Naval Research field campaign
2002-present	Planning committee, GEWEX Atmospheric Boundary Layer Study (GABLS)
2000-2004	Steering committee, AMS conference *Boundary Layers and Turbulence*
2002	Planning committee, Geophysical Turbulence Program workshop *"New Developments in Subfilter Scale Closures"*
2000	Chair, Geophysical Turbulence Program workshop *"Turbulence and the Air-Sea Interface"*
2000	Co-PI field program, Horizontal Array Turbulence Study *(HATS)*
2000-2005	PhD thesis committee, Jaeyong Chung, Department of Civil Engineering, CSU
1994-present	Affiliate Faculty, Department of Civil Engineering, CSU
1994-1998	PhD thesis committee, Sungsu Lee, Department of Civil Engineering, CSU
1995	Planning committee & Lecturer, ASP/NCAR summer colloquium *"The PBL and Its Parameterization"*

HONORS & AWARDS

2010	Nominated for Outstanding Scientific Publication Award
2004	UCAR Outstanding Scientific Publication Award
1995	Mesoscale & Microscale Meteorology Incentive Award
1991	U.S. Patent: A Boundary Layer Control Diffuser with a Single Suction Slot

AWARDED PROPOSALS AND GRANTS

total awards to NCAR approximately $2.5M

PUBLICATIONS

Recent manuscripts and meeting papers can be found at: http://www.mmm.ucar.edu/people/sullivan/

1. Graduate Work

(1) Sullivan, P. P., 1977: Aeroelastic Galloping of Tall Structures in Simulated Winds, Masters Thesis, Mechanical Engineering Department, University of British Columbia.

(2) Sullivan, P. P., 1984: Vorticity Amplification in Viscous Flow Around a Body, Ph.D. Dissertation, Civil Engineering Department, Colorado State University.

2. Refereed Journal Articles

(3) Parkinson, G.V. and Sullivan, P. P., 1979: Galloping response of towers. *J. of Wind Engineering & Industrial Aerodynamics*, **4**, 253-260.

(4) Moeng, C-H., and P. P. Sullivan, 1994: A comparison of shear and buoyancy driven planetary-boundary-layer flows. *Journal of the Atmospheric Sciences*, **51**, 999-1022.

(5) Sullivan, P. P., J. C. McWilliams, and C-H. Moeng, 1994: A subgrid-scale model for large-eddy simulation of planetary boundary-layer flows. *Boundary-Layer Meteorology*, **71**, 247-276.

(6) Ayotte, K. W., P. P. Sullivan, A. Andren, S. C. Doney, A. Holtslag, W. G. Large, J. C. McWilliams, C-H. Moeng, M. Otte, J. Tribbia, and J. C. Wyngaard, 1996: An evaluation of neutral and convective planetary boundary layer parameterizations relative to large eddy simulation. *Boundary-Layer Meteorology*, **79**, 131-175.

(7) Sullivan, P. P., J. C. McWilliams, and C-H. Moeng, 1996: A grid nesting method for large-eddy simulation of planetary boundary layer flows. *Boundary-Layer Meteorology*, **80**, 167-202.

(8) Lin, C-L., J.C. McWilliams, C-H. Moeng, and P. P. Sullivan, 1996: Coherent structures and dynamics in a neutrally stratified planetary boundary layer flow. *Physics of Fluids*, **8**, 2626-2639.

(9) Lin, C-L., C-H. Moeng, P. P. Sullivan, and J.C. McWilliams, 1997: The effect of surface roughness on flow structures in a neutrally stratified planetary boundary layer flow. *Physics of Fluids*, **9**, 3235-3249.

(10) McWilliams, J. C., P. P. Sullivan, and C.-H. Moeng, 1997: Langmuir turbulence in the ocean. *Journal of Fluid Mechanics*, **334**, 1-30.

(11) Su, H-B, R.H. Shaw, K.T.P. U, C-H. Moeng, and P.P. Sullivan, 1998: Turbulent statistics of neutrally stratified flow within and above a sparse forest from large-eddy simulation and field observations. *Boundary-Layer Meteorology*, **88**, 363-397.

(12) Sullivan, P. P., C-H. Moeng, B. Stevens, D. H. Lenschow, and S. D. Mayor, 1998: Structure of the entrainment zone capping the convective atmospheric boundary layer. *Journal of the Atmospheric Sciences*, **55**, 3042-3064.

(13) Muschinski, A., P. P. Sullivan, D. B. Wuertz, R. J. Hill, S. A. Cohn, D. H. Lenschow, and R. J. Doviak, 1999: First large-eddy simulation of clear-air wind-profiler signals. *Radio Science*, **34**, 1437-1459.

(14) Moeng, C-H., P. P. Sullivan, and B. Stevens, 1999: Including radiative effects in an entrainment-rate formula for buoyancy-driven PBLs. *Journal of Atmospheric Sciences*, **56**, 1031–1049.

