
Carol S. Woodward

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Research Interests

- Temporal and spatial discretization methods for nonlinear partial differential equations
 - Iterative solvers for nonlinear and linear systems
 - Code and calculation verification methods
 - Portable numerical software for high performance computing systems
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Education

Ph.D. Computational and Applied Mathematics, Rice University, Houston, TX, May 1996
Advisors: Clint N. Dawson and Mary F. Wheeler
M.A. Computational and Applied Mathematics, Rice University, Houston, TX, May 1996
B.S. Mathematics (summa cum laude), Louisiana State University, May 1991

Professional Experience

10/22-present	Distinguished Member of the Technical Staff, Center for Applied Scientific Computing (CASC), Lawrence Livermore National Laboratory (LLNL)
10/99–present	Project Leader, Nonlinear Solvers and Differential Equations / SUNDIALS, CASC, LLNL
4/97–9/22	Research Staff Member, CASC, LLNL
10/13-2019	Adjunct Professor, Mathematics Department, North Carolina State University
10/05–5/12	Project Leader, Code Verification, B Division, LLNL
11/03-10/10	Computation Directorate Post Doctoral Program Manager, LLNL.
6/02-9/06	Group Leader, Numerical Methods Group, Center for Applied Scientific Computing, LLNL.
6/96–3/97	Postdoctoral Research Staff Member, Center for Applied Scientific Computing, LLNL
9/95-5/96	Consultant, University of Texas at Austin
8/91-8/95	Research Assistant, Rice University
5/92–8/92	Student Co-op, Mathematical Sciences Section, Oak Ridge National Laboratory, Oak Ridge, TN
5/91–8/91	Student Research Participant, Global Studies Program, Pacific Northwest National Laboratory
1/91-5/91	Lab. Assistant, Department of Experimental Statistics, Louisiana State University, (also 6/89-1/90, 6/87-8/88)
5/90–8/90	Student Research Participant, Mathematical Sciences Section, Oak Ridge National Laboratory

Honors and Organizations

- SIAM/ACM Prize in Computational Science and Engineering, 2023 (as part of the SUNDIALS Core Development Group).
- Distinguished Member of the Technical Staff, LLNL, Sept. 2022. “DMTS is the highest technical staff level achievable by a scientist or engineer at Lawrence Livermore National Laboratory and is a prestigious recognition on the personnel ladder.” Limited to < 3% of the staff at LLNL.
- Fellow of the Association for Women in Mathematics, 2021.
- Fellow of the Society of Industrial and Applied Mathematics, 2017.
- Early and Mid-Career Recognition (EMCR) Program Award for 2015, Lawrence Livermore National Laboratory. (1 of 5 lab-wide in the 16-20 years past PhD category).
- Member, Society for Industrial and Applied Mathematics, Association for Women in Mathematics, IEEE – Computer Society, IEEE – Power Engineering Society, American Geophysical Union.

Editorial Board Service

1. Member, Editorial Board for *ACM Transactions on Mathematical Software*, 2011 – present.
2. Member, Editorial Board for *Advances in Water Resources*, 2000 – 2021.
3. Member, Editorial Board for *SIAM J. on Scientific Computing*, 2013 – 2018.
4. Member, Editorial Board for *SIAM NEWS*, 2012-2015.
5. Member, Editorial Board for *SIAM J. on Numerical Analysis*, 2004 – 2012.

Professional Service

1. President-Elect, Society for Industrial and Applied Mathematics (SIAM), Jan. 1, 2024 – Dec. 31, 2024, (President 2025-2026)
2. Member, SIAM Major Awards Committee, Jan. 1, 2024 – Dec. 31, 2027
3. Member, Executive Committee of SIAM Council, Jan. 1, 2024 – Dec. 31, 2027
4. Member, SIAM Nominating Committee, Jan. 1, 2024 – Dec. 31, 2027
5. Member, SIAM Council, Jan. 1, 2024 – Dec. 31, 2027
6. Vice-Chair for international Standing Committee on Gender Equality in Science, Oct. 2022 – present.
7. Member, Institute for Computational and Experimental Research in Mathematics (ICERM) Board of Trustees, July 1, 2022 – June 30, 2026.
8. DOE Computational Sciences Graduate Fellowship, Screening Committee, 2023, 2011-2017.
9. Judge, Student paper competition for Bavarian Graduate School of Computational Engineering, 2023, 2021, 2019, 2017, 2015, 2011, 2009.
10. *SIAM Journal on Scientific Computing*, Guest editor for Special Issue from the Copper Mountain Conference on Iterative Methods 2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022.
11. Advisory Board for the STRIVE For More Workshop (<https://intranet.math.vt.edu/MORE/index.html>) Jan. – Dec. 2023.
12. Webinar Coordinator for Standing Committee on Gender Equality in Science Webinar Series, Jan. 2022 – present.
13. International Council on Industrial and Applied Mathematics (ICIAM) Representative to the Standing Committee for Gender Equality in Science, 8/2020-present.
14. New Talent Award Selection Committee, International Conference on Scientific Computation and Differential Equations (SciCADE), Reykjavik, Iceland, July 2022.
15. Vice President at Large, Society for Industrial and Applied Mathematics, 2 terms, Jan. 1, 2018 – Dec. 31, 2021.
16. Chair, SIAM Major Awards Committee, Jan. 1, 2018 – Dec. 31, 2021.
17. Member, SIAM Committee on Committees and Appointments, Jan. 1, 2018 – Dec. 31, 2021.
18. Member, SIAM Committee on Membership, Jan. 1, 2018 – Dec. 31, 2021.
19. Member, SIAM Committee on Programs and Conferences, Jan. 1, 2018 – Dec. 31, 2021.
20. Member, SIAM Ethics Committee, Jan. 1, 2021- Dec. 31, 2021.
21. Student Paper Award Committee, Copper Mountain Conference on Iterative Methods, 2022, 2020, 2018, 2016, 2014, 2004.
22. NSF Panel Reviewer, 2021.
23. Member, ICERM Science Advisory Board, Jan. 1, 2017 – June 30, 2020.
24. Member-at-Large of the Executive Committee of the Association for Women in Mathematics (AWM), Feb. 1, 2016-Jan. 31, 2020.
25. Member, Joint SIAM, AMS, and MAA Review Committee for Morgan Prize, Jan. – Aug. 2019.
26. Chair, Awards Committee for the Association for Women in Mathematics, Feb. 1, 2017 – Jan. 31, 2019.
27. Judge, Best poster competition, SIAM Conference on Computational Science and Engineering, 2021, 2019, 2017.
28. Selection Committee for the John Butcher Student Prize Committee for SciCADE 2019.
29. Chair, SIAM *ad hoc* Committee on Diversity in Appointments, Aug. 2018 – June 2019.
30. AWM Student Chapter Awards Selection Committee, 2017.
31. SC17 Technical Papers: Applications Committee member, 2017.
32. SIAM Activity Group on Geosciences, Chair (01/2015-12/2016) and Secretary (1/2007-12/2008).
33. Joint Committee on Women in the Mathematical Sciences, Member (2/2014-1/2017) and Co-Chair (2/2015-1/2017).
34. Rice University Computational and Applied Mathematics Department Advancement Committee, 2014, 2017.

