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

2010-2017	Boundary Layer & Turbulence Section Head Mesoscale & Microscale Meteorology Laboratory (MMM) National Center for Atmospheric Research (NCAR)
2009-present	Senior Scientist, NCAR
2013-present	Director Geophysical Turbulence Program, 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

2019	Organzing Committee, Geophysical Turbulence Program, NCAR *"Workshop to Explore Science Opportunities and Concepts for a Large-Scale Aersol-Cloud-Turbulence Research Facility*
2017-2021	PhD thesis committee, Nyla Husain Department of Oceanography, University of Rhode Island
2017	Panel member, National Academy Workshop *"The Future of Boundary Layer Observing"*

2016	Organzing Committee, Geophysical Turbulence Program, NCAR *"Turbulence and the Climate System"* *A symposium on the occasion of James C. McWilliams' 70th birthday*
2016	Scientific Organzing Committee, Geophysical Turbulence Program, NCAR *"Turbulence and Waves in Flows Dominated by Rotation:* *Lessons from Geophysics and Perspectives in Space Physics and Astrophysics"*
2015	Chair, Geophysical Turbulence Program Workshop, NCAR *"Fundamental Aspects of Geophysical Turbulence II"*
2015	PhD thesis committee, Marc Buckley Physical Ocean Science & Engineering, University of Delaware
2011-2015	PhD thesis committee, Sean Haney Applied Mathematics CIRES, University of Colorado
2014	Organizer, Geophysical Turbulence Workshop, Nagoya, Japan *"Fundamental Aspects of Geophysical Turbulence"*
2013-present	Editorial Board, *Journal of Turbulence*
2012	Lecturer, *Bridging the Gap Between Atmospheric Scales*, Graduate Course, U. of Wageningen, The Netherlands
2011-2013	PhD thesis committee, Adrean Webb Applied Mathematics CIRES, University of Colorado
2010-2011	Technical Evaluation Team for the purchase of the NCAR-Wyoming petascale machine *Yellowstone*
2009-2012	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"*
2008-2011	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
2008-2012	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
2007-2012	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
2007-2013	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
2002-2015	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
1994-1998	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

2019	Mesoscale & Microscale Meteorology Outstanding Scientific Publication Award
2012	Mesoscale & Microscale Meteorology Incentive Award
2010	Mesoscale & Microscale Meteorology 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

Meneavu, C. R. Burns, T. Haine, A. Szalay, T. Zaki, P. Sullivan, E. Patton, & P. K. Yeung: *Frameworks: Advanced Cyberinfrastructure for Sustainable Community Usage of Big Data from Numerical Fluid Dynamics Simulations*, NSF, 2021-2026, collaboration with Johns Hopkins University, Amount to NCAR $780K.

McWilliams, J. C. & P. P. Sullivan (NCAR PI): *Interaction of the lower atmosphere and upper*

ocean, NOAA, Period: 7/2/18 - 7/1/23, Amount to NCAR: $308K.

Fernando, H. & P. P. Sullivan (NCAR PI): *Air-sea coupling in monsoon intraseasonal oscillations*, Office of Naval Research, Physical Oceanography, Period: 3/1/17 - 2/28/22, Amount to NCAR: $409K.

McWilliams, J. C. & P. P. Sullivan (NCAR PI): *Modeling coherent Lagrangian pathways from the surface ocean to interior*, Office of Naval Research, Physical Oceanography, Period: 7/2/18 - 7/1/23, Amount to NCAR: $327K.

McWilliams, J. C. & P. P. Sullivan (NCAR PI): *Dynamics of upper-ocean submesoscale and Langmuir turbulence*, Office of Naval Research, Physical Oceanography, Period: 6/1/14 - 12/31/17, Amount to NCAR: $300K.

Large, W., P. P. Sullivan, G. Danabasoglu, E. G. Patton & M. Long: *Southern Ocean uptake in the MPAS ocean model*, Department of Energy Office of Science Climate and Environmental Sciences Division, Period: 6/1/14 - 6/1/17, Amount to NCAR: $1.18M.

Sullivan, P.P. (PI), M. Banner, R. Morison and W. Peirson: *Turbulence simulation of laboratory wind-wave interaction in high winds and upscaling to ocean conditions*, Office of Naval Research, Physical Oceanography, Period: 1/1/13 - 5/31/16, Amount: $250K.

Patton, E.G., B. Kosovic, P. P. Sullivan, J. Dudhia, L. Mahrt (private consultant), M. Zagar (Vestas Technology), & L. Gulstad (Vestas Technology): *Impacts of stratification and non-equilibrium winds and waves on hub-height winds*, Department of Energy, Period: 1/1/13 - 5/31/15, Amount: $700K.

Weil, J. C. (PI), E. G. Patton, and P. P. Sullivan: *Collaborative research: Effects of stability, canopies, and non-stationarity on dispersion in the stable boundary layer*, Army Research Office, Period: 6/1/09 - 5/31/12, Amount: $250K.