(15) Stevens, B., C-H. Moeng, and P. P. Sullivan, 1999: Large-eddy simulation of radiatively driven convection: Sensitivities to the representation of small scales. *Journal of Atmospheric Sciences*, **56**, 3963-3984.

(16) Davis, K.J, N. Gamage, C.R. Hagelberg, C. Kiemle, D.H. Lenschow, and P.P. Sullivan, 2000: An objective method for deriving atmospheric structure from airborne lidar observations. *Journal of Oceanic and Atmospheric Technology*, **17**, 1455-1468.

(17) McWilliams, J.C. and P.P. Sullivan, 2000: Vertical mixing by Langmuir circulations. *Spill Science and Technology Bulletin*, **6**, 225-237.

(18) Saiki, E. M., C-H. Moeng, and P. P. Sullivan, 2000: Large eddy simulation of the stably stratified planetary boundary layer. *Boundary-Layer Meteorology*, **95**, 1-30.

(19) Sullivan, P. P., J. C. McWilliams, and C-H. Moeng, 2000: Simulation of turbulent flow over idealized water waves. *Journal of Fluid Mechanics*, **404**, 47-85.

(20) Patton, E.G., K.J. Davis, M.C. Barth, and P.P. Sullivan, 2001: Decaying scalars emitted by a forest canopy: A numerical study. *Boundary-Layer Meteorology*, **100**, 91-129.

(21) Dubrulle, B., J-P. Laval, and P.P. Sullivan, 2002: A new dynamical subgrid model for the planetary surface layer. II. Analytical computation of fluxes, mean profiles, and variances. *Journal of the Atmospheric Sciences*, **59**, 877-891.

(22) Dubrulle, B., J-P. Laval, P.P. Sullivan, and J. Werne, 2002: A new dynamical subgrid model for the planetary surface layer. I. The model and *a priori* tests. *Journal of the Atmospheric Sciences*, **59**, 861-876.

(23) Sullivan, P.P and J.C. McWilliams, 2002: Turbulent flow over water waves in the presence of stratification. *Physics of Fluids*, **14**, 1182–1195.

(24) Patton, E.G, P.P. Sullivan, and K.J. Davis, 2003: The influence of a forest canopy on top-down and bottom-up diffusion in the planetary boundary layer. *Q.J. Royal Meteorological Society*, **129**, 1415-1434.

(25) * Sullivan, P.P, T.W. Horst, D.H. Lenschow, C-H. Moeng, and J.C. Weil, 2003: Structure of subfilter-scale fluxes in the atmospheric surface layer with application to large-eddy simulation modeling. *Journal of Fluid Mechanics*, **482**, 101-139.

(26) Moeng, C-H., J.C. McWilliams, R. Rotunno, P.P. Sullivan and J.C. Weil, 2004: Investigating 2D modelling of atmospheric convection in the PBL. *J. Atmospheric Sciences*, **61**, 889–903.

(27) Weil, J.C., P.P. Sullivan & C-H. Moeng, 2004: On the use of large-eddy simulations in Lagrangian particle dispersion models. *J. Atmospheric Sciences*, **61**, 2877-2887.

(28) Horst, T.W., J. Kleissl, D.H. Lenschow, C. Meneveau, C-H. Moeng, M.B. Parlange, P.P. Sullivan, and J.C. Weil, 2004: HATS: Field observations to obtain spatially-filtered turbulence fields from crosswind arrays of sonic anemometers in the atmospheric surface layer. *Journal of the Atmospheric Sciences*, **61**, 1566-1581.

(29) Sullivan, P.P., J.C. McWilliams, and W.K. Melville, 2004: The oceanic boundary layer driven by wave breaking with stochastic variability. I: Direct numerical simulations. *Journal of Fluid Mechanics*, **507**, 143-174.

(30) Patton, E.G., P.P. Sullivan, & C-H. Moeng, 2005: Influence of idealized heterogeneity on wet and dry planetary boundary layers coupled to the land surface. *J. Atmospheric Sciences*, **62**, 2078-2097.

(31) Rutgersson, A. & P.P. Sullivan, 2005: The effects of idealized surface water waves on the turbulence structure and kinetic energy budget in the overlying airflow. *Dynamics of Atmospheres and Oceans*, **38**, 147-171.

(32) Moeng, C-H., B. Stevens, P.P. Sullivan, 2005: Where is the interface of the stratocumulus topped PBL? *J. Atmospheric Sciences*, **62**, 2640-2645.

(33) Sullivan, P.P., J.C. McWilliams, W.K. Melville, 2005: Surface waves and ocean mixing: Insights from numerical simulations with stochastic surface forcing. 14th ´Aha Huliko´a Hawaiian Winter Workshop on Rogue Waves pp 147-155.