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35. SC16 Technical Papers: Applications Track Chair, 2016.
 36. Association of Women in Mathematics Middle School Student Essay Contest Judge, 2016.
 37. Elected member of SIAM Council (policy-making body for SIAM), Jan. 2013-Dec.2015, Jan. 2010 – Dec. 2012.
 38. SIAM Supercomputing Activity Group Best Paper Prize Selection Committee, 2015.
 39. SC15 Technical Papers: Algorithms Committee member, 2015.
 40. DOE Workshop on Integrated Simulations for Magnetic Fusion Energy Sciences Multiphysics and Multiscale Coupling panel member, 2015.
 41. SIAM Diversity Advisory Committee, Member (2/2014-1/2017).
 42. SIAM Activity Group on Computational Science and Engineering, Vice Chair (01/11-12/12), Program Director (01/07-12/08), Secretary (01/09-12/10).
 43. Appointed representative of SIAM Council to SIAM Board, Jan. 2014 – Dec. 2015.
 44. Chair, SIAM/ACM CSE Prize Selection Committee, 2015.
 45. Invited panelist for a Professional Development panel at the SIAM Computational Science and Engineering meeting discussing “Interdisciplinary Research: Challenges and Opportunities,” 2015.
 46. SIAM-EESI Workshop on Future Directions in CSE Education and Research to update the SIAM report on the field of Computational Science and Engineering, 08/2014.
 47. SC13 Technical Papers: Algorithms Committee member, 2013.
 48. IEEE International Conference on High Performance Computing Program Committee, Applications Track, 2013.
 49. SIAM/ACM CSE Prize Selection Committee, 2013.
 50. LLNL – TAMU Technical Interactions Advisory Team, Nov. 2011.
 51. LANL ASC Level 2 Milestone Review, Los Alamos, NM, June 2012.
 52. Appointed member of SIAM Council Executive Committee, Aug. 2011 – Dec. 2012.
 53. Appointed member of Assoc. for Women in Mathematics SIAM Workshop committee, Aug. 2009 – July 2012.
 54. *Advances in Water Resources*, Co-editor of special issue on “New Computational Methods and Software Tools.”
 55. *DOE Computational Sciences Graduate Fellowship*, Selection Committee member, 2008-2010.
 56. *INCITE* mail-in proposal review.
 57. *DOE ASC Program L2 Milestone Review Panel* member for an LANL V&V Program milestone, Feb. - Sept., 2009.
 58. *National Science Foundation Science and Technology Centers: Integrative Partnerships Program*, physics and astrophysics panel, Jan. 2009, reviewer
 59. Awards committee member for SIAM Geosciences Activity Group Student and Career Awards, 2008
 60. Nominating committee for SIAM Geosciences Activity Group Officers, 2008.
 61. NSF Panel reviewer, 2008.
 62. Member of SIAM *ad hoc* committee to develop a Fellows Program, 2007-2008.
 63. Invited panelist for Association of Women in Mathematics panel session on Opportunities for Mathematicians and Computer Scientists in Industry at the SIAM Annual Meeting 2004.
 64. NSF Review Panel, Washington, DC, 2004.
 65. DHS Fellowship and Scholarship Review Panel, Arlington, VA, June 17-20, 2003.
 66. DOE/MICS Early Career Principal Investigator Program mail-in proposal review, 2003.
 67. Proposal reviewer (mail-in) for the State of Nebraska EpsCOR program, 2003.
 68. DOE/MICS Early Career Principal Investigator Program panel reviewer, 2002.

Conference Organization

1. Organizing Committee Member, SciCADE, the International Conference on Scientific Computation and Differential Equations, Singapore, July 2024.
2. Organizing Committee Member, SciCADE, the International Conference on Scientific Computation and Differential Equations, Reyjavik, Iceland, July 2022.
3. Organizing Committee Member, ICERM Workshop, “Holistic Design of Time-Dependent PDE Discretization,” Providence, RI, Jan. 10-14, 2022.
4. Organizing Committee Member: SIAM Conference on Computational Science and Engineering March 1-5, 2021.
5. Organizing Committee Member, International Conference on Computational Methods in Water Resources, Stanford, CA, December 2020.

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6. Program Committee: Copper Mountain Conference on Iterative Methods, 2004 – present.
 7. Organizing Committee Member for Association of Women in Mathematics Research Symposium, Los Angeles, CA, April 8-9, 2017.
 8. Member of organizing committee for *XXI International Conference on Computational Methods in Water Resources*, Toronto, Canada, June 2016.
 9. Co-Organizer (with Homer Walker and Tim Kelley) of ICERM Topical Workshop on, “Numerical Methods for Large-Scale Nonlinear Problems and Their Applications,” Aug. 31-Sept. 4, 2015.
 10. Organizing Committee Member: SIAM Conference on Mathematical and Computational Issues in the Geosciences 2015, 2003
 11. Member of organizing committee for *SIAM Annual Meeting, 2012, 2005*.
 12. Member of organizing committee for *XIX International Conference on Computational Methods in Water Resources*, Urbana-Champagne, IL, June 2012.
 13. Member of Steering Committee for *Mathematical Methods in Fluid Dynamics and Simulation of Giant Oil and Gas Reservoirs*, Istanbul, Turkey Sept. 2012.
 14. Co-Organizer, ICiS Workshop on Multiphysics Simulations: Challenges and Opportunities, Park City, UT, July 31 – Aug. 6, 2011.
 15. Co-Organizer of the Association of Women in Mathematics SIAM Workshop on “Careers Beyond Academia,” held with the International Congress on Industrial and Applied Mathematics, Vancouver, BC, Canada, July 2011.
 16. Organizing Committee Chair: SIAM Conference on Computational Science and Engineering 2011, 2009.
 17. Organizing Committee Chair, “Solution Methods for Large-Scale Nonlinear Problems” Workshop held in Livermore, CA, August 2003.
 18. Organizing Committee Chair, “Solution Methods for Large-Scale Nonlinear Problems” Workshop held in Pleasanton, CA, August 2000.
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Conference Session Organization