Sullivan, P. P. (PI), and J. C. McWilliams (Co-PI): *Turbulent flow and large surface wave events in the marine boundary layers*, ONR Ocean Modeling and Prediction, Period: 10/1/08 - 9/30/12, Amount: $400K.

Sullivan, P. P. (PI), and J. C. McWilliams (Co-PI): *High wind upper ocean mixing with explicit surface wave processes*, ONR Ocean Modeling and Prediction, Period: 10/1/08 - 9/30/12, Amount: $261K.

Hara, T. (PI), P. P. Sullivan, and S. E. Belcher (Co-PIs): *Large eddy simulation of turbulent wind over realistic seas with frequent wave breaking events*, ONR Ocean Modeling and Prediction, Period: 10/1/07 - 9/30/08, Amount: $165K. collaborative research no financial support to NCAR.

Sullivan, P. P. (PI), and J. C. McWilliams (Co-PI): *Impacts of ocean waves on the atmospheric surface layer: Simulations and observations*, ONR Ocean Modeling and Prediction, Period: 1/1/06 - 1/1/08, Amount: $84K.

Sullivan, P. P. (PI): *Large eddy simulations of surface winds above water waves: Effects of wind-wave alignment and wave age*, ONR Ship Hydrodynamics, Period: 10/1/06 - 9/30/11, Amount: $60K.

Sullivan, P. P. (PI), and E. G. Patton (Co-PI): *Turbulent flow over a canopy covered hill generated by large-eddy simulation*, Windlabsystems, AU, Period: 3/1/05 - 2/28/06, Amount: $30K.

Weil, J. C., E. G. Patton (PIs) and P. P. Sullivan (Co-PI): *Collaborative Research: Lagrangian Modeling of Dispersion in the Stable Boundary Layer and Canopy Environments*, Army Research Office, Period 1/1/05 - 1/1/08, Amount: $131K.

Sullivan, P. P. (PI), J. C. Wyngaard and J. B. Edson (Co-PIs): *Subfilter scale fluxes in the marine surface layer*, ONR Ocean Modeling and Prediction, Period: 9/1/04 - 9/1/06, Amount: $150K.

Sullivan, P. P. (PI) & E. G. Patton: *High resolution modeling of acoustic wave propagation in atmospheric environments generated by large-eddy simulation*, Army Research Laboratory, Period: 9/1/03 - 9/1/04, Amount: $70K.

Edson, J. B., J. C. Wyngaard (PIs) and P. P. Sullivan (Co-PI): *Collaborative research: Ocean horizontal array turbulence study: An investigation of subfilter-scale fluxes in the marine surface layer*, NSF Physical Oceanography, Period: 1/1/04 - 1/1/06, collaborative research no financial support to NCAR.

Wyngaard, J. C. (PI), C-H. Moeng and P. P. Sullivan (Co-Is): *Improvement of Fine-mesh Numerical Meteorological Modeling*, NSF Atmospheric Science, Period: 1/1/04 - 1/1/06, collaborative research no financial support to NCAR.

Patton, E. G. (PI), P. P. Sullivan (Co-PI): *Numerical simulation of sub-canopy drainage flows and their influence on above canopy measurements*, DOE National Institute for Global Environmental Change, Period: 2/1/04 - 6/30/04, Amount: $20K.

Sullivan, P. P. (PI), J.C. McWilliams and C-H. Moeng (Co-PIs): *Surface Gravity Waves and Coupled Marine Boundary Layers*, ONR Ocean Modeling and Prediction, Period: 1/1/00 - 1/1/06, Amount: $478K.

Patton, E. G. (PI), P. P. Sullivan and D. H. Lenschow (Co-PIs): *Simulation of Kelvin-Helmholtz Instability for Obtaining Inflow Conditions for Wind Turbine Design*, DOE National Renewable Energy Laboratory, Period: 7/1/00 - 8/1/00, Amount: $30K.

Sullivan, P. P. (PI), E. G. Patton and C-H. Moeng (Co-PIs): *Heat and Moisture Transport in a Coupled Land-Atmosphere System*, NASA Land Surface Hydrology, Period: 7/1/99 - 7/1/02, Amount: $330K.

McWilliams, J.C. (PI), P. P. Sullivan and C-H. Moeng (Co-PIs): *Intermittency and coherent structures near the air-sea interface in the planetary boundary layers*, Office of Naval Research, Period: 9/1/92 - 9/1/98, Amount: $275K.

Sullivan, P. P. (PI), E. G. Patton, C-H. Moeng, and R. Rotunno (Co-PIs): *Investigation of high wind ocean mixed layers using stochastic large-eddy simulations*, NCAR Opportunity Fund, Period: 10/1/05 - 9/30/07, Amount: $105K.

PUBLICATIONS

Recent manuscripts and meeting papers can be found at: http://www2.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) 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.

(38) * 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.

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

(40) 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.

(41) 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.

(42) 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.

(43) 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.

(44) 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.

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

(46) 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.

(47) 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.

(48) * 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].