(34) Beare, R. J., M. K. Macvean, A. A. M. Holtslag, J. Cuxart, I. Esau, J-C. Golaz, M. A. Jimenez, M. Khairoutdinov, B. Kosovic, D. Lewellen, T. S. Lund, J. K. Lundquist, A. Mccabe, A. F. Moene, Y. Noh, S. Raasch & P. P. Sullivan, 2006: An intercomparison of large-eddy simulations of the stable boundary layer. *Boundary-Layer Meteorology*, **118**, 242-272.

(35) Edson, J., T. Crawford, J. Crescenti, T. Farrar, J. French, N. Frew, G. Gerbi, C. Helmis, T. Hristov, D. Khelif, A. Jessup, H. Jonsson, M. Li, L. Mahrt, W. McGllis, A. Plueddmann, L.

Shen, E. Skyllingstad, T. Stanton, P. Sullivan, J. Sun, J. Trowbridge, D. Vickers, S. Wang, Q. Wang, R. Weller, J. Wilkin, D. Yue, & C. Zappa, 2007: The coupled boundary layers and air-sea transfer experiment in low winds (CBLAST-Low) *Bulletin of the American Meteorological Society*, **88**, 342-356.

(36) Moeng, C.-H. J. Dudhia, J. Klemp & P. Sullivan, 2007: Examining two-way grid nesting for large-eddy simulation of the PBL using the WRF model. *Monthly Weather Review*, **135**, 2295-2311.

(37) Hsu, H.-M., M. W. Moncrieff, P. P. Sullivan, W. Tung, M. J. Dixon & J. D. Tuttle, 2007: Spatial spectral structures of warm-season rainfall over North America. *J. Climate*, submitted.

(38) Wilson, D. K., E. L. Andreas, J. W. Weatherly, C. L. Pettit, E. G. Patton, & P. P. Sullivan, 2007: Characterization of uncertainty in outdoor sound propagation predictions. *Journal of the Acoustical Society of America Express Letters*, **121** (5), EL177-EL183.

(39) * Sullivan, P. P., J. C. McWilliams, & W. K. Melville, 2007: Surface gravity wave effects in the oceanic boundary layer: Large-eddy simulation with vortex force and stochastic breakers. *Journal of Fluid Mechanics*, **593**, 405-452.

(40) Jonker, H. J. J., T. Heus, & P. P. Sullivan, 2008: A refined view of vertical transport by cumulus convection. *Geophysical Research Letters*, **35**, L07810.

(41) Lin, M-Y., W. Tsai, C-H. Moeng, P. P. Sullivan & S. E. Belcher, 2008: Direct numerical simulation of wind-wave generation processes. *Journal of Fluid Mechanics*, **616**, 1-30.

(42) Sullivan, P. P., J. B. Edson, T. Hristov, & J. C. McWilliams, 2008: Large eddy simulations and observations of atmospheric marine boundary layers above non-equilibrium surface waves. *Journal of the Atmospheric Sciences*, **65**, 1225-1245.

(43) Kukulka, T., A. J. Plueddemann, J. H. Trowbridge, & P. P. Sullivan, 2009: Significance of Langmuir circulation in upper ocean mixing: Comparison of observations and simulations. *Geophysical Research Letters*, **36**, L10603.

(44) Kelly, M., J. C. Wyngaard & P. P. Sullivan, 2009: Application of a subfilter scale flux model over the ocean using OHATS field data. *Journal of the Atmospheric Sciences*, **66**, 3217-3225.

(45) Chen, Q., M.J. Otte, P.P. Sullivan, & C. Tong, 2009: A *posteriori* subgrid-scale model tests based on the conditional means of subgrid-scale stress and its production rate. *Journal of Fluid Mechanics*, **626**, 149-181.

(46) Hanley, K. E., S. E. Belcher & P. P. Sullivan, 2010: A global climatology of wind-wave interaction. *Journal of Physical Oceanography*, **40**, 1263-1282.

(47) Nilsson, E., A. Rutgersson, & P. P. Sullivan, 2010: Flux attenuation due to sensor displacement over sea. *Journal of Atmospheric and Oceanic Technology*,**27**, 856-868.

(48) Moeng, C.-H. Moeng, P. P. Sullivan, M. F. Khairoutdinov, & D. A. Randall, 2010: A mixed scheme for subgrid-scale fluxes in cloud-resolving models. *Journal of the Atmospheric Sciences*, **67**, 3692-3705.

(49) * Sullivan, P. P. and J. C. McWilliams, 2010: Dynamics of winds and currents coupled to surface waves. *Annual Review of Fluid Mechanics*, **42**, 19-42, [invited].

(50) Lenschow, D. H., M. Lothon, S. D. Mayor, P. P. Sullivan, & G. Canut, 2011: A comparison of higher-order vertical velocity moments in the convective boundary layer from lidar with in situ measurements and LES. *Boundary-Layer Meteorology*, accepted.

