Curriculum Vitae

James Michael Wilczak
National Oceanic and Atmospheric Administration
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Education

Postdoctoral, National Research Council Research Fellowship, 1983.
Wave Propagation Laboratory, NOAA
Boulder, Colorado 80305

Ph.D., Atmospheric Sciences, 1982.
University of Washington, Seattle, Washington 98195

M.S., Atmospheric Sciences, 1979.
University of Washington, Seattle, Washington 98195

B.A., Physics, 1976.
Kalamazoo College, Kalamazoo, Michigan

Professional Associations

American Meteorological Society
American Geophysical Union

Committee Memberships/Professional Activities

Member, Energy Committee, American Meteorological Society (2023-present)
Editorial Board Member, Boundary Layer Meteorology (scientific journal) (1992- 2023)
Chair, Committee on Mountain Meteorology, American Meteorological Society, 1998-2000
Member, NASA Inter-Agency Nuclear Safety Review Panel (INSRP), Meteorology Sub-panel, 1995-2000
Chairman, Front Range Chapter of the American Geophysical Union, 1993-1994

Special Honors/Awards

NOAA Bronze Medal Award, 2024
NOAA Silver Medal Award, 2023
NOAA Administrator Award, 2020
NOAA Technology Transfer Award, 2017
Achievement Award, Utility Variable-Generation Integration Group, 2015
Department of Commerce Silver Medal, 1998 (ET7 Division Team Achievement)
Department of Commerce Bronze Medal, 1997
Outstanding Scientific Paper Award, 1996, NOAA/ERL, Department of Commerce
NOAA/Oceanic and Atmospheric Research Employee of the Year, 1994
Distinguished Authorship Award, 1989, NOAA/ERL, Department of Commerce

Research Experience

Dr. Wilczak's main area of research is the turbulent atmospheric boundary layer, and includes observational, modeling, and theoretical approaches. In particular, he has extensive expertise in the application remote sensing instrumentation for boundary layer investigations, including the development of novel techniques for extracting new geophysical information from remote sensing signals. Instrumentation-related research includes the development of techniques for estimating boundary layer depths using radar wind profiler observations, the calculation of turbulence dissipation rates from wind profiler data, and wind profiling radar quality control to identify and remove contamination from intermittent interference sources. Dr. Wilczak has applied these and other techniques in studies of boundary layer mesoscale variability, especially of flows in complex terrain, as well as studies of severe weather including tornadic storms. He also has specific expertise in turbulence pressure measurements, and of theoretical models aiding in their interpretation. His boundary layer studies have also included the development of improved methods for measuring surface heat and momentum fluxes, as well as investigations of air sea-interaction.

A particular application area of Dr. Wilczak's research is advancing our knowledge of boundary layer processes affecting wind and solar energy. Because of the weather dependence of these two energy sources, he has significantly contributed to the development of a renewable energy research program within NOAA. Specific tasks include being the NOAA Technical Manager for the 2012 DOE/NOAA Wind Forecast Improvement Project (WFIP), which assessed the impact of assimilating new atmospheric observations, including large numbers of tall tower and turbine nacelle anemometer measurements provided by wind plant operators, on numerical weather prediction models used for wind energy forecasting. More recently, he led the observational component of the 2016-2017 DOE/NOAA/Vaisala Second Wind Forecast Improvement Project (WFIP2), which deployed networks of wind profiling radars, sodars, lidars, and microwave radiometers to study meteorological processes affecting wind energy generation in the complex terrain region of the Pacific Northwest. He then contributed to the use of these observations to increase the skill of wind speed forecasts through improvement of physical parameterization schemes in the operational NOAA HRRR and RAP forecast models. He has also worked on projects to examine the role of meteorology in national grid design in a high-penetration renewable energy scenario, and on offshore wind.

Dr. Wilczak's research also includes investigations of the impact of meteorology on air quality, analysis of meteorological and air quality data from large field campaigns, evaluation of numerical air quality prediction models, and post-processing of air quality model forecasts. This includes analysis of observations from a network of over 20 wind profiling radars collected during the Central California Ozone Study (CCOS) carried out in 2000. He contributed to both the 2004 New England Air Quality Study and the 2006 Texas Air Quality Study, in which networks of up to a dozen wind profiling radars were deployed in both. He led research to analyze wind profiler radar data in these studies, focusing on mesoscale transport effects on air quality. He planned the wind profiler field deployment for the 2010 CalNex air quality field program, and has collaborated on research combining Bayesian statistics, model simulations, and wind profiler observations to determine sources of methane in California. Recently, he has developed post-processing techniques for surface ozone and fine particulate matter, and transitioned these to NOAA's operational air quality prediction models, significantly improving health-risk forecasts made available to the public.