1. Co-organizer (with Ulrike Yang (LLNL)) of minisymposium, “Numerical Software Libraries Enabling Benefits to Scientific Applications,” for the International Congress on Industrial and Applied Mathematics to be held in Tokyo, Japan, August 19-25, 2023.
2. Co-organizer (with Maria Esteban (CNRS and Univ. Paris-Dauphine) and GuiYing Yan (Chinese Academy of Sciences)) of minisymposium, “Gender Equality in Mathematics: A Global Perspective,” for the International Congress on Industrial and Applied Mathematics to be held in Tokyo, Japan, August 19-25, 2023.
3. Co-organizer (with Chris Vogl and Kate Evans) of minisymposium, “Improving Operator Splitting in Large Multiphysics Systems including Global Climate,” for the 2023 SIAM Conference on Computational Science and Engineering, Amsterdam, The Netherlands, Feb. 26-March 3, 2023.
4. Co-organizer (with David Gardner) of a Breakout Session, “SUNDIALS Plans and Uses,” at the Exascale Computing Project Annual Meeting, held virtually, May 2022.
5. Co-organized the webinar, “Gender Equality in Mathematics,” for the inaugural webinar in the Standing Committee for Gender Equality in Science webinar series, Feb. 16, 2022, <https://gender-equality-in-science.org/event/scges-webinar-february-16th-2022/>. The recording is available at <http://www.youtube.com/watch?v=Rqj183H9By4>.
6. Co-convener (with C. Vogl, K. Evans, and O. Fruhrer) of session, “Addressing Challenges for the Next Generation of Earth System Models,” for AGU Fall Meeting, Virtual, Dec. 17, 2021
7. Co-organizer (with David Gardner, Daniel Reynolds, and Cody Balos) of a Breakout Session, “SUNDIALS Plans and Uses,” at the Exascale Computing Project Annual Meeting, held virtually, April 2021.
8. Co-convener (with C. Vogl, K. Evans, and O. Fruhrer) of session, “Addressing Challenges for the Next Generation of Earth System Models,” for AGU Fall Meeting, Virtual, Dec. 1-17, 2020
9. Co-Organizer (with Ann Almgren) of 2-part mini-symposium, “Experiences in Developing GPU Support for Department of Energy Math Libraries,” for the SIAM Conference on Parallel Processing for Scientific Computing, Seattle, WA, Feb. 12-15, 2020.
10. Co-convener (with C. Vogl, K. Evans, and P. Dueben) of session, “Addressing Challenges for the Next Generation of Earth System Models,” for AGU Fall Meeting, San Francisco, CA, Dec. 9-13, 2019.
11. Co-Organizer (with David Gardner) of minisymposium, “Convergence Verification and Challenges in Atmospheric Climate Simulations,” for the *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Houston, TX, March 2019.
12. Session Convener (with Mario Putti and Geraldine Pichot) for session, “Advances in Numerical Solvers for Water Resources Applications” at the International Conference on Computational Methods in Water Resources, St. Malo, France, June 3-7, 2018.

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13. Session co-organizer (with Cindy Phillips, SNL), "Women in Government Laboratories," Association of Women in Mathematics Research Symposium, Los Angeles, CA, April 8-9, 2017.
 14. Panel Organizer, "Jobs Panel: Math Research in Government and Industry," Association of Women in Mathematics Research Symposium, Los Angeles, CA, April 8, 2017.
 15. Co-Organizer (with D. Gardner, K. Evans, R. Archibald, and M. Norman), "Numerical Methods for Geosciences Applications," for the *First SIAM Conference on Mathematics of Planet Earth*, Philadelphia, PA, Sept. 2016.
 16. Co-Convener (with Peter Bastian, University of Heidelberg) of special session, "Advances in Numerical Solvers for Water Resources Applications," at the *XXI International Conference on Computational Methods in Water Resources*, Toronto, Canada, June 2016.
 17. Co-Organizer (with Tim Kelley) of minisymposium, "Recent advances in Iterative Nonlinear Solvers," for the International Congress on Industrial and Applied Mathematics, Beijing, China, Aug. 2015.
 18. Co-Organizer (with Kate Evans and Hans Johansen) of workshop, "Numerical and Computational Developments to Advance Multiscale Earth System Models (MSESM)," as part of the International Conference on Computational Science, Reykjavik, Iceland, June 1-3, 2015.
 19. Organizer of two-part minisymposium, "Application and Impact of FASTMath (Frameworks, Algorithms and Scalable Technologies for Mathematics on Next-generation Computers)," at the *SIAM Conference on Parallel Processing*, Portland, OR, Feb. 2014.
 20. Co-organizer (with Shrirang Abhyankar) of minisymposium, "Numerical Methods for Power Grid Simulation," SIAM Annual Meeting, Chicago, IL, July 10, 2014.
 21. Co-Organizer (with Aaron Lott and Kate Evans) of two-part minisymposium, "Implicit Approaches for Climate Simulations," at the *SIAM Conference on Computational Science and Engineering*, Boston, MA, March 2013.
 22. Co-Convener (with M. Putti, Univ. of Padua, Italy) of special session, "Advances in Nonlinear and Linear Solvers for Water Resources Applications," at the *XIX International Conference on Computational Methods in Water Resources*, Urbana-Champagne, IL, June 2012.
 23. Co-Organizer of the *Association of Women in Mathematics SIAM Workshop* on "Teaming Up in Tough Times," held with the SIAM Annual Meeting, Minneapolis, MN, July 2012.
 24. Co-Organizer (with Jeff Connors) of two-part minisymposium, "Advances in Theory and Application of Operator Splitting Methods," at the *SIAM Annual Meeting*, Minneapolis, MN, July 2012.
 25. Co-Organizer (with Greg Wiers, SNL) of two-part minisymposium, "Code Verification: Practices and Problem Development" at the *SIAM Conference on Uncertainty Quantification*, Raleigh, NC, March 2012.
 26. Co-Organizer (with Jeffrey Banks and Jeffrey Hittinger) of three-part minisymposium, "Numerical Discretization Error Estimation for Uncertainty Quantification," at the SIAM Conference on Computational Science and Engineering, Reno, NV, March 2011.
 27. Co-Organizer (with M. Putti, C. Janna, and M. Ferronato) of two-part minisymposium, "Iterative Solvers for Environmental Simulations," at the SIAM Conference on Mathematical and Computational Issues in the Geosciences, Long Beach, CA, March 2011.
 28. Co-organizer (with K. Salari) of a two-part minisymposium, "Code Verification in Computational Science and Engineering," at the SIAM Conference on Computational Science and Engineering, 2007.
 29. Co-organizer (with David Keyes) of a two-part minisymposium, "Transitioning Nonlinear, Time-dependent Codes From Explicit to Implicit Formulations," at the SIAM Annual Meeting, Portland, OR, July 2004.
 30. Co-organizer (with lea Jenkins) of a two-part minisymposium, "Numerical Methods for Fully Implicit Formulations of Nonlinear Systems," at the SIAM Annual Meeting, Philadelphia, PA, 2002.
 31. Organizer of a minisymposium, "Computational Issues in Fully Implicit Solutions for Large-Scale Nonlinear Systems," at the SIAM Computational Science and Engineering Conference, Washington, DC, 2001

LLNL Service

1. Computation Information Management Directorate Reviewer, 2005-present.
2. Early and Mid-Career Recognition Program Award Selection Committee member, 2018-2019.
3. LDRD Review Panel Member for Energy, Earth, and Atmosphere Committee, 2015-2017.
4. LDRD review panel member, May 2011.
5. Computation PostDoc Program Manager, 2003-2010.
6. Computation Representative on the Institutional PostDoc Program Board, 2008- 2010.
7. Computation Representative to the LLNL PostDoc Advisory Council, 2005-2007.
8. Computation Representative on the Lawrence Fellowship Committee, 2004-2009.