(51) Liang, J., J. C. McWilliams, P. P . Sullivan & B. Baschek, 2011: Modeling bubbles and dissolved gases in the ocean. *Journal of Geophysical Research – Oceans*. **116**, C03015.

(52) Suzuki, N., T. Hara, & P. P. Sullivan, 2011: Turbulent airflow at young sea states with frequent wave breaking events: Large eddy simulation. *Journal of the Atmospheric Sciences*, accepted.

(53) Patton, E. T. Horst, P. Sullivan, D. Lenschow, S. Oncley, W. Brown, S. Burns, A. Guenther, A. Held, T. Karl, S. Mayor, L. Rizzo, S. Spuler, J. Sun, A. Turnipseed, E. Allwine, S. Edburg, B. Lamb, R. Avissar, R. Calhoun, J. Kleissl, W. Massman, K. Paw-U, & J. Weil, 2011: The canopy horizontal array turbulence study (CHATS). *Bulletin of the American Meteorological Society*, accepted.

(54) Hanley, K. E., S. E. Belcher & P. P. Sullivan, 2011: Response to "Comments on a global climatology of wind-wave interaction". *Journal of Physical Oceanography*, accepted.

(55) Kukulka, T., A. J. Plueddemann, J. H. Trowbridge, & P. P. Sullivan, 2010: The influence of crosswind tidal currents on Langmuir circulation in a shallow ocean. *Journal of Geophysical Research –Oceans*, accepted.

(56) Lenschow, D.H., M. Lothon, S. D. Mayor, P. P. Sullivan & G. Canut, 2011: A comparison of higher-order vertical velocity moments in the convective boundary layer from lidar with in situ measurements and LES. Boundary Layer Meteorology, accepted.

(57) Sullivan, P. P. & E. G. Patton, 2011: The effect of mesh resolution on convective boundary layer statistics and structures generated by large-eddy simulation. *Journal of the Atmospheric Sciences*, accepted.

* indicates an exemplary publication

Refereed Book Chapters

(58) McWilliams, J.C., C-H. Moeng, and P. P. Sullivan, 1999: Turbulent fluxes and coherent structures in marine boundary layers: Investigations by large-eddy simulation. In: *Air-Sea Exchange: Physics, Chemistry, Dynamics, and Statistics*, G. Geernaert, ed., Kluwer Publishers.

(59) Sullivan, P. P., J. C. McWilliams, and C-H. Moeng, 1999: Direct numerical simulations of turbulent flow over moving sinusoidal boundaries. *International symposium on turbulence and shear flow phenomena.* Santa Barbara, CA.

(60) Stevens, B., C-H. Moeng, and P.P. Sullivan, 2000: Entrainment and subgrid lengthscales in large-eddy simulations of atmospheric boundary layer flows. In *IUTAM Symposium on Developments in Geophysical Turbulence.* R. Kerr and Y. Kimura Editors, Kluwer, Dordrecht.

(61) Patton, E.G., M.C. Barth, K.J. Davis, and P.P. Sullivan, 2000: The interactions of turbulence and photochemistry in the planetary boundary layer. *International Symposium on the Measurement of Toxics and Related Pollutants*, Air and Waste Management Association, September 12-14, Research Triangle Park, NC.

(62) McWilliams, J.C. and P.P. Sullivan, 2001: Surface-wave effects on marine boundary layers. In: *Fluid Mechanics and the Environment: Dynamical Approaches*, J. Lumley, ed., Springer-Verlag, 412 pp.

(63) Moeng, C-H. and P.P. Sullivan, 2002: Large Eddy Simulation. In: *Encyclopedia of Atmospheric Sciences*, 1140-1150, Academic Press, 3000 pp.

(64) Moeng, C-H., B. Stevens, and P.P. Sullivan, 2004: Large-eddy simulation of cloud-topped mixed layers. In *Atmospheric Turbulence and Mesoscale Meteorology*, Eds. E. Federovich, R. Rotunno, & B. Stevens, 95-113, Cambridge University Press, 280 pp.

(65) Mininni, P., A. Pouquet, & P. Sullivan, 2009: Two examples from geophysical and astrophysical turbulence on modeling disparate scale interactions. *Handbook of Numerical Analysis: Special Volume: Computational Methods for the Ocean and the Atmosphere*, Editors, R. Temam & J. Tribbia, Elsevier, 339-381.

3. Submitted/In Preparation

(66) Sullivan, P. P., J. C. McWilliams & W. K. Melville, 2011: Catalyzing Craik-Leibovich instabilities by breaking waves. *J. Fluid Mechanics*, to be submitted.

(67) Sullivan, P. P., L. Romero, W. K. Melville & J. C. McWilliams, 2011: Langmuir turbulence forced by hurricane winds and waves. *J. Fluid Mechanics*, to be submitted.

4. Internal Refereed Publications

(1) Patton, E. G., P. P. Sullivan, and C-H. Moeng, 2004: Influence of idealized heterogeneity on planetary boundary layers coupled to the land surface, Technical Report TN-462+STR, National Center for Atmospheric Research, 71 pp.