(49) 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.

(50) 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*, **68**, 1290-1305.

(51) 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*, **92**, 593-611.

(52) 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*, **41**, 1814-1817.

(53) 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*, **116**, C08005.

(54) 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*, **68**, 2395-2415.

(55) Lenschow, D.H., M. Lothon, S. D. Mayor, P. P. Sullivan & G. Canut, 2012: A comparison of higher-order vertical velocity moments in the convective boundary layer from lidar with in situ measurements and LES. Boundary Layer Meteorology, **143**, 107-123.

(56) Van Roekel, L. P., B. Fox-Kemper, P. P. Sullivan, P. E. Hamlington, & S. R. Haney, 2012: The form and orientation of Langmuir cells for misaligned winds and waves. *Journal of Geophysical Research*, **117**, C05001.

(57) Kang, S.-L., D. H. Lenschow & P. P. Sullivan, 2012: Effects of mesoscale surface thermal heterogeneity on low-level horizontal wind speeds. *Boundary-Layer Meteorology*, **143**, 409-432.

(58) Liang, J-H., J. C. McWilliams, P. P. Sullivan & B. Baschek, 2012: Large eddy simulation of the bubbly ocean: New insights on subsurface bubble distribution and bubble-mediated gas transfer. *Journal of Geophysical Research - Oceans*, **117**, C04002.

(59) Nilsson, E., A. Rutgersson, A. Smedman & P. P. Sullivan, 2012: Convective boundary layer structure in the presence of wind-following swell. *Quarterly Journal of the Royal Meteorological Society*, **138**, 1476-1489.

(60) Belcher, S. E., A. A. L. M. Grant, K. E. Hanley, B. Fox-Kemper, L. Van Roekel, P. P. Sullivan, W. G. Large, A. Brown, A. Hines, D. Calvert, A. Rutgersson, H. Pettersson, J.-R. Bidlot, P. A. E. M. Janssen & J. A. Polton, 2012: A global perspective on Langmuir turbulence in the ocean surface boundary layer. *Geophysical Research Letters*, **39**, L18605.

(61) Weil, J. C., P. P. Sullivan, E. G. Patton, & C-H. Moeng, 2012: Statistical variability of dispersion in the convective boundary layer: Ensembles of simulations and observations. *Boundary-Layer Meteorology*, **145**, 185-210.

(62) Sullivan, P. P., L. Romero, J. C. McWilliams & W. K. Melville, 2012: Transient evolution of Langmuir turbulence in ocean boundary layers driven by hurricane winds and waves. *Journal of Physical Oceanography*, **42**, 1959-1980.

(63) McWilliams, J. C., E. Huckle, J.-H. Liang & P. P. Sullivan, 2012: The wavy Ekman layer: Langmuir circulations, breakers, and Reynolds stress. *Journal of Physical Oceanography*, **42**, 1793-1816.

(64) Kukulka, T., A. J. Plueddemann, J. H. Trowbridge, & P.P. Sullivan, 2012: Nonlocal transport due to Langmuir circulation in a coastal ocean. *Journal of Geophysical Research - Oceans*, **117**, C12007.

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(46) Sullivan, P. P., J. B. Edson, T. W. Horst, J. C. Wyngaard, & M. Kelly, 2006: Subfilter scale fluxes in the marine surface layer: Results from the Ocean Horizontal Array Turbulence Study (OHATS). *17th Conference on Boundary Layer and Turbulence*, San Diego, CA.

(47) Patton, E., P. Sullivan, K. Ayotte, & J. Finnigan, 2006: Turbulent flow over isolated ridges: Influence of vegetation. *17th Conference on Boundary Layer and Turbulence*, San Diego, CA.

(48) Weil, J. C., E. G. Patton, & P. P. Sullivan, 2006: Lagrangian particle modeling of dispersion in the stable boundary layer. *17th Conference on Boundary Layer and Turbulence*, San Diego, CA.

(49) Wilson, D. K. E. L. Andreas, C. L. Pettit, E. Patton, P. P. Sullivan, & J. W. Weatherly, 2006: On the predictability of sound propagation from vertical profile observations. *Long-Range Sound Propagation Symposium*, New Orleans, LA.

(50) Sullivan, P. P., J. C. McWilliams, W. K. Melville, 2007: Catalyzing Craik-Leibovich instabilities by breaking waves. *5th International Symposium on Environmental Hydraulics*, Tempe, AZ.

(51) Sullivan, P. P. & E. G. Patton, 2008: 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*, Stockholm, Sweden.

(52) Patton, E. G., J. C. Weil, & P. P. Sullivan, 2008: A coupled canopy-soil model for the simulation of the modification of atmospheric turbulence by tall vegetation. *18th Conference on Boundary Layer and Turbulence*, Stockholm, Sweden.

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(54) Weil, J. C., E. G. Patton, & P. P. Sullivan, 2008: Lagrangian particle modeling of dispersion in planetary boundary layers with and without a plant canopy. *18th Conference on Boundary Layer and Turbulence*, Stockholm, Sweden.