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9. Member of CASC/DNT Coordination Committee, 2005-2008.
 10. Computing Applications and Research Strategic Plan Working Group member, 2005-2006.
 11. LDRD Exploratory Research Program Review Committee, 2005.
 12. LLNL DOE CSGF Practicum Coordinator, 2003-2004.
 13. Computation Management Off-Site Planning Committee, 2003.
 14. Member, CASC Values committee, 2003.
 15. Member, CAR Department Values committee, 2003.
 16. Member, CASC Strategic Plan Projects Working Group and Criteria and Priorities Working Group, 2003.
 17. CASC Division Leader Search Committee, 2001-2002.
 18. Work/Life Subcommittee for Computation Directorate retention committee, 2001.
 19. CASC Reorganization committee, 1999.
 20. CASC Interoperable Software Environments committee, 1999.
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Funded Proposals

1. Co-I, "Terraforming Soil EERC: Accelerating Soil-Based Carbon Drawdown Through Advanced Genomics and Geochemistry," PI: Jennifer Pett-Ridge (LLNL), submitted in response to Energy Earth Shot Research Center DOE call, LAB 23-2954. Funded 2024-2027.
2. Co-I, "Farming Carbon: Accelerating the science of carbon sequestration and water security in working lands," PI: Jennifer Pett-Ridge (LLNL), submitted in response to LLNL call for Strategic Initiatives, funded 2024-2026.
3. Co-PI, (Gardner LLNL PI) for "Development of High-Fidelity Simulation Capabilities for ELM-free Design Optimization," PI: Fatima Ebrahimi (PPPL), submitted in response to the FES SciDAC Partnership call, DE-FOA-0002924. Aug. 2023-July 2027.
4. Co-PI (LLNL PI), "Nuclear Computational Low Energy Initiative (NUCLEI)," Thomas Papenbrock (Univ. TN), PI, a proposal to the DOE NP/ASCR SciDAC Partnership, DE-FOA-0002589. Funded 8/15/21-8/14/26.
5. Co-PI for "Physical, Accurate, and Efficient Atmosphere and Surface Coupling Across Scales," in response to solicitation DE-FOA-0002585, SciDAC: Partnerships in Earth System Model Development. PI: Hui Wan (PNNL). Funded Aug. 2022 – July 2027.
6. Co-PI, "Traversing the "death valley" separating short and long times in non-equilibrium quantum dynamical simulations of real materials," Garnet Chan (Caltech), PI, a proposal to the DOE BES/ASCR SciDAC Partnership, DE-FOA-0002441. Funded 8/15/21-8/14/25.
7. PI, "GitLab and Caliper Performance Testing for SUNDIALS," an ECP proposal funded for one year.
8. Co-I and Time Integration Lead for, "Frameworks, Algorithms, and Scalable Technologies for Mathematics (FASTMath) SciDAC Institute," a proposal to the DOE Office of Science Advanced Scientific Computing Office Applied Mathematics Program call for SciDAC Institutes, LAB 20-2223, with partners at LBNL, ORNL, ANL, SNL, MIT, RPI, SMU, CU Boulder, and USC, Funded 8/2020-7/2025.
9. PI for "Enabling Exascale Simulations with SUNDIALS and hypre," a project renewed for the Exascale Computing Project, funded 10/1/2020-6/30/2023.
10. Co-PI for "Extreme-Scale Scientific xSDK for ECP," a project renewed for the Exascale Computing Project, funded 10/1/2020-6/30/2023. PI: U. Yang (LLNL).
11. Co-PI for, "Assessing and Improving the Numerical Solution of Atmospheric Physics in E3SM, Phase 2" PI: Hui Wan (PNNL), funded 9/19-3/22.
12. Co-PI and Time Integrator Lead for, "Frameworks, Algorithms, and Scalable Technologies for Mathematics (FASTMath) SciDAC Institute," a proposal to the DOE Office of Science Advanced Scientific Computing Office Applied Mathematics Program call for SciDAC Institutes, LAB 17-1787, with partners at LBNL, ORNL, ANL, SNL, MIT, RPI, SMU, CU Boulder, and USC.
13. Co-PI for, "Assessing and Improving the Numerical Solution of Atmospheric Physics in ACME," PI: Hui Wan (PNNL), funded for 8/17-1/20.
14. PI for "Enabling Time Integrators for Exascale Through SUNDIALS," Solicitation for Software Technology for Exascale Systems, DOE ASCR, funded for 3 years.
15. Co-PI for "xSDK Numerical Libraries for the Exascale Computing Project," Solicitation for Software Technology for Exascale Systems, DOE ASCR, co-leads: Lois McInnes and Mike Heroux, funded for 3 years.
16. PI for "FASTMath SciDAC Institute Interactions with ParaDiS," funded 9/1/16-8/31/17.
17. PI for LLNL LDRD Exploratory Research, "Multirate Integrators for ODEs and DAEs," funded 10/1/16-9/30/19.
18. PI for, "Parallel in Time Algorithms for Solving Transient Stability Simulations for Power Systems," a proposal to the Energy Infrastructure Modeling and Analysis Program, DOE Office of Electricity Delivery and Energy Reliability. Funded for 8/16-6/17.

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19. LLNL PI for, "Computational Science for Grid Management," a Category 1 proposal in the Grid Modernization Laboratory Consortium, DOE Office of Electricity Delivery and Energy Reliability. Funded for 6/16-5/17.
 20. LLNL PI for, "Enabling a high resolution, integrated terrestrial simulation of the contiguous United States (CONUS) through enhanced computational interoperability," funded 9/1/2015-8/31/2017.
 21. LLNL PI for, "A Non-hydrostatic Variable Resolution Atmospheric Model in ACME," funded 9/1/2015-8/31/2018.
 22. PI for LDRD Feasibility Study, "Numerical Performance and Parallel Scalability of Multi-Rate Integrators Based on Discrete-Event Simulation," funded 6/2015-5/2016.
 23. PI for "FASTMath SciDAC Institute Interactions with ParaDiS," funded each year (10/1/12-9/30/15).
 24. Co-Investigator and FASTMath Liason on, "Multiscale Methods for Accurate, Efficient, and Scale-Aware Models of the Earth System," climate science SciDAC Center, PI: Bill Collins, LBNL. Funded 5/12-4/17.
 25. Co-Investigator on LDRD Exploratory Research, "Large-Scale Integrated Electric Transmission and Distribution Grid Dynamic Simulation," Liang Min, LLNL, (PI). Funded 10/12-9/15.
 26. Co-Investigator on, "Improving GE Concordia PSLF Simulation Performance and Capability," LLNL HPC 4 Energy proposal, PI: Devin Van Zandt, GE Energy Consulting. Funded for FY12.
 27. Co-Investigator on, "Frameworks, Algorithms, and Scalable Technologies for Mathematics (FASTMath) SciDAC Institute," PI: Lori Diachin, LLNL. Funded 9/11-8/16.
 28. PI for LDRD Exploratory Research, "An Adaptive Coupled Regional Climate and Hydrologic Modeling System for Accurate Wind-Power and Water-Resource Simulation," Carol S. Woodward (PI), Julie K. Lundquist, Reed M. Maxwell, Jeff Mirocha, Steven G. Smith, and Andrew F. B. Tompson. Funded 11/09-9/10.
 29. Co-Investigator on Uncertainty Quantification Strategic Initiative, Richard Klein (PI), "The Advance of UQ Science with Application to Climate Modeling, ICF Design and Science StockPile Stewardship: A Multi-directorate SI." Funded 10/09-9/12.
 30. PI for LDRD Feasibility Study, "A Posteriori Error Calculation of Hydrodynamics Simulations Using Adjoint Methodologies," 2008. Funded 10/08-11/09.
 31. Co-Investigator on "Towards Optimal Petascale Simulations," David Keyes (Columbia Univ.) PI, Funded 7/06-6/11, member of 7-person Steering Committee.
 32. Co-Investigator on "Terascale Optimal PDE Simulations (TOPS) Enabling Technology Center (ETC)," David Keyes (PI), 2001. Funded 2001-2006.
 33. Co-Investigator on, "Enabling Computational Technologies for Subsurface Simulations," Rob Falgout (PI), funded by LDRD 10/96-09/99.