Journal Publications

Wilczak, J. M., E. Akish, A. Capotondi, G. P. Compo, and A. Hoell, 2024: A Multi-decadal Analysis of U.S. and Canadian Wind and Solar Energy Droughts. Accepted for publication in the Journal of Renewable and Sustainable Energy.

Lee, J. A., J.-H. Kim, S. Meech, R. Kumar, I. V. Djalalova, J. M. Wilczak, 2024: Comparison of CAMS and CMAQ Analyses of Surface-Level PM2.5 and O3 Over CONUS. Submitted to Atmospheric Environment.

Naegele, S, J. M. Wilczak, S. J. Greybush, G. S. Young, M. Gervais, J. A. Lee, 2024: Analyzing Self-Organizing Maps of Modeled U.S. Coastal Wind Regimes with a Comparison to Observations. Submitted to Artificial Intelligence for the Earth Systems.

Adler, B., D. D. Turner, L. Bianco, I. Djalalova, T. A. Myers, J. M. Wilczak, 2024: Improving solution availability and temporal consistency of an optimal estimation physical retrieval for ground-based thermodynamic boundary layer profiling. Submitted to Atmospheric Measurement Technology.

Myers, T. A., A. Van Omer, D. D. Turner, J. M. Wilczak, L. Bianco, B. Adler, 2024: Evaluation of hub-height wind forecasts over the New York Bight, 2024: Wind Energy, 2024; 0:1–11 https://doi.org/10.1002/we.2936

Wilczak, J.M.; Akish, E.; Capotondi, A.; Compo, G.P., 2024: Evaluation and Bias Correction of the ERA5 Reanalysis over the United States for Wind and Solar Energy Applications. Energies **2024**, 17, 1667. https://doi.org/10.3390/en17071667.

Bianco, L., Adler, B., Bariteau, L., Djalalova, I. V., Myers, T., Pezoa, S., Turner, D. D., and Wilczak, J. M., 2024: Sensitivity of thermodynamic profiles retrieved from ground-based microwave and infrared observations to additional input data from active remote sensing instruments and numerical weather prediction models, Atmos. Meas. Tech., 17, 3933–3948, https://doi.org/10.5194/amt-17-3933-2024.

Adler, B., Wilczak, J. M., Kenyon, J., Bianco, L., Djalalova, I. V., Olson, J. B., and Turner, D. D., 2023: Evaluation of a cloudy cold-air pool in the Columbia River basin in different versions of the High-Resolution Rapid Refresh (HRRR) model, Geosci. Model Dev., 16, 597–619, https://doi.org/10.5194/gmd-16-597-2023.

Otárola-Bustos, S.F., H. J. S Fernando, J. M. Wilczak, A. A. Grachev, C. Hocut, R. Dumais, 2023: Subgrid Variability of Atmospheric Surface-Layer Parameters in Complex Terrain. Boundary-Layer Meteorology 187:229–265 https://doi.org/10.1007/s10546-023-00797-y

Djalalova I; Turner DD; Bianco L; Wilczak JM; Duncan J; Adler B; Gottas D., 2022. Improving thermodynamic profile retrievals from microwave radiometers by including radio acoustic sounding system (RASS) observations. Atmospheric Measurement Techniques 15(2). 10.5194/amt-15-521-2022.

Shaw, W.J., L. K. Berg, M. Debnath, G. Deskos, C. Draxl, V. P. Ghate, C. B. Hasager, R. Kotamarthi, J. D. Mirocha, P. Muradyan, W. Pringle, D. D. Turner, and J. M. Wilczak, 2022: Scientific Challenges to Characterizing the Wind Resource in the Marine Atmospheric

Boundary Layer. *Wind Energ. Sci.*, 7, 2307-2334, https://doi.org/10.5194/wes-7-2307-2022.

Duncan Jr. JB; Bianco L; Adler B; Bell T; Djalalova IV; Riihimaki L; Sedlar J; Smith EN; Turner DD; Wagner TJ; Wilczak JM, 2022: Evaluating daytime planetary boundary-layer height estimations resolved by both active and passive remote sensing instruments during the CHEESEHEAD19 field campaign. Atmospheric Measurement Techniques. 10.5194/amt-15-2479-2022.