(2) Kelley, N., M. Shirazi, M. Buhl, D. Jager, S. Wilde, J. Adams, J. Bianchi, P. Sullivan, and E. Patton, 2003: Lamar Low-Level Jet Project Interim Report, Department of Energy-National Renewable Energy Laboratory Report: NREL/TP-500-34593, 248p.

(3) P. P. Sullivan and S. Yaghmaee, 1990: Viscous Panel Analysis System User's Guide (A598 UNICOS version), Document D6-55174, Boeing Commericial Airplanes, Seattle, WA.

5. Non-Refereed Publications

Recent meeting manuscripts can be found at: http://www.mmm.ucar.edu/people/sullivan/

(1) Sadeh, W.Z., and P.P. Sullivan, 1980: Turbulence amplification in flow about an airfoil. ASME Paper 80-GT-11, 25th Annual International Gas Turbine Conference, New Orleans, Louisiana, 10-13 March.

(2) McLean, J.D., D.N. George-Falvey, and P.P. Sullivan, 1987: Flight test of turbulent skin-friction reduction by riblets. International Conference on Turbulent Drag Reduction by Passive Means, 15-17 September , Royal Aeronautical Society, London.

(3) Pradip, P.G., P.P. Sullivan, E. Bermingham, and A.L. Nagel, 1989: Stability of 3D Wing Boundary Layer on a SST Configuration. AIAA-89-0036, 27th Aerospace Sciences Meeting, Reno, Nevada.

(4) Sullivan, P.P., and C-H. Moeng, 1992: An evaluation of the dynamic subgrid scale model in buoyancy driven flows, *Tenth Symposium on Turbulence and Diffusion*, AMS Conference, Portland, Oregon.

(5) Lin, C-L., C-H. Moeng, and P.P. Sullivan, and J.C. McWilliams, 1995: Coherent structures and dynamics in shear-driven planetary boundary layer flows. *10th Symposium on Turbulent Shear Flows*, University Park, PA., pp 27-19 through 27-24.

(6) Sullivan, P.P., C-H. Moeng, and J.C. McWilliams, 1995: Grid nesting in large-eddy simulation of planetary boundary-layer turbulence. *10th Symposium on Turbulent Shear Flows*, University Park, PA., pp 27-13 to 27-18.

(7) Lin, C-L., C-H. Moeng, J.C. McWilliams and P.P. Sullivan, 1995: Coherent structures and dynamics in shear-driven planetary boundary layer flows. *11th Symposium on Boundary Layers and Turbulence*, Charlotte, N.C., Amer. Meteor. Soc., 287-290.

(8) Sullivan, P.P., C-H. Moeng, and J.C. McWilliams, 1995: Large-eddy simulation of surface layer flows in the atmospheric and oceanic planetary boundary layers using grid nesting.

11th Symposium on Boundary Layers and Turbulence, Charlotte, N.C., Amer. Meteor. Soc., 357-360.

(9) Moeng, C-H., P.P. Sullivan, and B. Stevens, 1997: An entrainment-rate formula for buoyancy-driven cloud-topped PBL. *12th Symposium on Boundary Layers and Turbulence*, Vancouver, Amer. Meteor. Soc., 208-209.

(10) Lin, C-L., C-H. Moeng, P.P. Sullivan, and J.C. McWilliams, 1997: The study of coherent structures in neutrally stratified planetary boundary layer flows of various surface roughness. *12th Symposium on Boundary Layers and Turbulence*, Vancouver, Amer. Meteor. Soc., 184-185.

(11) Weil, J.C., P.P. Sullivan, and C-H. Moeng, 1997: Lagrangian modeling of dispersion in the convective boundary layer using les velocity fields. *12th Symposium on Boundary Layers and Turbulence*, Vancouver, Amer. Meteor. Soc., 108-109.

(12) Sullivan, P.P., J.C. McWilliams, and C-H. Moeng, 1997: Structure of the atmospheric wave induced boundary layer. Preprints, *12th Symposium on Boundary Layers and Turbulence*, Vancouver, Amer. Meteor. Soc., 304-305.

(13) C-H. Moeng, and P.P. Sullivan, 1999: The role of cloud-top radiative cooling in stratocumulus-topped PBL. *13th Symposium on Boundary Layers and Turbulence*, Dallas, TX, Amer. Meteor. Soc., 441-444.

(14) Saiki, E.M., C-H. Moeng, and P.P. Sullivan, 1999: Large eddy simulation of the stably stratified planetary boundary layer. *13th Symposium on Boundary Layers and Turbulence*, Dallas, TX, Amer. Meteor. Soc., 211-214.

(15) Sullivan, P.P., J.C. McWilliams, & C-H. Moeng, 1999: Turbulent shear flow over moving sinusoidal boundaries. *13th Symposium on Boundary Layers and Turbulence*, Dallas, TX, Amer. Meteor. Soc., 241-244.

