Jeffrey D. Duda

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Employment history

- Research Scientist, Cooperative Institute for Research in Environmental Sciences; University of Colorado Level 1: 2018-2022 Level 2: 2022-present
- Post-doctoral research fellow, University of Oklahoma School of Meteorology 2016-2017
- Graduate research assistant, University of Oklahoma School of Meteorology and Center for Analysis and Prediction of storms 2011-2016
- Graduate research assistant, Iowa State University 2009-2011

Education

- PhD, meteorology – University of Oklahoma **2016**
  Dissertation title: *Optimal Design of a Convection-Allowing Ensemble from a Model Error Perspective*
- M.S., meteorology – Iowa State University **2011**
  Thesis title: *WRF Simulations of Mesoscale Convective Systems at Convection-Allowing Resolutions*
- B.S., meteorology and mathematics – Iowa State University, graduated *Summa Cum Laude* **2009**
  Thesis: *A Climatology of Severe Weather Reports as a Function of Storm Morphology*

Experience and Activities

- Associate Editor for *Monthly Weather Review* (2022-present)
- Performed more than 20 reviews of submitted manuscripts to atmospheric science journals such as *Monthly Weather Review* and *Weather and Forecasting*
- Reviewed NOAA Hollings Scholarship applications in 2020-2022 as well as Norlin Scholarship applications for the University of Colorado in 2020-2022
- NSF reviewer, 2023
- Participant in NOAA Hazardous Weather Testbed spring forecast experiment and Flash-Flood and Intense Rainfall experiment annually since 2018
- Advanced data assimilation topics including convective-scale radar DA and EnKF
- WRF model – running at convection-allowing grid spacings and finer for 10+ years; deep understanding of the structure and theory of multiple microphysics and land-surface parameterization schemes; modifying model code to output additional microphysics process rates and energy-flux partitions; ensemble perturbation methods
- Forecast verification – traditional/legacy (e.g., RMSE, POD, CSI/ETS, HSS), neighborhood methods (e.g., FSS), and object-based techniques (MODE)
- 10+ years of experience working in a UNIX programming environment, including shell scripting (bash, ksh, csh etc.)
- Experience with signal processing of base-band Doppler radar data; wrote a storm-tracking algorithm in MATLAB; wrote two guides for understanding radar meteorology, one for non-meteorologists, one for meteorologists.

Proficiencies

- Scientific programming languages such as FORTRAN, MATLAB, and Python (e.g., NumPy), and plotting software such as Matplotlib, Basemap, GrADS, and NCL
- Severe convective storms analysis and forecasting – have chased storms for more than 10 years, including with the Tactical Weather-Instrumented Sampling in/near Tornadoes Experiment (TWISTEX)
- Ensemble NWP and predictability; probabilistic forecasting
- High-performance computing on large supercomputers; managing large data sets and complex workflows

Significant peer-reviewed publications

h-index from Google Scholar: 7

Lead author

- Duda, J. D., and D. D. Turner, 2023: Using object-based verification to assess improvements in forecasts of convective storms between operational HRRR versions 3 and 4. *Wea. Forecasting*, in press., https://doi.org/10.1175/WAF-D-22-0181.1.
- ——, and——, 2021: Large-scale application of radar reflectivity object-based verification to evaluate HRRR warm-season forecasts. *Wea. Forecasting*, **36**, 805–821, https://doi.org/10.1175/WAF-D-20-0203.1.
- ——, X. Wang, Y. Wang, and J. Carley, 2019: Comparing the Assimilation of Radar Reflectivity Using the Direct GSI based Ensemble-Variational (EnVar) and Indirect Cloud Analysis Methods in Convection-Allowing Forecasts over the Continental US. *Mon. Wea. Rev.*, **147**, https://doi.org/10.1175/MWR-D-18-0171.1.
- ——, ——, and M. Xue, 2017: Sensitivity of convection-allowing forecasts to land-surface model perturbations and implications for ensemble design. *Mon. Wea. Rev.*, **145**, 2001–2025, https://doi.org/10.1175/MWR-D-16-0349.1.
- ——, ——, F. Kong, M. Xue, and J. Berner, 2016: Impact of a stochastic kinetic energy backscatter scheme on warm season convection-allowing ensemble forecasts. *Mon. Wea. Rev.*, **144**, 1887–1908, http://dx.doi.org/10.1175/MWR-D-15-0092.1.
- ——, ——, ——, and ——, 2014: Using varied microphysics to account for uncertainty in warm-season qpf in a convection-allowing ensemble. *Mon. Wea. Rev.*, **142**, 2198–2219, http://dx.doi.org/10.1175/MWR-D-13-00297.1.
- —— and W. A. Gallus, 2013: The impact of large-scale forcing on skill of simulated convective initiation and upscale evolution with convection-allowing grid spacings in the WRF. *Wea. Forecasting*, **28**, 994–1018, http://dx.doi.org/10.1175/WAF-D-13-00005.1.
- —— and ——, 2010: Spring and summer Midwestern severe weather reports in supercells compared to other morphologies. *Wea. Forecasting*, **25**, 190–206, http://dx.doi.org/10.1175/2009WAF2222338.1.