(55) Moeng, C-H., A. Arakawa, J. H. Jung, R. Rotunno, & P. P. Sullivan, 2008: Vorticity dynamics in the PBL using a vector-vorticity LES model. *18th Conference on Boundary Layer and Turbulence*, Stockholm, Sweden.

(56) Patton, E. G., T. Horst, D. Lenschow, P. Sullivan, S. Oncley, 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, H. Holder, R. Calhoun, J. Kleissl, W. J. Massman, K. T. Paw U, & J. C. Weil, 2008: The Canopy Horizontal Array Turbulence Study (CHATS). *18th Conference on Boundary Layer and Turbulence*, Stockholm, Sweden.

(57) Nilsson, E., A. Rutgersson, & P. P. Sullivan, 2008: Flux attenuation due to sensor displacement over sea. *18th Conference on Boundary Layer and Turbulence*, Stockholm, Sweden.

(58) Kukulka, T., A. J. Plueddemann, J. H. Trowbridge, & P. P. Sullivan, 2008: Wave effects on subsurface turbulence: A comparison between observations and large-eddy simulations. *American Geophysical Union*, San Francisco, CA.

(59) Belcher, S. E., A. L. M. Grant, K. E. Hanley, & P. P. Sullivan, 2008: Surface wave processes in air-sea interaction, ECMWF Ocean-Atmosphere Interaction Workshop, Reading, UK, 10 — 12 November.

(60) Saini, M. S., J. W. Naughton, E. G. Patton & P. P. Sullivan, 2010: Reduced Order Estimation of the Atmospheric Boundary Layer Using POD-LSE, *American Physical Society*, Division of Fluid Dynamics 62th Annual Meeting, Minneapolis, MN.

(61) Sullivan, P. P., 2009: Simulations of marine turbulence and surface waves: Potential impacts of petascale technology. *Oceanography in 2025: Proceedings of a Workshop*, Ocean Studies Board, The National Academies Press.

(62) Nguyen, K. X. S. P. Oncley, T. W. Horst, P. P. Sullivan & C. Tong, 2010: Investigation of subgrid-scale turbulence in the atmospheric surface layer using AHATS field data. *American Physical Society, Fluid Dynamics*, Long Beach, CA.

(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.

(64) Liang, J., J. C. McWilliams, P. P . Sullivan, 2010: Modeling gas bubbles in the ocean boundary layer. *17th Conference on Air Sea Interaction*, Annapolis, MD.

(65) Sullivan, P.P., J. C. McWilliams & T. Hristov, 2010: Large eddy simulation of high wind marine boundary layers above a spectrum of resolved moving waves. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(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.

(69) Nilsson, E., A. Rutgersson & P. P. Sullivan, 2010: Similarities between atmospheric boundary layers influenced by free convection and surface waves. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(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.

(71) Patton, E. G., J. C. Weil & P. P. Sullivan, 2010: Impact of a coupled canopy-soil model on canopy-resolving turbulence simulation. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(72) Nguyen, K. X. S. P. Oncley, T. W. Horst, P. P. Sullivan & C. Tong, 2010: Investigation of subgrid-scale turbulence in the atmospheric surface layer using AHATS field data. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO.

(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.

(81) Sullivan, P. P. and E. G. Patton, 2011: Offshore marine boundary-layer winds predicted by a large eddy simulation model with resolved surface waves. *6th Theoretical Fluid Mechanics Conference*, American Institute of Aeronautics and Astronautics, Honolulu, HI.

(82) Belcher, S. E., A. A. L. M. Grant, K. E. Hanley, B. Fox-Kemper, L. Van Roekel, P. P. Sullivan, W. G. Large, A. Brown, A. Hines, D. Calvert, A. Rutgersson, H. Pettersson, J.-R. Bidlot, P. A. E. M. Janssen & J. A. Polton, 2012: A global perspective on mixing in the ocean surface boundary layer. *Ocean Sciences Meeting*, Salt Lake City, UT.

(83) Kukulka, T., A. J. Plueddemann, J. H. Trowbridge, and P. P. Sullivan, 2012: The influence of crosswind tidal currents on Langmuir circulation in a shallow ocean. *Ocean Sciences Meeting*, Salt Lake City, UT.

(84) Suzuki, N., T. Hara & P.P. Sullivan, 2012: Impacts of breaking waves on airflow at high wind conditions. *Ocean Sciences Meeting*, Salt Lake City, UT.

(85) Hamlington, P.E., L. Van Roekel, P.P. Sullivan, & B. Fox-Kemper 2012: Langmuir-submesoscale interactions: Multiscale simulations with the Craik-Leibovich squations. *Ocean Sciences Meeting*, Salt Lake City, UT.

(86) Fox-Kemper, B., P. E. Hamlington, L. Van Roekel & P.P. Sullivan, 2012: Parameterization of submesoscale and Langmuir-scale processes and interactions. *Ocean Sciences Meeting*, Salt Lake City, UT.