(16) Weil, J.C., P.P. Sullivan, and C-H. Moeng, 2000: Lagrangian modeling of dispersion in the convective boundary layer over a range of stability. *11th Joint Conference on the Applications of Air Pollution Meteorology with the AWMA*, Amer. Meteor. Soc., Boston, 30–34.

(17) Muschinski, A., P.P. Sullivan, and V.I. Tatarskii, 2000: Using Large-Eddy Simulation (LES) to quantify the systematic difference between wind-profiler Doppler velocity and radial wind velocity, *5th Int. Symp. on Tropospheric Profiling*, Adelaide, Australia.

(18) Weil, J.C., P.P. Sullivan, and C-H. Moeng, 2000: Lagrangian modeling of mean and fluctuating concentrations from sources in the convective boundary layer. *14th Symposium on Boundary Layer and Turbulence*, Aspen, CO.

(19) Patton, E.G., P.P. Sullivan, and K.J. Davis, 2000: On the influence of a forest canopy on top-down and bottom-up diffusion in the planetary boundary layer. *14th Symposium on Boundary Layer and Turbulence*, Aspen, CO., 545-548.

(20) Sullivan, P.P., and J.C. McWilliams, 2000: Simulations of stratified turbulent flow over moving waves. *14th Symposium on Boundary Layer and Turbulence*, Aspen, CO., 503-506.

(21) Sullivan, P.P., E.G. Patton, and C-H. Moeng, 2000: Large-eddy simulation of a coupled pbl/land surface system. *14th Symposium on Boundary Layer and Turbulence*, Aspen, CO., 202-205.

(22) Weng, W., P.A. Taylor, and P.P. Sullivan, 2001: On turbulent and mean flow Reynolds stresses above water waves. *European Geophysical Society*, Nice, France, 25-30 March.

(23) Weil, J.C., P.P. Sullivan, and C-H. Moeng, 2001: Lagrangian Modeling of Dispersion in Convective Boundary Layers with Varying Degrees of Wind Shear. *3rd International Symposium on Environmental Hydraulics*, Tempe, AZ.

(24) Patton, E.G., P.P. Sullivan, and C-H. Moeng, 2002: The influence of large-scale soil moisture heterogeneity on wetting and drying planetary boundary layers. *15th Symposium on Boundary Layer and Turbulence*, U. Wageningen, The Netherlands, 676–679.

(25) Horst, T.W., J. Kleissl, D.H. Lenschow, C. Meneveau, C-H. Moeng, M.B. Parlange, P.P. Sullivan, and J.C. Weil, 2002: Field measurements of spatially-filtered turbulence in the atmospheric surface layer. *Preprints 15th Symposium on Boundary Layers and Turbulence*, U. Wageningen, The Netherlands, 436–439.

(26) Sullivan, P.P, T.W. Horst, D.H. Lenschow, C-H. Moeng, and J.C. Weil, 2002: Analysis of subfilter-scale fluxes in the atmospheric surface layer. *15th Symposium on Boundary Layer and Turbulence*, U. Wageningen, The Netherlands, 440–443.

(27) Rutgersson, A., and P.P. Sullivan, 2003: Investigating the effects of water waves on the turbulence structure in the atmosphere using direct numerical simulations. *European Geophysical Society*, Nice, France, March.

(28) Melville, W.K., P.P. Sullivan, and J.C. McWilliams, 2003: Oceanic Boundary Layers Driven by Wave Breaking: DNS. *American Physical Society*, Division of Fluid Dynamics 56th Annual Meeting, East Rutherford, NJ.

(29) Symons, N., D. Aldridge, D. Marlin, D. Wislin, V. Ostashev, and P. Sullivan, 2003: 3D staggered-grid finite-difference simulation of acoustic waves in turbulent moving media. *American Geophysical Union*, San Francisco, CA.

(30) Wilson, D.K., N.P. Symons, E.G. Patton, P.P. Sullivan, D.H. Marlin, D.F. Aldridge, V.E. Ostashev, S.A. Ketcham, and E.L. Andreas, 2004: High-fidelity, dynamic simulation of sound

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(63) Suzuki, N., T. Hara, & P. P. Sullivan, 2010: Turbulent airflow at young sea states with frequent wave breaking events: Large eddy simulation. *17th Conference on Air Sea Interaction*, Annapolis, MD.

