

## Nicholas D. Lybarger, Ph.D.

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### Research Experience

**Project Scientist I, National Center for Atmospheric Research** 06/20/2021 – Present  
Boulder, CO

Duties:

- Develop systematic methodology for CMIP6 climate model performance evaluation in the western US.
- Assess various precipitation downscaling methods' fidelity over the US using CMIP5 climate models.
- Perform dynamical downscaling using WRF on historical and future climate scenarios using the CESM2 Large Ensemble.

**Postdoctoral Fellow II, National Center for Atmospheric Research** 12/01/2020 – 06/20/2021  
Boulder, CO

Duties:

- Develop analytical tools for systematic verification of 40-year, 4-km CONUS reanalysis (CONUS404) for the USGS.
- Perform and analyze sensitivity experiments to test the viability of using real-time vegetation product with WRF-Hydro.

**Postdoctoral Fellow I, National Center for Atmospheric Research** 10/21/2019 – 12/01/2020  
Boulder, CO

Duties: Investigated scalability and track errors in case study of Unified Forecast System – Short Range Weather application.

Accomplishments: Part of team given the UCAR Outstanding Scientific and/or Technical Achievement Award.

**Graduate Research Assistant, George Mason University** 09/01/2014 – 08/24/2019  
Fairfax, VA

Duties: Performed data acquisition, analysis, and interpretation in pursuit of Ph.D. dissertation.

Accomplishments: Three published papers based on this work.

### Education

**Ph.D. in Climate Dynamics, George Mason University** August 2019

Thesis Title: The Effect of the Madden-Julian Oscillation on the Energetics and Prediction of El Niño-Southern Oscillation

Thesis Advisor: Dr. Cristiana Stan

**B.S. in Physics, Earth and Planetary Sciences, Johns Hopkins University** May 2013

### Refereed Publications

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- Lybarger, N.D.**, A. Smith, A.J. Newman, E.D. Gutmann, A.W. Wood, C. Frans, M. Warner, J.R. Arnold, 2023. Improving Methodologies for Earth System Model Selection for Climate Change Impact Applications. *Journal of Geophysical Research: Atmospheres*. Submitted.
- Lybarger, N. D.**, E. Kalina, K. Newman, 2023. Diagnosing Hurricane Barry Track Errors and Evaluating Physics Scalability in the UFS Short-Range Weather Application (SRW). *Advances in Tropical Cyclone Prediction: Observation, Simulation, and Verification [Special Issue]. Atmosphere*. Submitted.
- Rasmussen, R.M., Chen, F., Liu, C.H., Ikeda, K., Prein, A., Kim, J., Schneider, T., Dai, A., Gochis, D., Dugger, A., Zhang, Y., Jaye, A., Dudhia, J., He, C., Harrold, M., Xue, L., Chen, S., Newman, A., Dougherty, E., Abolafia-Rosenzweig, R., **Lybarger, N.D.**, Viger, R., Lesmes, D., Skalak, K., Brakebill, J., Cline, D., Dunne, K., Rasmussen, K., Miguez-Macho, G., 2023. CONUS404: The NCAR-USGS 4-km long-term regional hydroclimate reanalysis over the CONUS. *Bulletin of the American Meteorological Society* 1. <https://doi.org/10.1175/BAMS-D-21-0326.1>.
- Lybarger, N. D.**, C.-S. Shin, and C. Stan, 2020. MJO Wind Energy and Prediction of El Niño. *Journal of Geophysical Research: Oceans*, **125**, e2020JC016732. DOI: 10.1029/2020JC016732.
- Lybarger, N.D.**, and C. Stan, 2019: Revisiting MJO, Kelvin waves, and El Niño relationships using a simple ocean model. *Climate Dynamics*, **53**, 6363–6377, DOI: 10.1007/s00382-019-04936-5.
- Lybarger, N.D.**, and C. Stan, 2018: The effect of the MJO on the energetics of El Niño. *Climate Dynamics*, **51**, 2925–2839, DOI: 10.1007/s00382-017-4047-5.