Post-Doctoral Supervision

1. Steven Roberts (9/21 – 12/23), LLNL Fernbach Fellow, now at Center for Applied Scientific Computing (CASC) at LLNL
2. Stefanie Guenther (4/19 – 12/19), now in CASC at LLNL
3. Chris Vogl (5/17 – 3/19), now in CASC at LLNL
4. Matthieu Lecouvez (8/15-5/17); now at CEA-Bordeaux
5. David Gardner (7/14-12/16); now in CASC at LLNL
6. Aaron Lott (9/11-1/14); now at Universities Space Research Association (USRA)
7. Jeffrey Connors (8/10-8/13); now Associate Professor at University of Connecticut - Storrs
8. Daniel Reynolds (7/03-7/05); now Full Professor at Southern Methodist University
9. Miguel Dumett (7/01 -8/03); now at MathWorks

PhD Committees

1. Committee Member, Steven Roberts, Virginia Tech. University, PhD 2021
 2. Committee Member, Arash Sarshar, Virginia Tech. University, PhD 2021
 3. Committee Member, Benjamin Uekermann, Technical University of Munich, PhD, Oct. 28, 2016.
 4. Opponent for Christian Andersson, Lund University, Lund, Sweden, PhD, May 4, 2016.
 5. Committee Member for Todd Coffey, NCSU Mathematics Department, PhD, 2001-2003.
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Student Supervision

1. Thomas Blommel, Graduate Student at Univ. Michigan, May – Aug. 2022.
2. Shelby Lockhart, Graduate student at Univ. IL UC, June – Aug. 2018, 2020, and 2021.
3. Rujeko Chinomona, Graduate student at Southern Methodist University, June – Aug. 2019.
4. Ting Yan, Graduate student at SMU, June-Aug. 2017.
5. Austin Copeland, Graduate student at SMU, May-Aug. 2017.
6. Francois Hamon, Graduate student at Stanford University, June – Sept. 2016.
7. Benjamin Uekermann, Technical University of Munich, Sept. 9, 2015 – Oct. 30, 2015.
8. PhD Committee Member for Deena Giffin, NCSU Mathematics Department, 2013-2015.
9. Jean Sexton, Graduate student at SMU, May-Aug. 2014, June-Sept. 2015.
10. Alexis Guyot, Graduate student intern at RTE France, at LLNL April-Sept 2014.
11. Brianna Lynn, Graduate student at Rice University, June – Aug. 2014.
12. Chris Nguyen, Graduate student at Rice University, June - Aug. 2014.
13. Guanglian Li (TAMU), Azam Moosavi (VA Tech), Wei Du (UT Austin), and Anastasia Wilson (Clemson) for 9-month research project as part of the WhAM! A Research Collaboration Workshop for Women in Applied Mathematics: Numerical Partial Differential Equations and Scientific Computing, sponsored by the IMA, Aug. 2014-June 2015. Research project, “Adaptive coupling for multiphysics simulations.”
14. David Gardner, Graduate student at SMU, May-Sept. 2013.
15. Deena Hannoun, Graduate student at NCSU, May-August 2012.
16. Hillary Tiedeman, Graduate student at SMU, May-Aug. 2010.
17. Daniel Osei-Kuffuor, Graduate student at Univ. Minn., May-Aug. 2007, 2008, 2009, 2010.
18. Jason Howell, Graduate student at Clemson Univ., May-Aug. 2004, 2005, 2006.
19. Becky Wasyk, Graduate student at WPI, May-Aug. 2003, 2004.
20. Todd Coffey, Graduate student at NCSU, May-Aug. 2001, 2002.
21. Rachel Knop, Undergraduate at Westpoint, June-July 2001.
22. Kevin Scully, Graduate student at UC San Diego, May-Aug. 1999.
23. Lora Ballinger, Graduate student at Ball State University, May-Aug. 1998.

Software

1. SUNDIALS – Suite of Nonlinear and Differential/Algebraic Solvers, includes ODE and DAE time integrators with forward and adjoint sensitivity and algebraic nonlinear equation solvers, C language, distributed and threaded shared memory parallel; current project lead and prior developer, 1999-present.
 2. GridDyn – Transmission power grid simulator based on the SUNDIALS IDA integration package, C++, serial; contributor, 2012-2015.
 3. Transport3d/diffusion3d – 3D neutral particle transport code using the SUNDIALS CVODE time integrator, C language, distributed memory parallel; originator and main developer 1998-2005.
 4. PARFLOW (LLNL) – 3D, saturated and variably saturated subsurface flow simulator, C language, distributed memory parallel; originator and main developer of variably saturated flow model, 1996-2008.
 5. PREQS – 3D Richards’ equation solver for variably saturated subsurface flow, C++, distributed memory parallel; originator and main developer, 1995-1996.
 6. PARFLOW (Univ. of Texas) – 3D, two-phase subsurface flow simulator, Fortran, distributed memory parallel; contributor, 1994-1996.
 7. PARCEL – cell-centered finite difference elliptic equation solver, used balancing domain decomposition method for solution, Fortran 77, distributed memory parallel; contributor, 1992-1995.
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Publications

Papers in Review

1. Wan H, Zhang K, Vogl CJ, Woodward CS, Easter RC, Rasch PJ, Feng Y, Wang H. Numerical coupling of aerosol emissions, dry removal, and turbulent mixing in the E3SM Atmosphere Model version 1 (EAMv1), part I: dust budget analyses and the impacts of a revised coupling scheme. arXiv preprint arXiv:2306.05377 2023.