Pichugina, Y., R. M. Banta; W. A. Brewer; J. Kenyon; J. B. Olson; D. D. Turner; J. M. Wilczak; S. Baidar; J. K. Lundquist; W. Shaw; S. Wharton, 2022: Model evaluation by measurements from co-located remote sensors in complex terrain. Weather and Forecasting, 37 (10), 1829-1853. 10.1175/WAF-D-21-0214.1

Grachev A.A., Fairall C.W., Blomquist B.W., Fernando H.J.S., Leo L.S., Otárola-Bustos S.F., Wilczak J.M., McCaffrey K.L. (2022) A hybrid bulk algorithm to predict turbulent fluxes over dry and wet bare soils. J. Appl. Meteorol. Climatol. 61(4): 393-414. https://doi.org/10.1175/JAMC-D-20-0232.1

Sedlar, J. L. Riihimaki, D. Turner, J. Duncan, B. Adler, L. Bianco, K. Lantz, J. Wilczak, 2022: Investigating the impacts of daytime boundary layer clouds on surface energy fluxes and boundary layer structure during CHEESEHEAD19, 2022: JGR-Atmos. http://dx.doi.org/10.1029/2021JD036060

Adler, B. , J. M. Wilczak, L. Bianco , I. V. Djalalova , J. Duncan Jr. , and D. D. Turner, 2021: Observational Case Study of a Persistent Cold Pool and Gap Flow in the Columbia River Basin. J. Appl. Meteor. Climatology, 60, 1071-1090, https://doi.org/10.1175/JAMC-D-21-0013.1

Bianco, L., P. Muradyan, I. V. Djalalova, J. M. Wilczak, J. B. Olson, J. Kenyon, R. Kotamarthi, K. O. Lantz, C. N. Long, D. D. Turner, 2021: Comparison of observations and predictions of daytime planetary boundary layer heights and surface meteorological variables in the Columbia River Gorge and Basin during the second Wind Forecast Improvement Project (WFIP2). Bound.-Layer Meteor. https://doi.org/10.1007/s10546-021-00645-x.

Draxl, C., R. P. Worsnop, Geng Xia, Y. Pichugina, D. Chand, J. K. Lundquist, J. Sharp, G. Wedam, J. M. Wilczak, L. K. Berg, 2021: Mountain waves impact wind power generation, Wind Energ. Sci., 6, 45–60, https://doi.org/10.5194/wes-6-45-2021

Garratt, J., Wilczak, J., Holtslag, A. *et al.* Commentaries on Top-Cited *Boundary-Layer Meteorology* Articles. *Boundary-Layer Meteorol* 177, 169–188 (2020). https://doi.org/10.1007/s10546-020-00563-4

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Atmosphere Interactions to Surface Heterogeneity in CHEESEHEAD 2020. Bull. Amer. Meteor. Soc., 102, 421-445, https://doi.org/10.1175/BAMS-D-19-0346.1

Pichugina, Y., R. Banta, W. Brewer, L. Bianco, C. Draxl, J. Kenyon, J. Lundquist, J. Olson, D. Turner, S. Wharton, J. Wilczak, S. Baidar, L. Berg, H. J. S. Fernando, B. McCarty, R. Rai, B. Roberts, J. Sharp, W. J. Shaw, M. T. Stoelinga, and R. Worsnop, 2020: Evaluating the WFIP2 updates to the HRRR model using scanning Doppler lidar measurements in the complex terrain of the Columbia River Basin. *J. Renewable Sustainable Energy* (2020); doi: 10.1063/5.0009138

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Grachev, A. A., C. W. Fairall, B. W. Blomquist, H. J. S. Fernando, L. S. Leo, S. F. Otárola-Bustos, J. M. Wilczak, K. L. McCaffrey, 2020: On the surface energy balance closure at different time scales. Agricultural and Forest Meteor., https://doi.org/10.1016/j.agrformet.2019.107823

Bianco, L. I. V. Djalalova, J. M. Wilczak, J. B. Olson, J. S. Kenyon, A. Choukulkar, L. K. Berg, H. J. S. Fernando, E. P. Grimit, R. Krishnamurthy, J. K. Lundquist, P. Muradyan, M. Pekour, Y. Pichugina, M.T. Stoelinga, D. D. Turner, 2019: Impact of model improvements on 80-m wind speeds during the second Wind Forecast Improvement Project (WFIP2). *Geosci. Model Dev.*, 12, 4803-4821, https://doi.org/10.5194/gmd-12-4803-2019

