

Paul Aaron Ullrich, Ph.D.

- CONTACT** **University of California, Davis** *Cell:* (530) 400-9817
Department of Land, Air and Water Resources *Fax:* (530) 752-1793
251 Hoagland Hall *E-mail:* paullrich@ucdavis.edu
Davis, CA, USA 95616 *Web:* <http://climate.ucdavis.edu>
- RESEARCH INTERESTS** Regional and global climate, climate change, extreme weather, atmospheric dynamics, atmospheric modeling, high-performance computing, planetary atmospheres, big climate data
- PROFESSIONAL APPOINTMENTS**
- University of California, Davis**, Davis, California, USA
- Associate Professor, Regional and Global Climate Modeling **July 2017 - Present**
- Assistant Professor, Regional and Global Climate Modeling **Sept 2012 - June 2017**
- Lawrence Berkeley National Laboratory**, Berkeley, California, USA **Jan 2013 - Present**
- Faculty Scientist
- University of Michigan**, Ann Arbor, Michigan, USA **May 2011 - Aug 2012**
- Postdoctoral Research Fellow (Atmospheric modeling)
- EDUCATION**
- University of Michigan**, Ann Arbor, Michigan, USA **Sept 2007 - May 2011**
- Ph.D.**, Atmospheric and Space Sciences and Scientific Computing, May 2011
- M.S.**, Atmospheric and Space Sciences, May 2010
- University of Waterloo**, Waterloo, Ontario, Canada **Sept 2000 - Aug 2007**
- M.Math.**, Applied Mathematics (Theoretical cosmology), Aug 2007
- B.Math.**, Double Major Applied Mathematics and Computer Science, Aug 2005
- Graduated with distinction – Deans’ Honours List, co-operative education program
- JOURNALS**
38. **Ullrich, P.A.**, C. Jablonowski, J. Kent, P.H. Lauritzen, R. Nair, K.A. Reed, C.M. Zarzycki, D.M. Hall, D. Dazlich, R. Heikes, C. Konor, D. Randall, T. Dubos, Y. Meurdesoif, X. Chen, L. Harris, C. Kuehnlein, V. Lee, A. Qaddouri, C. Girard, M. Giorgetta, D. Reinert, J. Klemp, S.-H. Park, W. Skamarock, H. Miura, T. Ohno, R. Yoshida, R. Walko, A. Reinicke and K. Viner (2017) “DCMIP2016: A Review of Non-hydrostatic Dynamical Core Design and Intercomparison of Participating Models.” Submitted to Geosci. Model. Dev. Disc. [Under review]
37. Wu, C., X. Liu, Z. Lin, A.M. Rhoades, **P.A. Ullrich**, C.M. Zarzycki, Z. Lu and S.R. Rahimi-Esfarjani (2017) “High-resolution climate simulations in the Rocky Mountain region using the variable-resolution CESM (VR-CESM).” Submitted to J. Geophys. Res. Atmospheres [Under review]
36. Wang, M. and **P.A. Ullrich** (2017) “A Variable-Resolution CESM Case Study of the Comparative Importance of Model Resolution and Microphysics in a Mountainous Region.” Submitted to J. Appl. Meteor. Clim. [Under review]
35. Rhoades, A.M., **P.A. Ullrich**, C.M. Zarzycki, S.A. Margulis, H. Johansen, Z. Xu and W. Collins (2017) “A Variable-Resolution CESM Case Study of the Comparative Importance of Model Resolution and Microphysics in a Mountainous Region.” Submitted to J. Hydrometeor. [Under review]