Refereed Papers (Journal and Conference)

1. Vogl CJ, Wan H, Woodward CS, Bui QM. Numerical coupling of aerosol emissions, dry removal, and turbulent mixing in the E3SM Atmosphere Model version 1 (EAMv1), part II: a semi-discrete error analysis framework for assessing coupling schemes. arXiv preprint arXiv:2306.04929. 2023. To appear in Geoscience Model Development.
2. John J. Loffeld and Andy Nonaka and Daniel R. Reynolds and David J. Gardner and Carol S. Woodward, "Performance of explicit and IMEX MRI multirate methods on complex reactive flow problems within modern parallel adaptive structured grid frameworks," <https://doi.org/10.48550/arXiv.2211.03293>. To appear in Int. J. High Perf. Comput. Appl.
3. Zhang S, Vogl CJ, Larson VE, Bui QM, Wan H, Rasch PJ, Woodward CS. Removing numerical pathologies in a turbulence parameterization through convergence testing. *Journal of Advances in Modeling Earth Systems*. 2023 May;15(5):e2023MS003633.
4. Reynolds, Daniel R. and Gardner, David J. and Woodward, Carol S. and Chinomona, Rujeko, 2023. ARKODE: A Flexible IVP Solver Infrastructure for One-Step Methods. *ACM Trans Math Softw.* volume 49, issue 2, pp. 1–26, 2023, <https://doi.org/10.1145/3594632>.
5. Gardner DJ, Reynolds DR, Woodward CS, Balos CJ. "Enabling New Flexibility in the SUNDIALS Suite of Nonlinear and Differential/Algebraic Equation Solvers," *ACM Trans. Math. Softw.* volume 48, issue 3, Article 31 (September 2022). <https://doi.org/10.1145/3539801>.
6. Lockhart S, Gardner DJ, Woodward CS, Thomas S, Olson LN. Performance of Low Synchronization Orthogonalization Methods in Anderson Accelerated Fixed Point Solvers. In *Proceedings of the SIAM Conference on Parallel Processing for Scientific Computing*, 2022. <https://epubs.siam.org/doi/10.1137/1.9781611977141.5>.
7. Balos CJ, Gardner DJ, Woodward CS, Reynolds DR. "Enabling GPU Accelerated Computing in the SUNDIALS Time Integration Library," *Parallel Computing*, **108**, Dec. 2021. <https://doi.org/10.1016/j.parco.2021.102836>.
8. Aggarwal I, Kashi A, Nayak P, Balos CJ, Woodward CS, Anzt H. Batched Sparse Iterative Solvers for Computational Chemistry Simulations on GPUs. In *2021 12th Workshop on Latest Advances in Scalable Algorithms for Large-Scale Systems (ScalA) 2021 Nov 19* (pp. 35-43). IEEE.
9. Roberts S, Loffeld J, Sarshar A, Woodward CS, Sandu A., "Implicit multirate GARK methods," *Journal of Scientific Computing* 87.1 (2021): 1-32. <https://doi.org/10.1007/s10915-020-01400-z>.
10. C. Vogl, S. Zhang, C. Woodward, H. Wan, P. Stinis, "Improving Time Step Convergence in an Atmosphere Model With Simplified Physics: Using Mathematical Rigor to Avoid Nonphysical Behavior in a Parameterization." *Journal of Advances in Modeling Earth Systems*. 2020 Oct;12(10):e2019MS001974.
11. H. Wan, C. Woodward, S. Zhang, C. Vogl, P. Stinis, D. Gardner, P. Rasch, X. Zeng, V. Larsen, and B. Singh, "Improving Time Step Convergence in an Atmosphere Model With Simplified Physics: The Impacts of Closure Assumption and Process Coupling." *Journal of Advances in Modeling Earth Systems*. 2020 Oct;12(10):e2019MS001982.
12. S. Guenther, R. D. Falgout, P. Top, C. S. Woodward, and J. Schroder, "Parallel-in-Time Solution of Power Systems with Unscheduled Events," in *Proceedings of the 2020 IEEE Power and Energy Society General Meeting (PESGM)*, Lawrence Livermore National Laboratory Report LLNL-CONF-796422. <https://ieeexplore.ieee.org/document/9281595>.
13. B. Kuffner, N. Engdahl, C. Woodward, L. Condon, S. Kollet, and R. Maxwell, "Simulating Coupled Surface-Subsurface Flows with ParFlow v3.5.0: Capabilities, applications, and ongoing development of an open-source, massively parallel, integrated hydrologic model," *Geoscientific Model Development*, **13**(3), 1373-1397, 10.5194/gmd-13-1373-2020, 2020.
14. M. Lecouvez, R. D. Falgout, and C. S. Woodward, "A parallel-in-time algorithm for variable step multistep methods," *Journal of Computational Science*, **37**, p.101029, 2019.
15. Vogl, Christopher J., Andrew Steyer, Daniel R. Reynolds, Paul A. Ullrich, and Carol S. Woodward. "Evaluation of Implicit-Explicit Additive Runge-Kutta Integrators for the HOMME-NH Dynamical Core." *Journal of Advances in Modeling Earth Systems*, **11**(12), p. 4228-4244, <https://doi.org/10.1029/2019MS001170>, 2019.
16. S. Zhang, H. Wan, P. Rasch, B. Singh, V. Larsen, and C. Woodward, "An objective and efficient method for assessing the impact of reduced-precision calculations on solution correctness," *Journal of Advances in Modeling Earth Systems*, **11**, 3131-3147. <https://doi.org/10.1029/2019MS001817>, 2019.
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- Large-Scale Heterogeneous System,” In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis*, p. 32. ACM, 2019.
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 21. J. Loffeld and C. S. Woodward, "Considerations on the implementation and use of Anderson acceleration on distributed memory and GPU-based parallel computers," in Letzter, Gail, et al., eds. *Advances in the Mathematical Sciences: Research from the 2015 Association for Women in Mathematics Symposium*. Vol. 6. Springer, 2016.
 22. Lecouvez, Matthieu, Robert D. Falgout, Carol S. Woodward, and Philip Top. "A parallel multigrid reduction in time method for power systems." In Power and Energy Society General Meeting (PESGM), 2016, pp. 1-5. IEEE, 2016.
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 33. J. W. Banks, J. A. F. Hittinger, J. M. Connors, C. S. Woodward, “A Posteriori error estimation via nonlinear error transport with application to shallow water,” in Recent Advances in Scientific Computing and Applications, *Contemporary Mathematics*, 586, Amer. Math. Soc., Providence, RI, 2013, pp. 35-42. DOI: 10.1090/conm/586/11646.
 34. D. E. Keyes, L. C. McInnes, C. Woodward, W. D. Gropp, E. Myra, M. Pernice, J. Bell, J. Brown, A. Clo, J. Connors, E. Constantinescu, D. Estep, K. Evans, C. Farhat, A. Hakim, G. Hammond, G. Hansen, J. Hill, T. Isaac, X. Jiao, K. Jordan, D. Kaushik, E. Kaxiras, A. Koniges, K. Lee, A. Lott, Q. Lu, J. Magerlein, R. Maxwell, M. McCourt, M. Mehl, R. Pawlowski, A. P. Randles, D. Reynolds, B. Riviere, U. Rude, T. Scheibe, J. Shadid, B. Sheehan, M. Shephard, A. Siegel, B. Smith, X. Tang, C. Wilson, and B. Wohlmuth, “Multiphysics simulations: Challenges and opportunities,” *International Journal of High Performance Computing Applications* 27, pp. 4–83, 2013. DOI: 10.1177/1094342012468181.
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44. A. C. Hindmarsh, P. N. Brown, K. E. Grant, S. L. Lee, R. Serban, D. Shumaker, and C. S. Woodward, "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," *ACM Transactions on Mathematical Software*, **31**(3), (2005), pp. 363 - 396. DOI: 10.1145/1089014.1089020.
45. Brown Peter N., Dana E. Shumaker, and Carol S. Woodward, "Fully Implicit Solution of Large-Scale Non-Equilibrium Radiation Diffusion with High Order Time Integration," *J. Comp. Phys.*, **204**(2), (2005), pp. 760-783. DOI: 10.1016/j.jcp.2004.10.031.
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Unrefereed Conference Papers and Book Chapters