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(66) Sullivan, P.P., E. G. Patton & K. W. Ayotte, 2010: Turbulent flow over and around sinusoidal bumps, hills, gaps and craters derived from large eddy simulations. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(67) Mironov, D. V. & P. P. Sullivan, 2010: Effect of horizontal surface temperature heterogeneity on turbulence mixing in the stably stratified atmospheric boundary layer. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(68) Jonker, H. J. J., P. P. Sullivan, E. G. Patton & M. van Reeuwijk, 2010: Direct numerical simulation of entrainment in dry convective boundary layers. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

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(70) Weil, J. C., E. G. Patton & P. P. Sullivan, 2010: Line-source diffusion in a walnut orchard canopy during CHATS. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

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(73) Kang, S-L., D. Lenschow, P. Sullivan & P. Mininni, 2010: Significance of mesoscale surface heterogeneity in wind speed forecasting. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(74) Ayotte, K., P. P. Sullivan & E. G. Patton, 2010: LES and wind tunnel modelling over hills of varying steepness and roughness. *5th International symposium on computational wind engineering*, Chapel Hill, NC.

(75) Lothon, M., D. H. Lenschow, G. Canut, S. D. Mayor & P. P. Sullivan, 2010: Measurements of higher-order turbulence statistics in the daytime convective boundary layer from a ground-based Doppler lidar. *International Symposium for the Advancement of Boundary Layer Remote Sensing*, Paris.

(76) Sullivan, P. P., J. C. McWilliams, W. K. Melville, 2010: Ocean boundary layers driven by high winds and wave effects. *Ocean Sciences Meeting*, Portland, OR.

(77) Liang, J., J. C. McWilliams, P. P . Sullivan, 2010: Modeling the gas bubbles in the oceanic boundary layer. *Ocean Sciences Meeting*, Portland, OR.

(78) Kukulka, T., A. J. Plueddemann, J. J. Trowbridge, P. P. Sullivan, 2010: The role of Langmuir turbulence during a rapid mixed-layer deepening event. *Ocean Sciences Meeting*, Portland, OR.

(79) Suzuki, N., T. Hara, & P. P. Sullivan, 2010: Turbulent airflow at young sea states with frequent wave breaking events: Large eddy simulation. *Ocean Sciences Meeting*, Portland, OR.

(80) Saini, M. S., J. W. Naughton, E. G. Patton & P. P. Sullivan, 2010: Compact representation of LES Simulations of the atmospheric boundary layer using POD, ASME Wind Conference, Orlando, FL.

SELECTED PRESENTATIONS (from a list of more than 70)

1. *High Reynolds number large-eddy simulation: Where real and virtual turbulence meet?*, Models versus physical laws/first principles, or why models work?, Wolfgang Pauli Institute, Vienna, AU, 2-4 February 2011, [invited].

2. *Large eddy simulations of high wind marine boundary layers above a spectrum of resolved moving waves*, ONR planning meeting meeting, March 23-24, 2011, Scripps Institute of Oceanography, La Jolla, CA.

3. *Marine boundary layers: Do surface waves matter?*, Sigma Xi Meeting, March 1, 2011. NCAR [invited].

4. *High resolution simulations and observations of atmospheric boundary layers*, Germany Weather Service, January 31, 2011, Offenbach, am Main, Germany.

5. *The evolution of Langmuir circulations in wind-wave disequilibrium and inhomogenous flow*, ONR planning meeting, Ocean response under high winds and the role of Langmuir circulations in ocean mixing, September 15-16, 2010. Scripps Institute of Oceanography, [invited].

6. *Linking Fluxes Across Scales: Kansas to Kettleman City*, John C. Wyngaard Symposium, Pennsylvania State University, June 24-25, 2010.

7. *Large surface wave events and marine boundary layers*, Office of Naval Research PI meeting on High Resolution Air Sea Interaction, Monterey California, 11–12 December, 2008.

8. *High resolution simulations and observations of planetary boundary layers*, Faculty of Multi-Scale Physics, Technical University of Delft, The Netherlands, 9 December, 2008. [invited]

9. *Boundary-Layer Processes*, Mesoscale & Microscale Meteorology Divisional Retreat, Lafayette, CO, September, 2008. [invited].

10. *Subgrid-Scale Motions in Rough Wall Boundary Layers*, Geophysical Turbulence Program Theme of the Year 2008 "Summer School: Geophysical Turbulence", NCAR, Boulder, CO, July 2008. [invited]

11. *Atmospheric Boundary Layers.*, International Summer School Les Houches, France, 17-27 June, 2008. [invited lecturer]

12. *A Highly Parallel Algorithm for Turbulence Simulations in Planetary Boundary Layers: Results with Meshes up to* 1024^3. 18th Conference On Boundary Layer and Turbulence, American Meteorological Society, Stockholm, Sweden, June, 2008.

13. *Using HATS Databases to Evaluate Subfilter-Scale Rate Equations for LES*, Geophysical Turbulence Program Theme of the Year 2008, "Observing the Turbulent Atmosphere: Sampling Strategies, Technology and Applications", NCAR, Boulder, CO, May 2008. [invited].

14. *High Resolution Simulations of Ocean Boundary Layers with Stochastic Wave Breaking*, Geophysical Turbulence Program Theme of the Year 2008, "Workshop on Petascale Computing: Its Impact on Geophysical Modeling and Simulation", NCAR, Boulder, CO, May 2008. [invited].