(87) Richter, D. & P. Sullivan, 2012: Sea spray dynamics in the marine boundary layer. *Ocean Sciences Meeting*, Salt Lake City, UT.

(88) Liang, J-H., J. C. McWilliams, P. P. Sullivan & B. Baschek, 2012: Subsurface bubble distribution and its implication for boundary layer turbulence and air-sea gas transfer. *Ocean Sciences Meeting*, Salt Lake City, UT.

(89) Sullivan, P. P., L. Romero, W. K. Melville & J. C. McWilliams, 2012: Signatures of Langmuir turbulence in the hurricane OBL. *Ocean Sciences Meeting*, Salt Lake City, UT.

itemJonker, H., M. van Reeuwijk, P. P. Sullivan, E. G. Patton, 2012: Interfacial layers in atmospheric boundary layers. *Turbulence, Heat and Mass Transfer 7*, Sicily.

(90) Weil, J., P. Sullivan, E. Patton & C-H. Moeng, 2012: Statistical variability of dispersion at local and regional scales: LPDM-LES model ensembles and observations. *International Technical Meeting on Air Pollution Modelling and its Application*, NATO/SPS, Utrecht, The Netherlands.

(91) Sullivan, P. P., T. Hristov & E. G. Patton, 2012: Marine atmospheric turbulence coupled to time-varying three-dimensional surface water waves: Results from LES. *20th Symposium on Boundary Layers and Turbulence*, Boston, MA.

(92) Richter, D. & P. P. Sullivan, 2012: Turbulence and momentum flux modification in the presence of sea spray. *18th Conference on Air-Sea Interaction*, Boston, MA.

(93) Nguyen, K. X., S. P. Oncley, T. W. Horst, P. P. Sullivan, & C. Tong, 2012: Measurements of the budget of the subgrid-scale stress in convective atmospheric surface layers. *20th Symposium on Boundary Layers and Turbulence*, Boston, MA.

(94) Nilsson, E., A. Rutgersson, E. Sahlé, A. Smedman & P. P. Sullivan, 2012: Influences of surface gravity waves on atmospheric boundary layer structure and fluxes. *20th Symposium on Boundary Layers and Turbulence*, Boston, MA.

(95) Liang, J-H., J. C. McWilliams, P. P. Sullivan & B. Baschek, 2012: Subsurface bubble distribution and its implication for air-sea gas transfer: A large eddy simulation study. *18th Conference on Air-Sea Interaction*, Boston, MA.

(96) Weil, J., P. Sullivan, E. Patton & C-H. Moeng, 2012: Statistical variability of dispersion at local and regional scales: LPDM-LES model ensembles and observations. *International Technical Meeting on Air Pollution Modelling and its Application*, NATO/SPS, Utrecht, The Netherlands.

(97) Jonker, H., M. van Reeuwijk, P. P. Sullivan, E. G. Patton, 2012: Interfacial layers in atmospheric boundary layers. *Turbulence, Heat and Mass Transfer 7*, Sicily.

(98) Kulkulka, T., A. J. Pludemann, & P. P. Sullivan, 2013: Inhibited upper ocean restratification in non-equilibrium swell conditions. *EUROMECH Colloquium 552, Modelling Atmospheric and Oceanic Flows*, Sept. 24-26, Berlin, Germany.

(99) Sullivan, P.P., 2013: Impacts of surface waves on marine boundary layers: Large eddy simulation results. *Direct and Large Eddy Simulation 9*, Dresden, Germany.

(100) Sullivan, P.P., L. Romero, J.C. McWilliams, & W. K. Melville, 2013: Large eddy simulations of high wind ocean boundary layers and the impact of surface waves. *Gulf Of Mexico Oil Spill and Ecosystem Conference*, Janurary 21-23, New Orleans, LA.

(101) Muschinksi, A. & P. P. Sullivan, 2013: Using large-eddy simulation to investigate intermittency fluxes of clear-air radar reflectivity in the atmospheric boundary layer. *IEEE International Symposium on Antennas and Propagation*, Lake Buena Vista, Florida.

(102) Vijayakumar, G., J. Brasseur, A. Lavely, B. Jayaraman, E. Paterson, & P. P. Sullivan, 2014: Two key discoveries on atmospheric turbulent wind forcing of nonsteady wind turbine loadings, from HPC. *67th Meeting of the Division of Fluid Dynamics, American Physical Society*, San Francisco, CA.

(103) Richter, D. H. & P. P. Sullivan, 2014: Spray mediated sensible heat flux in shear-driven turbulence. *21st Symposium on Boundary Layers and Turbulence*, Leeds, UK.

(104) Weil, J.C., P. P. Sullivan & E. G. Patton, 2014: Surface temperature heterogeneity effects on dispersion in the stable boundary layer. *21st Symposium on Boundary Layers and Turbulence*, Leeds, UK.

(105) Sullivan, P. P., J. C. Weil, E. G. Patton & D. V. Mironov, 2014: Structures, temperature fronts, and intermittent behavior in stable boundary layers. *21st Symposium on Boundary Layers and Turbulence*, Leeds, UK.