34. Zarzycki, C.M. and **P.A. Ullrich** (2017) "Assessing sensitivities in algorithmic detection of tropical cyclones in climate data." *Geophys. Res. Lett.*, 44 (2), pp. 1141-1149, doi: 10.1002/2016GL071606.
33. Huang, X. and **P.A. Ullrich** (2017) "The changing character of twenty-first century precipitation over the western United States in the variable-resolution CESM." *J. Clim.*, 30(18), pp. 7555-7575, doi: 10.1175/JCLI-D-16-0673.1.
32. Rhoades, A.M., **P.A. Ullrich** and C.M. Zarzycki (2017) "Projecting 21st Century Snowpack Trends in Western USA Mountains Using Variable-Resolution CESM." *Clim. Dyn.*, pp. 1-28, doi: 10.1007/s00382-017-3606-0.
31. **Ullrich, P.A.** and C.M. Zarzycki (2017) "TempestExtremes: A Framework for Scale-Insensitive Pointwise Feature Tracking on Unstructured Grids." *Geosci. Model. Dev.*, 10, pp. 1069-1090, doi: 10.5194/gmd-10-1069-2017.
30. Lauritzen, P.H., M.A. Taylor, J. Overfelt, **P.A. Ullrich**, R.D. Nair, S. Goldhaber and R. Kelly (2017) "CAM-SE-CSLAM: Consistent coupling of a conservative semi-Lagrangian finite-volume method with spectral-element dynamics." *Mon. Weather Rev.*, doi: 10.1175/MWR-D-16-0258.1. [Early View]
29. Ferguson, J., C. Jablonowski, H. Johansen, P. McCorquodale, **P.A. Ullrich** and P. Colella (2016) "Analyzing the Adaptive Mesh Refinement (AMR) characteristics of a high-order cubed-sphere shallow water model." *Mon. Weather Rev.*, 144(12), pp. 4641-4666, doi: 10.1175/MWR-D-16-0197.1.
28. O'Brien, T.A., K. Kashinath, W. Collins, O. Rübél, S. Byna, J. Gu, H. Krishnan, **P.A. Ullrich** (2016) "Resolution dependence of precipitation statistical fidelity in hindcast simulations." *J. Adv. Earth System Model.*, 8 (2), pp. 976-990, doi: 10.1002/2016MS000671.
27. Huang, X. and **P.A. Ullrich** (2016) "Irrigation impacts on California's climate with the variable-resolution CESM." *J. Adv. Earth System Model.*, 8(3), pp. 1151-1163, doi: 10.1002/2016MS000656.
26. Hotta, D., K. Eugenia and **P.A. Ullrich** (2016) "A semi-implicit modification to Lorenz N-cycle scheme and its application for integration of meteorological equations." *Mon. Weather Rev.*, 144 (6), pp. 2215-2233, doi: 10.1175/MWR-D-15-0330.1.
25. Guerra, J.E. and **P.A. Ullrich** (2016) "A High-order Staggered Finite-Element Vertical Discretization for Non-Hydrostatic Atmospheric Models." *Geosci. Model. Dev.*, 9, pp. 2007-2029, doi:10.5194/gmd-9-2007-2016.
24. Huang, X., A.M. Rhoades, **P.A. Ullrich** and C.M. Zarzycki (2016) "An Evaluation of the Variable Resolution-CESM for Modeling California's Climate." *J. Adv. Earth System Model.*, 8 (1), pp. 345-369, doi: 10.1002/2015MS000559.
23. **Ullrich, P.A.**, D. Devendran and H. Johansen (2016) "Arbitrary-Order Conservative and Consistent Remapping and a Theory of Linear Maps, Part 2." *Mon. Weather Rev.*, 144 (4), pp. 1529-1549, doi: 10.1175/MWR-D-15-0301.1.
22. Rhoades, A.M., X. Huang, **P.A. Ullrich** and C.M. Zarzycki (2016) "Characterizing Sierra Nevada Snowpack Using Variable-Resolution CESM." *J. Appl. Meteor. Clim.* 55 (1), pp. 173-196, doi: 10.1175/JAMC-D-15-0156.1.
21. Hall, D.M., **P.A. Ullrich**, K.A. Reed, C. Jablonowski, R.D. Nair and H.M. Tufo (2016) "DCMIP Tracer Transport Test Results for CAM-SE." *Quart. J. Royal Meteor. Soc.*, 142 (697), pp. 1672-1684, doi: 10.1002/qj.2761.
20. McCorquodale, P., **P.A. Ullrich**, H. Johansen and P. Colella. (2015) "An adaptive multi-block high-order finite-volume method for solving the shallow-water equations on the sphere." *Comm. Appl. Math. Comp. Sci.*, 10-2, pp. 121-162, doi: 10.2140/camcos.2015.10.121.