15. *On the role of surface waves in marine boundary layers: Explorations via large-eddy simulations*, College of Marine and Earth Studies, University of Delaware, April 18th, 2008, [invited].

16. *High resolution simulations and observations of PBLs with complex surface layers*, Department of Meteorology, Pennsylvania State University, April 17th, 2008, [invited].

17. *NCAR Capabilities and Interests in Wind-Energy Research*, Presentation to Vestas, University of Colorado, March 11, 2008, [invited].

18. *Recent large-eddy simulations and observations of planetary boundary layers*, Department of Mathematics Colloquium, University of Wyoming, Feb., 6th, 2008, [invited].

19. *Catalyzing Craik-Leibovich instabilities by breaking waves*, 5th International Symposium on Environmental Hydraulics, Tempe, AZ, December, 2007. [invited].

20. *Subfilter scale motions in atmospheric surface layers: What do LES models need?*, Stable Atmospheric Boundary Layer Workshop, Sedona, AZ, 2006. [invited]

21. *From Microscale to Mesoscale.*, Summer school Lecce, Italy, 26-30 September, 2005. [invited lecturer]

22. *High wind LES of ocean mixed layers*, Community Climate System Modeling Workshop, NCAR, December 13th, 2005. [invited].

23. *Wave-driven marine boundary layers*, Purdue University, April 18, 2005. [invited]

24. *Surface gravity waves and coupled marine boundary layers*, Center for Environmental and Applied Fluid Mechanics, Johns Hopkins University, April 8, 2005. [invited]

25. *Surface waves and ocean mixing: Insights from numerical simulations.* 14th 'Aha Huliko'a Hawaiian Winter Workshop on Rogue Waves. Sponsored by Office of Naval Research. Honolulu, Hawaii, Jan 24-28, 2005. [invited]

26. *Interrogation and parameterization of atmospheric and oceanic boundary layers.* National Academy of Sciences, Workshop on Challenges in Representing Physical Processes in Coupled Atmosphere-Ocean-Land Models. July 12-13, 2004, Woods Hole, MA. [invited]

27. *Current research topics in large-eddy simulation: Applications and measurements.* AHPCRC workshop on mesoscale and microscale meteorological modeling for military applications. Jackson State University, 25-26 May, 2004. [invited]

28. *Large eddy simulation: Methods and applications.* ARL PI meeting on acoustic wave propagation in the atmosphere. August 19-20, 2003, Cold Regions Research and Engineering Laboratory, Hanover, NH. [invited]

29. *Subfilter scale fluxes near a rough boundary at high Reynolds number.* NCAR Geophysical Turbulence Program workshop, "New Developments in Subfilter Scale Closures," August 7-9, 2002. [invited]

30. *Subfilter scale fluxes in the surface layer: Implications for stable LES.* GEWEX Atmospheric Boundary Layer Study (GABLS) workshop at ECMWF, 25-27 March 2002. [invited]

31. *The use of turbulence simulation to study planetary boundary layer dynamics.* Arizona State University, Ecosystems Engineering Colloquium March 22, 2000. [invited]

32. *Large-eddy simulation of planetary boundary layer flows with grid nesting.* IWEF workshop on *Computational Wind Engineering/Computational Fluid Dynamics for Prediction of Wind Effects on Structures*, Colorado State University, Fort Collins, CO, 1996. [invited]

Biography

Peter P. Sullivan

Peter Sullivan is a Scientist IV in the Mesoscale and Microscale Division of NCAR and an affiliate faculty in the Civil Engineering Department at Colorado State University. Peter received his Bachelor's and Ph.D Degrees in Civil Engineering from Colorado State University and a Master's Degree in Mechanical Engineering from University of British Columbia (Vancouver, CA). Prior to coming to NCAR, Peter worked for six years as a Senior Specialist Engineer in Aerodynamics Research at the Boeing Company.

Peter's research interests are: simulations and measurements of turbulence in geophysical settings, subgrid-scale modeling, air-sea interaction, effects of surface gravity (water) waves on marine boundary layers, impacts of stratification, turbulent flow over hills, and numerical methods. He uses large-eddy and direct numerical simulations to investigate turbulent processes in both the atmospheric boundary layer and the ocean mixed layer. These turbulence simulation codes run on large parallel supercomputers. Peter has participated in and planned field campaigns, Horizontal Array Turbulence Study , Ocean Horizontal Array Turbulence Study, Canopy Horizontal Array Turbulence Study, and Advective Horizontal Array Turbulence Study focused on the measurement of subgrid scale variables in the atmosphere. He was a lecturer at two recent European summer schools focused on Atmospheric Boundary Layers.

His current interests include developing a large-eddy simulation model of high wind marine boundary layers with a resolved spectrum of time dependent surface waves and incorporating wave effects in hurricane driven ocean mixed layers.