(106) Patton, E. G., P. P. Sullivan, B.Kosovic, L. Mahrt, M. Zagar, J. Dudhia & L. Gulstad 2014: Non-equilirbum winds-waves: Impact of wave-propagation direction and wave age. *21st Symposium on Boundary Layers and Turbulence*, Leeds, UK,

(107) Sullivan, P. P., A. De Paolo, Y. Liu, J. C. McWilliams, W. K. Melville, L. Romero, E. J. Terrill, C. L. Vincent & D. K. P. Yue, 2014: Large-eddy simulations of marine boundary layers above a measured spectrum of phase-resolved nonlinear ocean waves. *21st Symposium on Boundary Layers and Turbulence*, Leeds, UK.

(108) Jonker, H. J. J., M. van Reeuwijk, P. P. Sullivan, & B.J.H. van de Wiel, 2014: Universal characteristics in the deepening rate of sheared convective and stable boundary layers. *21st Symposium on Boundary Layers and Turbulence*, Leeds, UK.

(109) Kulkulka, T., A. Pludemann, & P. P. Sullivan, 2014: Inhibited upper ocean restratification in nonequilibrium swell conditions. *2014 Ocean Sciences Meeting*, Honolulu, Hawaii.

(110) Hara, T. & P. P. Sullivan, 2014: Effects of wave induced stress on air-sea momentum flux and atmospheric wave boundary layer turbulence. *2014 Ocean Sciences Meeting*, Honolulu, Hawaii.

(111) Liang, J. H., C. A. Deustch, J. C. McWilliams, B. G. Baschek & P. P. Sullivan, 2014. Parameterizing bubble-mediated air-sea gas exchange and its effect on ocean ventilation. *2014 Ocean Sciences Meeting*, Honolulu, Hawaii.

(112) Martilli, A., R. Rotunno, P. P. Sullivan, E. G. Patton, M. A. LeMone, 2015: On the importance of horizontal turbulent transport in high resolution mesoscale simulations over cities. *9th International Conference on Urban Climate*, Toulouse, France.

(113) Zhang, R., Hara, T. & P. P. Sullivan, 2015: Transient separation-like airflow over wind waves and its impact on air-sea momentum flux. *19th Air-Sea Interaction Conference*, Phoenix, AZ.

(114) Hara, T. & P. P. Sullivan, 2015: Wave boundary layer turbulence over surface waves in a strongly forced condition. *19th Air-Sea Interaction Conference*, Phoenix, AZ.

(115) Kukulka, T., T. J. Rabe, I. Ginnis, T. Hara, B. Reichl, E. D'Asaro, R. Harcourt, & P. P. Sullivan P. P. Sullivan, 2015: Langmuir turbulence under Hurricane Gustav (2008). *7th International Conference on Gas Transfer at Water Surfaces*, Seattle, WA, May 18-21.

(116) Pearse, S. and P. P. Sullivan, 2015: Visualization of marine atmospheric boundary layers above a spectrum of moving waves. *The 15th Extreme Science and Engineering Discovery Environment (XSEDE)*, St. Louis, USA.

(117) Sullivan, P. P., J. C. McWilliams, & L. Romero, 2015: Coupling turbulence, surface waves and submesoscale cold filaments in the upper ocean boundary layer using LES. *International Conference on Model Integration across Disparate Scales in Complex Turbulent Flow Simulation*, Penn State University, 15-17 June.

(118) Pearse, S. and P. P. Sullivan, 2015: Visualization of marine atmospheric boundary layers above a spectrum of moving waves. *The 15th Extreme Science and Engineering Discovery Environment (XSEDE)*, St. Louis, USA.

(119) Richter, D. and P. P. Sullivan, 2015: How far upscale does a dispersed phase influence turbulence? *Fundamental Aspects of Geophysical Turbulence II*, Geophysical Turbulence Program, NCAR, Boulder, CO.

(120) McWilliams, J.C. and P. P. Sullivan, 2015: Oceanic submesoscale dynamics: Dense filament frontogenesis & arrest by boundary layer turbulence. *Fundamental Aspects of Geophysical Turbulence II*, Geophysical Turbulence Program, NCAR, Boulder, CO.

(121) Sullivan, P. P. and J. C. McWilliams, 2016: Cold filament frontogenesis and arrest by ocean boundary layer turbulence. *Ocean Sciences*, New Orleans, 22-26, Feb.

(122) Kimura, Y., P. P. Sullivan & J. R. Herring, 2016: Temperature fronts in stably stratified turbulence. *24th International Congress of Theoretical and Applied Mechanics*, Montreal, 21-26 August.

(123) Berg, J., D. Verest, E. G. Patton & P. P. Sullivan, 2016: Large-eddy simulation of the conditional neutral atmospheric boundary layer and the effect of spatial resolution on loads. *The Science of Making Torque from Wind (TORQUE 2016)*, Munich, Germany, 5-7 October.