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Technical Reports

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Journal Special Issue Introductions and News Articles

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5. J.A.F. Hittinger and C. S. Woodward, "Building simulation confidence through error estimation," Computation Annual Report, 2012.
6. Bakker, Mark; Farthing, Matthew W.; Kees, Christopher E., Woodward, Carol, "Computational challenges in the solution of water resources problems," *Advances in Water Resources*, **34** (9), 2011, pp. 1059-1061. DOI: 10.1016/j.advwatres.2011.08.003.
7. Tuminaro, Ray; Benzi, Michele; Cai, Xiao-Chuan; et al., "Special Section: 2010 Copper Mountain Conference," *SIAM J. Sci. Comput.*, **33** (5), 2011, pp. 2685-2685.
8. Tuminaro, Ray; Cai, Xiao-Chuan; Jordan, Kirk; et al., "Special Issue: 2008 Copper Mountain Conference," *SIAM J. Sci. Comput.*, **32** (1), 2010, pp. VII-VII.
9. Walker, H.F. and C.S. Woodward, "Application Scientists Join Algorithm Designers at Workshop on Large-Scale Nonlinear Problems," *SIAM News*, **37**, (2), (Mar 2004).
10. Vassilevski, P; Woodward, C. S., "Special issue on 'Solution methods for large-scale non-linear problems'," *Numerical Linear Algebra with Applications*, **8** (8), 2001, pp. 497-497. DOI: 10.1002/nla.261.
11. Walker, H. and C.S. Woodward, "Workshop on Solution Methods for Large-Scale Nonlinear Problems," *SIAM News*, April, 2001.

Invited Plenary Presentations

1. C. S. Woodward, "Considerations on Time Integrators and Numerical Software for Digital Twins," an **invited plenary presentation** to the NSF Mathematical Opportunities for Digital Twins Workshop, Arlington, VA, Dec. 12, 2023.
2. C. S. Woodward, C. J. Balos, P. N. Brown, D. J. Gardner, A. C. Hindmarsh, D. R. Reynolds, and R. Serban, "A Historical Perspective of SUNDIALS," an **invited prize plenary presentation** to the SIAM Conference on Computational Science and Engineering, Amsterdam, The Netherlands, Feb. 27, 2023.
3. Carol S. Woodward, "Time Integration Methods and Software for Scientific Simulations," an **invited plenary presentation** to the TX/LA SIAM Section Meeting, Houston, TX, Nov. 5, 2022.
4. Carol Woodward, "Solving Nonlinear Problems at a National Laboratory," **invited plenary presentation** at the STRIVE for MORE Workshop, held virtually, Sept. 25, 2021.
5. Carol S. Woodward, "Coupled Systems, Numerical Libraries, and High Performance Computing: How Do We Bring These Together?" an **invited keynote presentation** to the International Conference on Terrestrial Systems Research: Monitoring, Prediction and High Performance Computing, Bonn, Germany, April 5, 2018.
6. C.S. Woodward, "Multidisciplinary Research: Challenges and Recommendations from a National Laboratory Perspective," an **invited plenary presentation** to the NSF CyberBridges Workshop, Rochester, NY, Oct. 22, 2016.

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7. C. S. Woodward, "A Reconsideration of Fixed Point Methods for Nonlinear Systems," an **invited keynote presentation** to "Scientific Computing Across Louisiana," Baton Rouge, LA, Feb. 12, 2016.
 8. C. S. Woodward, "A Consideration of Tradeoffs Between Nonlinear and Linear Solution Methods in Solving Nonlinear Models in the Water Cycle," an **invited keynote presentation** to the SimRace, Conference on numerical methods and High Performance Computing for industrial fluid flows, Rueil-Malmaison, France, Dec. 10, 2015.
 9. C. S. Woodward, "A Reconsideration of Fixed Point Methods for Nonlinear Systems," an **invited plenary presentation** to the SPPEXA International Workshop on Numerical Methods on High-Performance Computers, Heidelberg, Germany, Dec. 1-3, 2014.
 10. Woodward, C. S., "Nonlinear Solvers for Variably Saturated Flow," an **invited plenary presentation** to *SCALA 2012: Scientific Computing Around Louisiana*, Baton Rouge, LA, Jan. 2012.
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Recent Selected Technical Presentations (from over 130)

1. C. S. Woodward, C. J. Balos, D. J. Gardner, and D. R. Reynolds, "Overview and Application Experiences with SUNDIALS," a minisymposium presentation to the International Congress on Industrial and Applied Mathematics, Tokyo, Japan, Aug. 23, 2023.
2. C. S. Woodward, D. J. Gardner, and S. Lockhart, "Anderson Acceleration in the KINSOL Nonlinear Solver Package," an invited oral presentation to the ICERM Workshop on "Acceleration and Extrapolation Methods," Providence, Rhode Island, July 26, 2023.
3. C. S. Woodward, "Adaptive Time Integrators and Their Use in Non-Equilibrium Quantum Simulations," a minisymposium oral presentation to the SIAM Conference on Computational Science and Engineering, Amsterdam, The Netherlands, March 1, 2023.
4. Chris Vogl, Carol Woodward, Hui Wan, Kai Zhang, Shixuan Zhang, Vincent Larson, Phil Rasch, Quan Bui, "An Error Analysis Framework for Process Coupling in Atmospheric Models," an invited colloquium presentation to the Rice University Department of Computational Mathematics and Operations Research, Houston, TX, Nov. 7, 2022.
5. Carol S. Woodward, "Time Integration Methods and Software for Scientific Simulations," an invited colloquium presentation to the Colorado State University Mathematics Department, Ft. Collins, CO, Oct. 24, 2022.
6. Carol S. Woodward, Daniel R. Reynolds, David J. Gardner, and Cody J. Balos, "The SUNDIALS Suite of Time Integrators and Nonlinear Solvers: Its Capabilities, Design, and Role in Ushering New Methods Into Scientific Applications," an invited virtual seminar presentation to the University of Waterloo Numerical Analysis and Scientific Computing Seminar Series, Sept. 27, 2022.
7. C.S. Woodward, "Time Integration Methods and Software for Scientific Simulations," an oral presentation given to the ICIAM Workshop on Industrial and Applied Mathematics, Glasgow, Scotland, Sept. 1, 2022.
8. Chris Vogl, Carol Woodward, Hui Wan, Kai Zhang, Shixuan Zhang, Vincent Larson, Phil Rasch, Quan Bui, "An Error Analysis Framework for Process Coupling in Atmospheric Models," an oral presentation to the International Conference on Scientific Computation and Differential Equations (SciCADE), Reykjavik, Iceland, July 2022.
9. Carol S. Woodward, Daniel R. Reynolds, David J. Gardner, and Cody J. Balos, "The SUNDIALS Suite of Time Integrators and Nonlinear Solvers: Its Capabilities, Design, and Role in Ushering New Methods Into Scientific Applications," an invited presentation to the Holistic Design of Time-Dependent PDE Discretization Workshop, presentation given virtually at hybrid workshop, Providence, RI, Jan. 11, 2022.
10. C. S. Woodward, D. J. Gardner, D. R. Reynolds, and C. J. Balos, "The SUNDIALS Time Integrator Software Suite and Multirate Methods," an oral presentation to the Workshop on Computational and Mathematical Challenges in Complex Engineering Systems, held virtually, June 23, 2021.
11. Carol S. Woodward, "Recent Advances in Time Integration Methods and How They Can Enable Exascale Simulations," an invited lecture as part of the 46th Annual Spring Lecture Series, University of Arkansas Mathematics Department, held virtually, April 7, 2021.
12. Carol S. Woodward, Daniel R. Reynolds, David J. Gardner, and Cody J. Balos, "Overview of New Features in SUNDIALS Time Integrators," an invited minisymposium presentation at the SIAM Conference on Computational Science and Engineering, held virtually, March 3, 2021.
13. C. S. Woodward, D. J. Gardner, J. Loffeld, and D. R. Reynolds, "Multirate Time Integration Methods and Their Deployment in the SUNDIALS Library," an invited session presentation to the Joint Math Meetings, Denver, CO, Jan. 15, 2020.
14. C. S. Woodward, "Application of Anderson Acceleration in Parallel," an invited minisymposium presentation at the AMS Fall Southeast Sectional Meeting, Gainseville, FL, Nov. 2, 2019.
15. C. J. Vogl, D. R. Reynolds, P. A. Ullrich, A. J. Steyer, C. S. Woodward, and D. J. Gardner, "Evaluation of Implicit-Explicit Runge-Kutta Integrators for the HOMME-NH Dynamical Core," an invited minisymposium presentation at the SciCADE Conference, Innsbruck, Austria, July 23, 2019.