19. **Ullrich, P.A.**, K.A. Reed and C. Jablonowski (2015) "Analytical initial conditions and an analysis of baroclinic instability waves in f- and beta-plane 3D channel models." *Quart. J. Roy. Meteor. Soc.* 141(693), pp. 2972–2988, doi: 10.1002/qj.2583.
18. **Ullrich, P.A.** and J.E. Guerra (2015) "Exploring the Effects of a High-Order Vertical Coordinate in a Non-Hydrostatic Global Model." *Procedia Comput. Sci.*, 51, pp. 2076–2085, doi: 10.1016/j.procs.2015.05.475.
17. **Ullrich, P.A.** and M.A. Taylor (2015) "Arbitrary-Order Conservative and Consistent Remapping and a Theory of Linear Maps, Part 1." *Mon. Weather Rev.*, 143, 2419-2440, doi: 10.1175/MWR-D-14-00343.1.
16. **Ullrich, P.A.** (2014) "A global finite-element shallow-water model supporting continuous and discontinuous elements." *Geosci. Model Dev.*, 7, 5141-5182, doi: 10.5194/gmd-7-3017-2014.
15. Guba, O., M.A. Taylor, **P.A. Ullrich**, J.R. Overfelt and M.N. Levy (2014) "The spectral element method on variable resolution grids: Evaluating grid sensitivity and resolution-aware numerical viscosity." *Geosci. Model Dev.*, 7, 2803-2816, doi: 10.5194/gmd-7-2803-2014.
14. Zarzycki, C.M., M. Levy, C. Jablonowski, J.R. Overfelt, M.A. Taylor and **P.A. Ullrich** (2013) "Aquaplanet experiments using CAM's variable resolution dynamical core." *J. Climate*, 27, 5481-5503, doi:10.1175/JCLI-D-14-00004.1.
13. Lauritzen, P. H., **P.A. Ullrich**, C. Jablonowski, P.A. Bosler, D. Calhoun, A.J. Conley, T. Enomoto, L. Dong, S. Dubey, O. Guba, A.B. Hansen, E. Kaas, J. Kent, J.-F. Lamarque, M.J. Prather, D. Reinert, V.V. Shashkin, W.C. Skamarock, B. Sorensen, M.A. Taylor and M.A. Tolstykh, (2014) "A standard test case suite for two-dimensional linear transport on the sphere: results from a collection of state-of-the-art schemes." *Geosci. Model Dev.*, 7, 105-145, doi:10.5194/gmdd-6-4983-2013.
12. **Ullrich, P.A.**, P.H. Lauritzen and C. Jablonowski (2013) "A high-order 'incremental-remap'-based semi-Lagrangian dynamical core." *Int. J. Numer. Meth. Fluids.*, 75 (2), 103-133, doi: 10.1002/fld.3887.
11. **Ullrich, P.A.**, T. Melvin, C. Jablonowski and A. Staniforth (2013) "A baroclinic wave test case for deep- and shallow-atmosphere dynamical cores." *Quart. J. Royal Meteor. Soc.*, 140 (682), 1590–1602, doi: 10.1002/qj.2241.
10. Kent, J., **P.A. Ullrich** and C. Jablonowski (2013) "Dynamical Core Model Intercomparison Project: Tracer transport test cases." *Quart. J. Roy. Meteor. Soc.*, 140 (681), pp. 1279–1293, DOI: 10.1002/qj.2208.
9. **Ullrich, P.A.** (2013) "Understanding the treatment of waves in high-order atmospheric models, Part I: The shortest resolved waves of the 1D linear wave equation." *Quart. J. Roy. Meteor. Soc.*, 140 (682), 1426–1440, doi: 10.1002/qj.2226.
8. **Ullrich, P.A.** and M.R. Norman (2013) "The conservative Flux-Form Semi-Lagrangian Spectral Element (FF-SLSE) method for tracer transport." *Quart. J. Roy. Meteor. Soc.*, 140 (680), 1069–1085, doi:10.1002/qj.2184.
7. **Ullrich, P.A.**, P.H. Lauritzen and C. Jablonowski (2012) "Some considerations for high-order 'incremental remap'-based transport schemes: edges, reconstructions and area integration." *Int. J. Num. Methods Fluids*, 71 (9), pp. 1131–1151, doi:10.1002/fld.3703.
6. **Ullrich, P.A.** and C. Jablonowski (2012) "MCore: A non-hydrostatic atmospheric dynamical core utilizing high-order finite-volume methods." *J. Comput. Phys.*, 231, 5078–5108. doi: 10.1016/j.jcp.2012.04.024.