Other publications

- Contributing author to *The Geoscience Handbook, 5th Ed.*, American Geosciences Institute. Contributed material includes introductory radar meteorology material. Contribution made in 2015.

Conference presentations/posters

- Duda. J. D., and D. D. Turner, 2023: Sensitivity of object-based verification results to configuration options using MODE. 32nd Conf. on Weather Analysis and Forecasting/28th Conf. on Numerical Weather Prediction/20th Conf. on Mesoscale Processes, Madison, WI, Amer. Meteor. Soc., 16.3, https://ams.confex.com/ams/WAFNWPMS/meetingapp.cgi/Paper/424519.
- Duda. J. D., and T. Ladwig, 2022: Application of Direct Reflectivity Data Assimilation to HRRR-like Forecasts to Guide Future Configurations of the Rapid Refresh Forecast System. 26th Conf. on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Houston, TX [virtual], Amer. Meteor. Soc., J14.3, https://ams.confex.com/ams/102ANNUAL/meetingapp.cgi/Paper/391525.
- ——, 2021: Investigating Extreme Surface Winds in the 10 August 2020 Midwest Derecho Using Cloud-Resolving WRF Forecasts. Student and Early Career Severe Local Storms Conference, [virtual], Amer. Meteor. Society, 5 November 2021. [Also presented at the 31st Conf. on Weather Analysis and Forecasting/27th Conf. on Numerical Weather Prediction, Houston, TX, 1A.1, https://ams.confex.com/ams/102ANNUAL/meetingapp.cgi/Paper/391498].
- ——, and C. Alexander, 2020: Object-Based Climatology and Verification of HRRR Forecasts. 30th Conf. on Weather Analysis and Forecasting/26th Conf. on Numerical Weather Prediction, Boston, MA, Amer. Meteor. Soc., 1B.5, https://ams.confex.com/ams/2020Annual/meetingapp.cgi/Paper/367250.
- ——, D. Dowell, C. Alexander, X. Wang, and Y. Wang, 2018: The Future of the HRRR: Data Assimilation Advances for Version 4. 29th Conf. on Severe Local Storms, Stowe, VT, Amer. Meteor. Soc., Poster 69.
- ——, X. Wang, and J. R. Carley, 2017: Using the NAMRR Cloud Analysis in a Cycled Radar Data Assimilation Forecast of the 26 December 2015 Texas Tornado Event. 28th Conf. on Weather Analysis and Forecasting/24th Conf. on Numerical Weather Prediction, Seattle, WA, Amer. Meteor. Soc., 621.
- ——, ——, and M. Xue, 2017: Sensitivity of Convection-Allowing Forecasts to Land-Surface Model Perturbations and Implications for Ensemble Design. 28th Conf. on Weather Analysis and Forecasting/24th Conf. on Numerical Weather Prediction, Seattle, WA, Amer. Meteor. Soc., 9A.4.
- —— and ——, 2015: Addressing land-surface model uncertainty in convective-scale ensemble forecasts. 4th Int. Symp. on Earth-Science Challenges, Norman, OK, Advanced Radar Research Center, 31. [Also presented at the National Weather Association's 40th annual meeting as poster AP-70.]
- ——, ——, F. Kong, M. Xue, and J. Berner, 2014: Impact of a stochastic kinetic energy backscatter scheme on warm-season convection-allowing ensemble forecasts. 27th Conf. on Severe Local Storms, Madison, WI, Amer. Meteor. Soc., 5.4. [Available online at https://ams.confex.com/ams/27SLS/webprogram/Paper255474.html.]
- ——, ——, ——, and ——, 2013: Using varied microphysics to account for uncertainty in warm-season QPF in a convection-allowing ensemble. 3rd Int. Symp. on Earth-Science Challenges, Uji, Kyoto, Japan, Kyoto University, O32.
- ——, ——, ——, and ——, 2012: Toward improving representation of model microphysics errors in a convection-allowing ensemble: Evaluation and diagnosis of mixed-microphysics and perturbed microphysics parameter ensembles in the 2011 HWT spring experiment. 2012 Warn-on-Forecast and High Impact Weather Workshop, Norman, OK, National Severe Storms Laboratory. [Available online at https://www.nssl.noaa.gov/projects/wof/documents/workshop2012/Session%205/Duda_WoF_HIWW.pptx.]
- —— and W. A. Gallus, 2011: Comparison of convective initiation and evolution in 3 km WRF simulations with and without the Kain-Fritsch scheme. Extended abstract, 24th Conf. on Wea. Forecasting/20th Conf. on Num. Wea. Prediction, Seattle, WA, Amer. Meteor. Soc., 13B.1. [Available online at https://ams.confex.com/ams/91Annual/webprogram/Paper182082.html.]
- —— and ——, 2009: A climatology of storm reports as a function of convective morphology in the central U.S. 13th Annual Severe Storms and Doppler Radar Conf., Des Moines, IA, Natl. Wea. Assoc. [Also presented at the 3rd annual Undergraduate Research Symposium at Iowa State University in 2009 and the 16th annual Iowa State University Atmospheric Science Undergraduate Research Symposium in 2008.]