Olson, J.B., J.S. Kenyon, I. Djalalova, L. Bianco, D.D. Turner, Y. Pichugina, A. Choukulkar, M.D. Toy, J.M. Brown, W.M. Angevine, E. Akish, J.-W. Bao, P. Jimenez, B. Kosovic, K.A. Lundquist, C. Draxl, J. K.Lundquist, J. McCaa, K. McCaffrey, K. Lantz, C. Long, J. Wilczak, R. Banta, M. Marquis, S. Redfern, L.K. Berg, W. Shaw, and J. Cline, 2019: *Improving Wind Energy Forecasting through Numerical Weather Prediction Model Development*, Bulletin of the American Meteorological Society, doi:10.1175/BAMS-D-18-0040.1, 2019.

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Shaw, W. J., L. K. Berg, J. Cline, C. Draxl, E. Grimit, J. K. Lundquist, M. Marquis, J. McCaa, J. Olson, C. Sivaraman, J. Sharp, J. M. Wilczak, 2019: The Second Wind Forecast Improvement Project (WFIP 2): General Overview. Bull. Amer. Meteor. Soc., https://doi.org/10.1175/BAMS-D-18-0035.1.

Wilczak, J. M., M. Stoelinga, L. K. Berg, J. Sharp, C. Draxl, K. McCaffrey, R. M. Banta, L. Bianco, I. Djalalova, J. K. Lundquist, P. Muradyan, A. Choukulkar, L. Leo, T. Bonin, R. Eckman, C. N. Long, R. P. Worsnop, J. Bickford, N. Bodini, D. Chand, A. Clifton, J. Cline, D. R. Cook, H. J. S. Fernando, K. Friedrich, R. Krishnamurthy, K. Lantz, M. Marquis, J. McCaa, J. B. Olson, S. Otarola-Bustos, Y. Pichugina, G. Scott, W. J. Shaw, S. Wharton, A. B.White, 2019: The Second Wind Forecast Improvement Project (WFIP2): Observational Field Campaign. Bull. Amer. Meteor. Soc., https://doi.org/10.1175/BAMS-D-18-0035.1.

Akish, E. L. Bianco, I. V. Djalalova, J. M. Wilczak, J. Olson, J. Freedman, C. Finley, and J. Cline, 2019: Measuring the impact of additional instrumentation on the skill of numerical weather prediction models at forecasting wind ramp events during the first Wind Forecast Improvement Project (WFIP). *Wind Energy*, 2019;1-10. https://doi.org/10.1002/we.2347

Wilczak, J. M., J. Olson, I. Djalalova, L. Bianco, L. K. Berg, W. J. Shaw, R. Coulter, R. M. Eckman, J. Freedman, C. Finley, J. Cline, 2019: Data Assimilation Impact of Tall Towers, Wind Turbine Nacelle Anemometers, Sodars and Wind Profiling Radars on Wind Velocity and Power Forecasts during the First Wind Forecast Improvement Project (WFIP). *Wind Energy*. 2019;1–13. https://doi.org/10.1002/we.2332

Banta, R.M.; Y. L. Pichugina; A. Brewer; E. James; J. Olson; S. Benjamin; J. R. Carley; L. Bianco; I. Djalalova; J. M. Wilczak; M. C. Marquis; J. Cline, 2018: Evaluating and Improving NWP Forecast Models for the Future: How the Needs of Offshore Wind Energy Can Point the Way. *Bull. Amer. Meteor. Soc.*, vol. 99, 1155-1176, doi:10.1175/BAMS-D-16-0310.1

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McCaffrey, K., L. Bianco, and J. M. Wilczak, 2017: Improved observations of turbulence dissipation rates from wind profiling radars. *Atmos. Meas. Tech.,* **10**, 2595-2611, doi:10.5194/amt-10-2595-2017.

Huang, J., J. McQueen, J. Wilczak, I. Djalalova, I. Stajner, P. Shafran, D. Allured, P. Lee, L. Pan, D. Tong, H.-C. Huang, G. DiMego, S. Upadhayay, L. Delle Monache, 2017: Improving NOAA NAQFC $PM_{2.5}$ predictions with a bias correction approach. Weather and Forecasting, 32, pg. 407-421, DOI: http://dx.doi.org/10.1175/WAF-D-16-0118.1

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