5. **Ullrich, P.A.** and C. Jablonowski (2011) "Implicit-Explicit Runge-Kutta-Rosenbrock (IMEX-RKR) schemes for nonhydrostatic atmospheric models." *Mon. Weather Rev.*, 140, pp. 1257–1284, doi: 10.1175/MWR-D-10-05073.1.
 4. **Ullrich, P.A.** and C. Jablonowski (2011) "An analysis of finite-volume methods for smooth problems on refined grids." *J. Comput. Phys.*, 230, pp. 706–725, doi: 10.1016/j.jcp.2010.10.014.
 3. **Ullrich, P.A.**, C. Jablonowski and B. van Leer (2010) "High-order finite-volume models for the shallow-water equations on the sphere." *J. Comput. Phys.*, 229, pp. 6104–6134, doi: 10.1016/j.jcp.2010.04.044.
 2. Lauritzen, P.H., R.D. Nair and **P.A. Ullrich** (2010) "A conservative semi-Lagrangian multi-tracer transport scheme (CSLAM) on the cubed-sphere grid," *J. Comput. Phys.*, 229, pp. 1401–1424, doi: 10.1016/j.jcp.2009.10.036.
 1. **Ullrich, P.A.**, P.H. Lauritzen and C. Jablonowski (2009) "Geometrically Exact Conservative Remapping (GECORE): Regular latitude-longitude and cubed-sphere grids." *Mon. Weather Rev.*, 137, pp. 1721–1741, doi: 10.1175/2008MWR2817.1.
- CHAPTERS
1. Lauritzen, P.H., **P.A. Ullrich** and R.D. Nair (2011) "Atmospheric transport schemes: Desirable properties and a semi-Lagrangian view on finite-volume discretizations." In *Numerical Techniques for Global Atmospheric Models*, Springer-Verlag: Heidelberg, pp. 185–250.
- THESES
2. **Ullrich, P.A.** (2011) *Atmospheric Modeling with High-Order Finite-Volume Methods*, (Ph.D. Thesis) University of Michigan, Ann Arbor, Michigan, USA. 323pp.
 1. **Ullrich, P.A.** (2007) *Exact and Perturbed Friedmann-Lemaître Cosmologies*, (Master's Thesis) University of Waterloo, Waterloo, Ontario, Canada. 169pp.
- LIMITED DISTRIBUTION
2. Ng, E.G., K. Evans, P. Caldwell, F.M. Hoffman, C. Jackson, K. Kleese Van Dam, R. Leung, D. Martin, G. Ostrouchov, R. Tuminaro, **P.A. Ullrich**, S.M. Wild, and S. Williams (2017) "Advancing Cross-Cutting Ideas for Computational Climate Science: Workshop Report", Eds. E.G. Ng and K. Evans. URL: https://science.energy.gov/~media/ber/pdf/workshop%20reports/AXICCS_Report_2017.pdf.
 1. **Ullrich, P.A.** and C.M. Zarzycki (2016), "Variable and adaptive resolution climate modeling with applications in subseasonal to seasonal extreme weather prediction." In: *S2S Predictability of Extreme Weather, US CLIVAR Variations Newsletter Vol. 14, No. 4*, Fall 2016, Eds. K. Pegion and S. Wang. URL: <https://goo.gl/QRd0yd>.
- CONTRIBUTING AUTHORSHIP
1. Hanak, E., J. Mount, J. Lund, et al. (2016), "Climate Change and Water." In: *California's Water*, published by the Public Policy Institute of California Water Policy Center, URL: http://www.ppic.org/content/pubs/report/R_1016WPCBKR.pdf.
- PUBLISHED ABSTRACTS
7. **Ullrich, P.A.** (2015) "Recent Advances in the Development of Next-Generation Global Modeling Systems," presented at Comparative Climates of Terrestrial Planets II, NASA Ames, Moffett Field, CA, September 8 - 11, 2015.
 6. **Ullrich, P.A.** and J.E. Guerra (2014) "Tempest - Efficient Computation of Atmospheric Flows Using High-Order Local Discretization Methods," Abstract A21A-3013, presented at the 2014 Fall Meeting, American Geophysical Union, San Francisco, CA, December 15-19, 2014.