(124) Berg, J., P. P. Sullivan & E. G. Patton, 2016: Large eddy simulation of flow in complex terrain: Challenges with a pseudo-spectral model. EUROMECH Colloquim 576: Wind Farms in Complex Terrains, 8-10 June 2016, Stockholm.

(125) Sullivan, P.P., J. C. Weil, E. G. Patton, H. J. J. Jonker & D. V. Mironov 2016: Impacts of surface cooling on turbulence and temperature fronts in the stable atmospheric boundary layer. *22nd Symposium on Boundary Layers and Turbulence* 20-24 June, Salt Lake City, UT.

(126) Weil, J.C., P. P. Sullivan, E. G. Patton & A. A. Wyszogrodzki, 2016: A Lagrangian two-particle model driven by LES for concentration fluctuations in the atmospheric boundary layer. *22nd Symposium on Boundary Layers and Turbulence* 20-24 June, Salt Lake City, UT.

(127) Weil, J.C., E. G. Patton & P. P. Sullivan, 2016: Coupled LES and Lagrangian particle modeling of canopy dispersion over a range of stability During CHATS. *22nd Symposium on Boundary Layers and Turbulence* 20-24 June, Salt Lake City, UT.

(128) Sullivan, P.P., J. C. Weil, E. G. Patton, H. J. J. Jonker & D. V. Mironov 2016: Temperature fronts and vortical structures in turbulent stably stratified atmospheric boundary layers. *VIIIth International Symposium on Stratified Flows*, 29 August - 1 September, San Diego, CA.

(129) Weil, J.C., P. P. Sullivan, E. G. Patton, & A. Wyszogrodski, 2016: Concentration fluctuations and variability at local and regional scales: Use of a Lagrangian two-particle dispersion model

coupled with LES fields. *35th International Technical Meeting on Air Pollution Modelling and its Application*, 3-7 October, Crete.

(130) Berg, J., N. Troldborg, E. G. Patton, & P. P. Sullivan, 2017: Pseudospectral LES of turbine wake in complex terrain. *Wake Conference*, 30 May - 1 June, 2017, Visby, Sweden.

(131) Mironov, D. V. and & P. P. Sullivan, 2018: Turbulence structure and mixing in strongly stable boundary-layer flows over thermally heterogeneous surfaces. *23rd Symposium an Boundary Layers and Turbulence* June 11-15, Oklahoma.

SELECTED PRESENTATIONS

1. Marine boundary layers with submesoscale surface heterogeneity: LES results Atmosphere-ocean coupling at (sub)mesoscales, Lorentz Center, Leiden, Netherlands, 25-29 September, 2023.

2. Large eddy simulations of a wavy upper ocean with submesoscale surface heterogeneity, MMM Seminar, August, 2023.

3. Stable atmospheric boundary layers: Fine mesh LES and observations, New horizons in environmental mechanics, NCAR, Boulder, CO, July 24-July 27, [invited].

4. Marine boundary layers coupled to ocean surface heterogeneity: Secondary circulations in LES process studies St. Anthony Falls Laboratory, U. Minnesota, Minneapolis, MN, 2 May, 2023 [invited].

5. Atmospheric boundary layers coupled to ocean currents, 23rd Conference on Air-Sea Interaction, 103rd AMS Annual Meeting, Denver, CO, Jan. 2023.

6. Impacts of SST gradients on marine boundary layers with across-front and alongfront winds, 24th Symposium on Boundary Layers & Turbulence, 103rd AMS Annual Meeting, Denver, CO, Jan. 2023.

7. Transition-layer physics of the mini warm pool: LES process studies, ONR, March, 2023.

8. Impacts of a heterogeneous ocean surface on atmospheric marine boundary layers. MMM Seminar, NCAR, October, 2022.

9. Large eddy simulation of stable atmospheric boundary layers: Geophysical turbulence for the JHU database Presentation to Mechanical Engineering, Johns Hopkins University, Cyberinfrastructure and the JHU Community Database, August 26, 2022.

10. Atmospheric boundary layers above a heterogeneous ocean, *Ocean Sciences*, virtual meeting, Feb. 24 - March 4, 2022.

11. Potential impacts of atmospheric and oceanic heterogeneity for modeling wind-wave interaction, Workshop on Air-sea interactions and implications for offshore wind energy, Hosted by NREL, invited, Feb 10-11, 2022.

12. Coupling marine atmospheric boundary layer winds to the ocean surface Workshop on DOE's vision for a wind program, Zoom Meeting hosted by RAL, NCAR, October 19-20, Boulder, CO, 2020.

13. Surface wave effects on atmospheric and oceanic boundary layers Fluid Mechanics Seminar, Mechanical Engineering, Stanford University, October 13, 2020, Stanford, CA [invited].

14. Surface density effects on atmospheric and oceanic boundary layers: LES results NOAA ATOMIC review, July 13, Boulder, CO, 2020.