### Technical Presentations

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- Lybarger, N.D.**, A. Smith, A. Newman, E. Gutmann, A. Wood, C. Frans, and J. Arnold, 2022: *Improving Methods for Selecting and Evaluating Earth System Models for Climate Change Impact Applications over the Pacific Northwest*. AGU Annual Meeting, Chicago, IL, December
- Lybarger, N.D.**, E. Gutmann, T. Eidhammer, J. Hamman, A. Wood, and A. Newman, 2022: *Evaluation of Downscaling Methods for Precipitation over CONUS*. AGU Chapman Conference on Solving Water Availability Challenges through an Interdisciplinary Framework, Golden, CO, September.
- Lybarger, N.D.**, Y. Zhang, A. Dugger, F. Chen, 2022: *Sensitivity of the Weather Research Forecasting Hydrologic Modeling System (WRF-Hydro) to Real-Time Vegetation Forcing*. AMS Annual Meeting, virtual, January.
- Lybarger, N.D.**, E. Kalina, K. Newman, 2021: *Diagnosing Hurricane Track Errors in the UFS Short-Range Weather Application (SRW)*. AMS Annual Meeting, virtual, January.
- Lybarger, N.D.**, E. Kalina, K. Newman, 2020: *Diagnosing Track Bias of Hurricane Barry in the UFS Short-Range Weather Application*. UFS Users' Workshop, Boulder, CO, July.
- Lybarger, N.D.** and C. Stan, 2018: *Revisiting MJO, Kelvin Waves, and El Niño Relationships Using a Simple Ocean Model*. AGU Fall Meeting, Washington, D.C., December.
- Lybarger, N.D.** and C. Stan, 2018: *Quantifying the Effect of the Madden-Julian Oscillation on El Niño*. UMBC/JCET Earth Day Research Symposium, College Park, MD, April.

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### Technical Reports

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Kalina, E., K. Newman, M. Harrold, **N.D. Lybarger**, E. Grell, T. Hertnecky, G. Ketefian, W. Li, B. Nelson, M. Zhang, 2021: *Evaluation of Unified Forecast System (UFS) physics suites using the Common Community Physics Package single-column model and stand-alone regional configuration of the UFS-Atmosphere.*

Kalina, E., K. Newman, E. Grell, M. Harrold, T. Hertnecky, **N.D. Lybarger**, L. Pan, 2020: *Evaluating performance of physics suites available within the Common Community Physics Package (CCPP) across spatial and temporal scales*

### Fellowships

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**Summer Research Fellowship, George Mason University** Summer 2019  
Competitive award for summer graduate research funding

### Service

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**ECSA Early Career Scientist Assembly** February, 2023 - present  
Serving as RAL representative on Steering Committee.

**Climate Dynamics** Fall 2022  
Served as manuscript reviewer.

**Journal of Climate** Fall 2021  
Served as manuscript reviewer.

**NCAR Postdoc Professional Development Committee** January 2021 – June 2022  
Developed and organized virtual professional development events for early career scientists.

**Monthly Weather Review** Spring 2020  
Served as manuscript reviewer.

**George Mason University Earth Systems Modeling Graduate Symposium** Spring 2019  
Organized and hosted symposium featuring graduate students' research from American universities.

### Teaching Experience

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**George Mason University, Department of Atmospheric, Oceanic, and Earth Sciences** Fall 2017  
TA for course "Introduction to Fundamentals of Atmospheric Science Lab"

### Professional References

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Michael Ek, Program Director [ek@ucar.edu](mailto:ek@ucar.edu)  
Research Applications Laboratory (303) 497 – 2870  
National Center for Atmospheric Research  
3450 Mitchell Lane, Boulder, CO 80301

Evan Kalina, Research Scientist [evan.kalina@noaa.gov](mailto:evan.kalina@noaa.gov)  
Global Systems Laboratory (303) 497 – 5399

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