5. **Ullrich, P.A.** and J.E. Guerra (2013) "Arbitrary-Order Hybrid Finite-Element Methods for Geophysical Flows," Abstract A31H-08, presented at the 2013 Fall Meeting, American Geophysical Union, San Francisco, CA, December 9-13, 2013.
4. **Ullrich, P.A.**, C. Jablonowski, J. Kent, K.A. Reed, M.A. Taylor, P.H. Lauritzen and R. Nair (2012) "Towards a Unified Test Case Suite for Global Atmospheric Models," Abstract A53C-0160, presented at the 2012 Fall Meeting, American Geophysical Union, San Francisco, CA, December 3-7, 2012.
3. **Ullrich, P.A.** and C. Jablonowski (2011) "MCore: A High-Order Finite-Volume Dynamical Core for Atmospheric General Circulation Models," Abstract A11J-07 presented at the 2011 Fall Meeting, American Geophysical Union, San Francisco, CA, December 5-9, 2011.
2. **Ullrich, P.A.** and C. Jablonowski (2010) "High-Order Finite-Volume Schemes for Simulating Atmospheric Flows," Abstract A41G-07 presented at 2010 Fall Meeting, American Geophysical Union, San Francisco, CA, December 13-17.
1. **Ullrich, P.A.** and P.H. Lauritzen (2008) "GECORE: A New Geometrically Exact Remapping Scheme on the Sphere," Eos Trans. American Geophysical Union, 89(53), Fall Meet. Suppl., Abstract A33A-0213.

PATENTS

1. Mikkelsen, S., T. Mann, P. Ertl, L. O'Hagan, D. Sparkes and **P.A. Ullrich** (2005) Electrochemical Assay for the Identification of Microorganisms. European Patent CA2549658.

PRESENTATIONS (JAN 2015 -)

Ullrich, P.A. and M. Wang (2017) "Advances in variable resolution climate and weather modeling." Presentation at the Meteorology and Climate - Modeling for Air Quality Conference, Davis, California. September 13, 2017.

Ullrich, P.A. et al. (2017) "Hyperion: Understanding Hydroclimate Data with Use-Inspired Metrics." Poster presentation to the Community Earth System Model Workshop. June 19-22, 2017.

Ullrich, P.A. et al. (2017) "Hyperion: Understanding Hydroclimate Data with Use-Inspired Metrics." Invited presentation to the Water Utility Climate Alliance. April 24, 2017.

Ullrich, P.A. (2017) "Tempest: Software Tools for Addressing the Needs of Next-Generation Climate Science." Invited presentation at Stanford University, Stanford, California. January 27, 2017.

Ullrich, P.A., C.M. Zarzycki, M. Wang and A. Rhoades (2016) "Climate model applications at the scale of NWP." Invited presentation at AGU Fall Meeting (IN13D-08), San Francisco, California. December 15, 2016.

Ullrich, P.A., C.M. Zarzycki, and R. Grotjahn (2016) "TempestExtremes: Automated Detection and Characterization of Extreme Weather." Presentation at AGU Fall Meeting (A44F-01), San Francisco, California. December 12, 2016.

Ullrich, P.A. and J.E. Guerra (2016) "Tempest: A Framework for Experimental Numerical Methods." Presentation at SIAM Mathematics of Planet Earth, Philadelphia, Pennsylvania, October 2, 2016.

Ullrich, P.A., B. LeBlach, H. Johansen, P. Jones (2016) "New Programming Models for Climate: Bringing Climate Models to the Exascale." Invited presentation at Advancing X-cutting Ideas for Computational Climate Science (AXICCS), Washington, D.C. September 12, 2016.

Ullrich, P.A. (2016) "TempestExtremes: Indicators of change in the characteristics of extreme weather." Invited presentation at NASA Ames, Moffett Field, California. May 17, 2016.

Ullrich, P.A. (2016) "Drought in California: A Climatological Look at Water in a Semi-Arid Landscape." Invited seminar at the California Water Policy Seminar Series on Drought (ECI 298), University of California Davis, Davis, California. January 11, 2016.

Ullrich, P.A., J.E. Guerra, M. Pinheiro and J. Fong (2015) "Tempest: Tools for Addressing the Needs of Next-Generation Climate Models." Poster presentation at the American Geophysical Union, San Francisco, California. Abstract NG23A-1778. December 14-18, 2015.

Ullrich, P.A. (2015) "Working with Finite Elements: Addressing a Paradigm Shift in Geosciences Modeling." Invited presentation at the Naval Research Laboratory, Monterey, California. December 3, 2015.

Ullrich, P.A. (2015) "Tempest: Tools for Addressing the Needs of Next-Generation Climate Models." Presentation at the Workshop on Partial Differential Equations on the Sphere, Seoul, South Korea. October 20, 2015.

Ullrich, P.A. (2015) "Reaching High Spatial Resolutions with Regionally Refined Global Climate Models." Presentation at the Meteorology And Climate - Modeling for Air Quality Conference, Sacramento, California. September 16 - 18, 2015.