15. Langmuir turbulence and cold filaments: Do they couple? *Ocean Sciences*, San Diego, Feb. 16-21, 2020.

16. Structure and fluxes in the stable boundary layer: LES results Department of Meteorology, Stockholm University, Stockholm, Sweden, May 7, 2019 [invited].

17. The NCAR parallel LES boundary layer code: Description and Applications, Workshop: Development of next generation LES for atmospheric boundary layers. Stockholm University, Stockholm, Sweden May 9, 2019 [invited].

18. Structure and fluxes in the stable boundary layer: LES results German Weather Service, Offenbach am Main, Germany, May 13, 2019 [invited].

19. Interaction of the lower atmosphere and upper ocean: LES process studies Workshop on ATOMIC/EURECA field campaign planning, Paris, France, Jan. 9-13, 2019 [invited].

20. Turbulent marine boundary layers: Winds, waves and simulations, Workshop on high-Reynolds number flow simulations on exascale platforms, Argonne National Laboratory, Sept 16-19, 2018 [invited].

21. Upper ocean mixing driven by Langmuir turbulence and submesoscale density filaments, Workshop on Waves, turbulence, and large-scale structures in rotating magnetic fluids: Above & beyond geophysical fluid dynamics, Geophysical Turbulence Program, NCAR, Sept 10-14, 2018 [invited].

22. Temperature fronts and fluxes in stable boundary layers, Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers, Kavli Institute for Theoretical Physics, Santa Barbara, CA., May 21, 2018 [invited].

23. Process coupling across scales in the marine boundary layers: Recent results from large-eddy simulations, 23rd Symposium on Boundary Layers & Turbulence and 21st Conference on Air-Sea Interaction Oklahoma City, OK., June 2018, [plenary invited talk].

24. Coupling observations and large eddy simulations to advance boundary-layer science, National Academy Workshop on: The future of boundary layer observing, October 2017, Arlie, VA [invited].

25. Turbulent flow and the drag of steep waves, *Wind Waves* sponsored by International Union of Theoretical and Applied Mechanics, Department of Mathematics University College London, Sept 4-8, 2017 [invited].

26. Simulations and observations of scalar fronts in the stable boundary layer, *Workshop on the atmospheric stable boundary layer*, Delft, Netherlands, 27-31 March, 2017.

27. Dense filaments, turbulence, and frontogenesis in the ocean surface boundary layer, *Environmental Fluid Dynamics Seminar*, U. of Notre Dame, November, 2016 [invited].

28. Temperature fronts and vortical structures in turbulent stably stratfied atmospheric boundary layers, *VIIIth International Symposium on Stratified flows*, August, 2016, San Diego, CA.

29. Large eddy simulations of upper ocean Langmuir turbulence and cold filaments: Frontogenesis dynamics, *Turbulence and the Climate System a Symposium on the occasion of Jim McWilliams 70th Birthday*, NCAR, Aug. 2016.

30. Impacts of surface cooling on turbulence and temperature fronts in the stable atmospheric boundary layer, *22nd Symposium on Boundary Layers and Turbulence*, June, 2016, Salt Lake City, Utah.

31. Cold filament frontogenesis and arrest by ocean boundary layer turbulence. *Ocean Sciences*, New Orleans, 22-26, Feb. 2016.

32. *Coupling turbulence, surface waves and submesoscale cold filaments in the upper ocean boundary layer using LES,* International Conference on Model Integration across Disparate Scales in Complex Turbulent Flow Simulation, Penn State University, 15-17 June, 2015, [invited].

33. *Impacts of surface waves on marine boundary layers: Large eddy simulation results.* Direct and large Eddy Simulation 9, April 3-5, 2013, Dresden, Germany [invited].

34. *High Reynolds number large eddy simulations.* Geophysical Turbulence Program Workshop, Large-Eddy Simulations of MHD Turbulence, May 20-23, 2013, NCAR [invited].

35. *A large eddy simulation perspective of terra-incognita: An Introduction to terra-incognita*, Bridging the gap between atmospheric scales, a 1-week course at U. Wageningen, The Netherlands, October 8-12, 2013 [invited].

36. *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].

37. *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.

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

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

40. *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].

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

42. *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.

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

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

45. *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]

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

47. *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.

48. *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].

49. *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].

50. *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].

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

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

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

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

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

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

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

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

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

60. *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]

61. *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]

62. *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]

63. *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]

64. *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]

65. *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]

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

67. *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 Senior Scientist in the Mesoscale and Microscale Laboratory 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 where he worked on shock/boundary-layer interaction, drag reducing riblets, and the design of the 777 transonic airplane.

Peter's research interests are: simulations and measurements of geophysical turbulence, 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.

His current interests include developing a large-eddy simulation model of wind marine boundary layers with a resolved spectrum of time dependent surface waves, incorporating wave effects in hurricane driven ocean mixed layers, computing turbulent flow over breaking waves, simulating stable atmospheric boundary layers using LES, coupling submesoscale density fronts and ocean boundary layer turbulence, and coupling atmospheric-oceanic boundary layers using LES.