Awards and honors

- NOAA Administrator's Award for completion of the HRRR weather model project that improves forecasts and warnings for high-impact weather events, 2021
- Boulder Outreach Coordination Committee Gold Star Award for representing NOAA in the CU Denver Career Fair, 2021
- Third place for best student oral presentation, 27th Conference on Severe Local Storms, 2014
- Phi Beta Kappa – Zeta chapter of Iowa, inducted in 2009
- Ethan and Allen Murphy Endowed Memorial Undergraduate Scholarship from the American Meteorological Society, 2009
- Runner-up Senior Thesis Award, Department of Geological and Atmospheric Sciences, Iowa State University, 2008
- UCAR/NCAR Undergraduate Leadership Workshop, attended in 2008

Teaching, mentoring, and service

- American Meteorological Society STAC committee on Probability and Statistics member **2023-present**
- AMS WAF/NWP program committee **2022-2023**
- NOAA/GSL summer internship mentor of an undergraduate student **2022**
- UCAR Significant Opportunities in Atmospheric Research and Science writing mentor **2021, 2022**
- CIRES mentorship program mentor **2019-2020, 2021-2022, 2022-2023**
- Course instructor, *Severe and Hazardous Weather*, University of Oklahoma **2014**
  Taught a non-major sophomore-level science general-education course. Taught course in two halves: first half on fundamentals of meteorology, second half on convective storms. Created most materials, including assignments and exams, from scratch.
- Teaching assistant, *Dynamic Meteorology*, University of Oklahoma **2013**
  Graded quizzes and homework assignments. Also guest lectured and wrote a quiz and two MATLAB assignments.
- Guest lecturer, *Introduction to Meteorology*, Iowa State University **2011**
  Led a lecture on precipitation measurement using rain gauges and radar.
- Tutor, Iowa State University **2006-2007**
  Tutored small groups of students in calculus and differential equations.

Professional memberships

- American Association for the Advancement of Science **Since 2021**
- American Meteorological Society **Since 2006**
- National Weather Association **2007-2016**
- American Geophysical Union **2008-2016**