Ullrich, P.A. (2015) "Recent Advances in the Development of Next-Generation Global Modeling Systems." Invited presentation at Comparative Climates of Terrestrial Planets II, NASA Ames, Moffett Field, California. September 8 - 11, 2015.

Ullrich, P.A. (2015) "Towards Robust Multi-Scale Global Atmospheric Models." Presentation at SIAM Geosciences 2015, Palo Alto, California. June 29 - July 2, 2015.

Ullrich, P.A. and J.E. Guerra (2015) "Exploring the Effects of a High-Order Vertical Coordinate in a Non-Hydrostatic Global Model." Conference paper presented at the International Conference on Computational Science: Numerical and Computational Developments to Advance Multiscale Earth System Models (MSESM), Reykjavik, Iceland, June 1-3, 2015.

Ullrich, P.A. and J.E. Guerra (2015) "Tempest: Efficient Computation of Atmospheric Flows Using High-Order Local Discretization Methods." Presentation at SIAM Computer Science and Engineering (CS&E) 2015, Salt Lake City, Utah. March 18, 2015.

Ullrich, P.A., A. Rhoades, X. Huang and C. Zarzycki (2015) "An Assessment of Variable-Resolution Climate Modeling in CAM." Presentation at the Community Earth System Model Atmospheric Model Working Group Meeting 2015, National Center for Atmospheric Research, Boulder, Colorado. February 19, 2014.

A complete list of presentations is available from
<http://climate.ucdavis.edu/publications.php>.

FUNDING
(AWARDED)

[Co-PI] Ullrich, P.A. (2017) "Advanced Statistical-Dynamical Downscaling Methods and Products for California Electrical System Climate Planning." \$1,400,000. California Energy Commission (PI Dan Cayan (UCSD), Active 10/01/2017 - 09/30/2020)

[Co-PI] Ullrich, P.A. (2017) "SciDAC4: Coupling Approaches for Next Generation Architectures (CANGA)." \$3,000,000. Department of Energy, Office of Science SciDAC grant (PI Share \$550,000, Active: 09/01/2017 - 08/31/2022).

[PI] Ullrich, P.A. (2016) "An Integrated Evaluation of the Simulated Hydroclimate System of the Continental US." \$6,000,000. Department of Energy, Office of Science SciDAC grant (PI Share \$829,000 / Active: 09/01/2016 - 08/31/2019).

[PI] Ullrich, P.A. (2016) "2016 Summer School and Dynamical Core Model Intercomparison Project." \$110,000. Inter-agency education award (DOE, NSF, NASA, NOAA) (Active: 06/01/2016 - 07/31/2018).

[Co-PI] Ullrich, P.A. (2016) "Understanding and Mitigating Barriers to Wind Energy Expansion in California Using a Combination of Observations and High-Resolution Climate Models." \$200,000. California Energy Commission (Active: 07/01/2016 - 12/31/2017).

[PI] Ullrich, P.A. (2016) "TempestExtremes: Indicators of change in the characteristics of extreme weather." \$529,000. National Aeronautics and Space Administration grant (Active: 04/01/2016 - 03/31/2019).

[Co-PI] Ullrich, P.A. (2015) "A Non-hydrostatic Variable Resolution Atmospheric Model in ACME." \$1,900,000. Department of Energy, Office of Science SciDAC grant (PI share \$510,000 / Active: 08/01/2015 - 07/31/2018).

[Asst. Res.] Ullrich, P.A. (2015) "Preparing for Water Scarcity: Learning from California's Recent Drought." \$1,000,000. Environmental Protection Agency (Active: 10/01/2015 - 09/30/2017).

[PI] Ullrich, P.A. (2014) "Multiscale Methods: Vertex to cell centered remapping algorithms." \$80,000. Department of Energy, Office of Science SciDAC grant (Active: 07/01/2014 - 03/31/2017).

[PI] Ullrich, P.A. (2014) "Identifying the Influence of Anthropogenic Forcing on Extreme Weather Events." \$30,000. Hellman Foundation Fellowship (Completed: 07/01/2014 - 06/30/2015).

[PI] Ullrich, P.A. (2013) "The Influence of Anthropogenic Forcing on Global Extreme Heat Events." \$13,000. Academic Senate Research Grant Programs (Completed: 07/01/2013 - 06/30/2014).

