

Curriculum Vitae

James Michael Wilczak
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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
Dissertation: A Study of the Convective Atmospheric Boundary and Surface Layers
Advisor: Prof. Joost Businger

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

Editorial Board Member, Boundary Layer Meteorology (scientific journal) (1992- present)
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 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

Employment

2014-present: Supervisory Meteorologist
Earth Systems Research Laboratory, Physical Sciences Division

Boulder, Colorado

2006-2014: Team Lead, Boundary Layer Processes and Applications Group
Earth Systems Research Laboratory, Physical Sciences Division
Boulder, Colorado

2001-2006: Team Lead, Model Assessment Team
Environmental Technology Laboratory/NOAA
Boulder, Colorado

1993-2001: Supervisory Research Meteorologist
Environmental Technology Laboratory/NOAA
Boulder, Colorado

1985-1993: Research Meteorologist
Wave Propagation Laboratory/NOAA
Boulder, Colorado

1983-1985: Research Associate
Cooperative Institute for Research in Environmental Sciences (CIRES)
University of Colorado
Boulder, Colorado

1982-1983: National Research Council Postdoctoral Fellow
Wave Propagation Laboratory/NOAA
Boulder, Colorado

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 lead the observational component of the 2016 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

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>

Duncan, J.B., L. Bianco, B. Adler, T. Bell, I. Djalalova, L. Riihimaki, J. Sedlar, E. N. Smith, D. D. turner, T. J. Wagner, and J.M. Wilczak, 2021: Evaluating daytime planetary boundary-layer height estimation resolved by both active and passive remote sensing instruments during the CHEESEHEAD19 field campaign. Submitted.

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>

- Butterworth, B. J., R. Desai, S. Metzger, P. A. Townsend, M. D. Schwartz, G. W. Petty, M. Mauder, H. Vogelmann, C. G. Andresen, T. J. Augustine, T. H. Bertram, W.O. J. Brown, M. Buban, P. Cleary, D. J. Durden, C. R. Florian, E. Ruiz Guzman, T. J. Iglinski, E. L. Kruger, K. Lantz, T. R. Lee, T. P. Meyers, J. K. Mineau, E. R. Olson, S. P. Oncley, S. Paleri, R. A. Pertzborn, C. Pettersen, D. M. Plummer, L. Riihimaki, J. Sedlar, E. N. Smith, J. Speidel, P. C. Stoy, M. Sührling, J. E. Thom, D. D. Turner, M. P. Vermeuel, T. J. Wagner, Z. Wang, L. Wanner, L. D. White, J. M. Wilczak, D. B. Wright, T. Zheng, 2020: Connecting Land-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. Accepted by *Journal of Renewable and Sustainable Energy*.
- Delle Monache, L., S. Alessandrini, I. Djalalova, J. Wilczak, J. C. Knievel, 2020: Improving Air Quality Predictions over the United States with an Analog Ensemble. Accepted by *Weather and Forecasting*.
- 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 Meteorol.*, <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. Gritmit, 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.
- McCaffrey, K., J.M. Wilczak, L. Bianco, E. Gritmit, J. Sharp, R. Banta, K. Friedrich, H.J.S. Fernando, R. Krishnamurthy, L. Leo, and P. Muradyan, 2019: *Identification and Characterization of Cold Pool Events in the Columbia River Basin during WFIP2*. *Journal of Applied Meteorology and Climatology*, doi:10.1175/JAMC-D-19-0046.1, 2019.
- Shaw, W. J., L. K. Berg, J. Cline, C. Draxl, E. Gritmit, 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>
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- Pichugina, Y. L., R.M. Banta, J.B. Olson, J.R. Carley, M.C. Marquis, W.A. Brewer, J.M. Wilczak, I.V. Djalalova, L. Bianco, E.P. James, S.G. Benjamin, and J. Cline, 2017: Assessment of NWP forecast models in simulating offshore winds through the lower boundary layer by measurements from a ship-based scanning Doppler lidar. *Monthly Weather Review*, 145 (10), 4277-4301, doi: [10.1175/MWR-D-16-0442.1](https://doi.org/10.1175/MWR-D-16-0442.1)
- Bianco, L., K. Friedrich, J. Wilczak, D. Hazen, D. Wolfe, R. Delgado, S. Oncley, and J. K. Lundquist: 2017: Assessing the accuracy of microwave radiometers and radio acoustic sounding systems for wind energy applications, *Atmos. Meas. Tech.* **10**, 1707-1721, doi:[10.5194/amt-10-1707-2017](https://doi.org/10.5194/amt-10-1707-2017).
- 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](https://doi.org/10.5194/amt-10-2595-2017).
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- McCaffrey, K., P. T. Quelet, A. Choukulkar, J. M. Wilczak, D. E. Wolfe, S. P. Oncley, W. A. Brewer, M. Debnath, R. Ashton, G. V. Iungo, and J. K. Lundquist, 2017: Identification of tower-wake distortions using sonic anemometer and lidar measurements. *Atmos. Meas. Tech.*, 10, 393-407, doi:10.5194/amt-10-393-2017. <http://www.atmos-meas-tech.net/10/1215/2017/>

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- Choukulkar, A. , W. A. Brewer, S. P. Sandberg, A. Weickmann, T. A. Bonin, R. M. Hardesty, J. K. Lundquist, R. Delgado, G. V. Iungo, R. Ashton 6 , M. Debnath, L. Bianco, J. M. Wilczak, S. Oncley, D. Wolfe, 2017: Evaluation of Single- and Multiple-Doppler Lidar Techniques to Measure Complex Flow during the XPIA Field Campaign. *Atmos. Meas. Tech.*, 10, 247-264, doi:10.5194/amt-10-247-2017, <http://www.atmos-meas-tech.net/10/247/2017/>
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- McCaffrey, K., L. Bianco, P. Johnston, and J. M. Wilczak, 2017: A comparison of vertical velocity variance measurements from wind profiling radars and sonic anemometers. *Atmos. Meas. Tech.*, 10, 999-1015, doi:10.5194/amt-10-999-2017, <http://www.atmos-meas-tech.net/10/999/2017/>
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- Djalalova I.V., J. Olson, J. Carley, L. Bianco, J.M. Wilczak, Y. Pichugina, R. Banta, M. Marquis, and J. Cline, 2016: The POWER experiment: Impact of Assimilation of a Network of Coastal Wind Profiling Radars on Simulating Offshore Winds in and Above the Wind Turbine Layer. *Weather and Forecasting*, 31, 1071-1091. doi: 10.1175/WAF-D-15-0104.1
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