SERVICE

Topical Editor, June 2015 - Present

Geoscientific Model Development, published by Copernicus

Associate Editor, Oct 2012 - Present

Monthly Weather Review, published by the American Meteorological Society

Conference Organization

(Program Committee Co-chair) *Meteorology and Climate - Modeling for Air Quality*. University of California, Davis, California, Sept 13-15, 2017.

(Co-organizer) *Workshop on Partial Differential Equations on the Sphere*. École Normale Supérieure, Paris, France, Apr 3-7, 2017.

(Lead Organizer) *Dynamical Core Model Intercomparison Project Summer School and Workshop*. National Center for Atmospheric Research, Boulder, CO, June 1-17, 2016.

(Program Committee) *Advancing X-cutting Ideas for Computational Climate Science*. Rockville Hilton, Rockville, MD, Sept 12-14, 2016.

(Co-organizer) *Workshop on Partial Differential Equations on the Sphere*. Korean Institute for Atmospheric Prediction Systems, Seoul, South Korea, Oct 19-23, 2015.

(Program Committee) *Meteorology and Climate - Modeling for Air Quality*. Sacramento, CA, Sept 16-18, 2015.

(Co-organizer) *Workshop on Partial Differential Equations on the Sphere*. National Center for Atmospheric Research, Boulder, CO, Apr 7-11, 2014.

(Program Committee) *Traversing New Terrain in Air Quality Meteorological Modeling*. University of California, Davis, Sept 10-12, 2013.

(Co-organizer) *Workshop on the Intercomparison of Non-Hydrostatic Dynamical Cores* (Joint summer school / workshop) National Center for Atmospheric Research, Boulder, CO, July 30 - Aug 10, 2012.

Conference Session Organizer

(Co-organizer) "An Object-Oriented View of Atmospheric Science: Feature Detection and Characterization in Big Data." American Geophysical Union, New Orleans, LA. Dec 11-15, 2017.

(Co-organizer) "Integration of climate, hydrology, social science, and water management: Connecting hydroclimate models with stakeholder need." American Geophysical Union, San Francisco, CA. Dec 12-16, 2016.

(Lead Organizer) "Advances in Numerical Methods for Geophysical Modeling." American Geophysical Union, San Francisco, CA. Dec 14-18, 2015.

(Co-organizer) "Recent advances in high order finite element methods for atmospheric sciences." SIAM CSE 15, Salt Lake City, UT. Mar 14-18, 2015.

(Lead Organizer) "Advances in Numerical Methods for Atmospheric and Ocean Modeling." American Geophysical Union, San Francisco, CA. Dec 15-19, 2014.

(Lead Organizer) "Advances in Numerical Methods for Atmospheric and Ocean Modeling." American Geophysical Union, San Francisco, CA. Dec 9-13, 2013.

(Co-organizer) "Cubed-Sphere Grids for Planet Earth and Beyond." Society for Industrial and Applied Mathematics (SIAM) Computer Science and Engineering Meeting, Boston, MA. Feb 25-Mar 1, 2013.

(Lead Organizer) "Advances in Numerical Methods for Atmospheric and Ocean Modeling." American Geophysical Union, San Francisco, CA. Dec 3-7, 2012.

(Session Chair) "Atmospheric Sciences: General Contributions I." American Geophysical Union, San Francisco, CA. Dec 5-9, 2011.

Paper Reviewer

Monthly Weather Review (MWR), International Journal of High Performance Computing Applications (IJHPCA), Journal of Hydrology (JH), Journal of Hydrometeorology (JHM), Journal of Computational Physics (JCP), Journal of Advances in Modeling Earth Systems (JAMES), Journal of Meteorological Research (JMR), Quarterly Journal of the Royal Meteorological Society (QJRMS), SIAM Journal on Scientific Computing (SISC), Geoscientific Model Development Discussions (GMDD), International Journal of Numerical Methods in Fluids (IJNMF), Communications in Computational Physics (CICP), Computers and Mathematics with Applications (CMA)

Society Memberships

American Geophysical Union (AGU)

Royal Meteorological Society (RMS)

American Meteorological Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)

HONORS

University of California, Davis

- Hellman Fellowship (\$30,035), July 2014 - June 2015.

University of Michigan

- Proquest Distinguished Dissertation Award (Nominated), Nov 2011.
- American Geophysical Union Outstanding Student Paper Award, Dec 2010.
- Michigan Graduate Symposium Outstanding Ph.D. Student Research Award Nominee, Nov 2010.
- Rackham Predoctoral Fellowship, Feb 2010.
- Michigan Graduate Symposium (1st place poster presentation, 2nd place oral presentation), Nov 2008.
- College of Engineering Dean's Fellowship, Sept 2007.

University of Waterloo

- Natural Sciences and Engineering Research Council of Canada (NSERC) Post-Graduate Scholarship Extension (\$17,500), Sept 2006.
- Ontario Graduate Scholarship (\$15,000), May 2005 (Declined by applicant – award could not be held alongside NSERC award)
- Natural Sciences and Engineering Research Council of Canada (NSERC) Post-Graduate Scholarship (Masters, \$17,500), Apr 2005.
- Canadian Computing Competition Bronze Medalist, May 2000.
- Sybase Scholarship for Computer Sciences (\$18,000), June 2000.

TEACHING

University of California, Davis

<i>ATM 245 / HYD 245 - Climate Change, Water and Society</i>	Fall 2017
<i>ATM 265 - The Art of Climate Modeling</i>	Spring 2017
<i>ATM 121b - Advanced Atmospheric Dynamics</i>	Spring 2017
<i>ATM 245 / HYD 245 - Climate Change, Water and Society</i>	Fall 2016
<i>ATM 5 - Our Changing Atmosphere</i>	Fall 2016
<i>ATM 5 - Our Changing Atmosphere</i>	Spring 2016
<i>ATM 241 - Climate Dynamics</i>	Fall 2015
<i>ATM 245 / HYD 245 - Climate Change, Water and Society</i>	Fall 2015
<i>ATM 5 - Climate and Climate Change</i>	Spring 2015
<i>ATM 298 - The Art of Climate Modeling</i>	Spring 2015
<i>ATM 121a - Atmospheric Dynamics</i>	Winter 2015
<i>ATM 245 / HYD 245 - Climate Change, Water and Society</i>	Fall 2014
<i>ATM 121b - Atmospheric Dynamics</i>	Spring 2014
<i>ATM 241 - Climate Dynamics</i>	Fall 2013
<i>HYD 298 - Climate Change, Water and Society</i>	Fall 2013
<i>ATM 298 - The Art of Global Climate Modeling</i>	Spring 2013

University of Michigan

AOSS 401 - Geophysical Fluid Dynamics **Fall 2011**

AOSS 605 - The Art of Climate Modeling **Fall 2010**

Co-instructor with Prof. Christiane Jablonowski.

AOSS 551 - Fluid Dynamics (Grader) **Fall 2008**

Short Course - Maple Instructor **Fall 2008, 2009, 2010, 2011**

University of Waterloo

Teaching Assistant (TA) **Sept 2005 to Aug 2007**

AM 341 / CM 271 - Introduction to Computational Mathematics

AM 342 / CM 352 - Computational Methods for Differential Equations

AM 452 / CM 452 - Computational Methods for Partial Differential Equations

INDUSTRY

Maplesoft, Waterloo, Ontario, Canada **Sept 2004 to Dec 2004**

Mathematics Developer

- Part of a team of four programmers developing an updated version of the statistics library for use within their flagship product.
- Developed approaches to statistics used in various papers and integrated them into the software.

RapidLabs Microsystems, Waterloo, Ontario, Canada **Jan 2004 to Apr 2004**

Senior Software Engineer

- Led an initiative within this local start-up to develop a software system complementing their hardware system.
- Developed a statistical software technique for identifying microbial cultures.

Sonic Foundry Canada, Waterloo, Ontario, Canada **Sept 2001 to Aug 2002**

Software Engineer

- Involved in the design and development of several software packages including Vegas Video and DVD Architect.
- Worked with a team of five members on image and video transformations.

Digital Tempest Productions, Kitchener, Ontario, Canada **June 2000 to June 2005**

CEO / Project Coordinator

- Founded a software development company producing an open source and cross-platform functional library for C++.

TECHNICAL

Atmospheric science: Climate change, climate dynamics, atmospheric dynamics, radiative transfer, clouds and precipitation, planetary sciences, atmospheric chemistry

Programming: C, C++, Fortran, MPI, OpenMP, CUDA, OpenGL, PHP, UNIX shell scripting, SQL, CVS, SVN, XML / HTML, MATLAB, MAPLE, NCAR Command Language (NCL)

Mathematics: Numerical methods, ordinary and partial differential equations, differential geometry, fluid and continuum dynamics, functional analysis, combinatorial theory, probability / statistics

Computer Science: Parallel computing, algorithms, software engineering, operating systems, artificial intelligence, databases

Languages: English, Mandarin