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16. C. S. Woodward, D. R. Reynolds, D. J. Gardner, A. C. Hindmarsh, and C. Balos, "The SUNDIALS Suite of Nonlinear Differential-Algebraic Solvers: Status and Plans," an invited minisymposium presentation to the International Congress on Industrial and Applied Mathematics, Valencia, Spain, July 19, 2019.
 17. C. S. Woodward, D. R. Reynolds, D. J. Gardner, and C. J. Balos, "An Overview of the SUNDIALS Suite of Time Integrators and Nonlinear Solvers," an invited presentation to the Women in Numerical Methods for PDEs and their Applications, Banff, Alberta, Canada, May 15, 2019.
 18. C. S. Woodward, "Overview of Code and Calculation Verification Practices and Their Use in Scientific Computing," an invited minisymposium presentation to the SIAM Conference on Mathematical and computational Issues in the Geosciences, Houston, TX, March 13, 2019.
 19. C. S. Woodward, R. D. Falgout, M. Lecouvez, J. B. Schroder, and P. Top, "Parallel Multigrid Reduction in Time (MGRIT) Applied to Power Grid Simulations," an invited minisymposium presentation to the SIAM Conference on Computational Science and Engineering, Spokane WA, Feb. 26, 2019.
 20. C. S. Woodward, D. R. Reynolds, D. J. Gardner, C. J. Balos, and S. Peles, "Designing Integrators for User Flexibility: Interface Design in the SUNDIALS Suite of Nonlinear and Differential/Algebraic Solvers," an invited presentation to the *Integrating the Integrators Workshop*, Banff, Canada, Dec. 3, 2018.
 21. Carol S. Woodward, Michael Heroux, Xiaoye Li, Lois Curfman McInnes, James Willenbring, and Ulrike Yang, "Toward a Community Software Development Kit (SDK) Including Iterative Solver Software," an oral presentation to the Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, March 27, 2018.
 22. Carol S. Woodward, Daniel R. Reynolds, David J. Gardner, Slaven Peles, and John Loffeld, "Preparing SUNDIALS for Exascale Computing Platforms," an invited minisymposium presentation given to the SIAM Conference on Parallel Processing, Tokyo, Japan, March 9, 2018.
 23. C. S. Woodward, "Solving Nonlinear and Time-Dependent Equations for the Department of Energy," an invited presentation to the Institute for Mathematics and Its Applications Industrial Problems Seminar Series, Minneapolis, MN, Dec. 1, 2017.
 24. C. S. Woodward, David J. Gardner, Jorge E. Guerra, Daniel R. Reynolds, Chris Vogl, and Paul Ullrich, "An Overview of the SUNDIALS suite of Nonlinear Differential/Algebraic Equation Solvers and an Application to Nonhydrostatic Climate Dynamics," an invited presentation to the University of Exeter Geophysical and Astrophysical Fluid Dynamics Seminar Series, Exeter, England, Sept. 18, 2017.
 25. C. S. Woodward, David J. Gardner, Jorge E. Guerra, Daniel R. Reynolds, and Paul Ullrich, "An Overview of the SUNDIALS suite of Nonlinear Differential/Algebraic Equation Solvers and an Application to Nonhydrostatic Climate Dynamics," a contributed presentation to SciCADE, Bath, England, Sept. 12, 2017.
 26. D. McNabb, T. Arsenlis, and C. Woodward, "Working with ASCR to build better material strength models," an invited presentation to NNSA ASC Program Headquarters staff, Washington, DC, Feb. 23, 2017.
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Workforce Development Presentations

1. C. S. Woodward, "The Standing Committee for Gender Equality in Science," a minisymposium presentation to the International Congress on Industrial and Applied Mathematics, Tokyo, Japan, Aug. 23, 2023.
2. Moderator of mid-career panel at the SIAM Conference on Computational Science and Engineering, Amsterdam, The Netherlands, March 2, 2023.
3. C. S. Woodward and C. Jami, "Standing Committee for Gender Equality in Science: Activities 2020-2022," an oral presentation to the SCGES Meeting with the International Science Council and International Scientific Unions, Paris, France, Feb. 14, 2023.
4. Carol S. Woodward, Cody J. Balos, David J. Gardner, and Daniel R. Reynolds, "Overview and Use of New Features in the SUNDIALS Suite of Nonlinear and Differential/Algebraic Equation Solvers," a tutorial presentation to the Exascale Computing Project Annual Meeting, held virtually, May 2, 2022.
5. C. S. Woodward, D. R. Reynolds, D. J. Gardner, C. J. Balos, "Introduction to the Capabilities and Use of the SUNDIALS Suite of Nonlinear and Differential/Algebraic Equation Solvers," a tutorial given to the Exascale Computing Project Annual Meeting, Houston, TX, Feb. 4, 2020.
6. C. S. Woodward, D. R. Reynolds, D. J. Gardner, C. J. Balos, "Introduction to the Capabilities and Use of the SUNDIALS Suite of Nonlinear and Differential/Algebraic Equation Solvers," a tutorial given to the Exascale Computing Project Annual Meeting, Houston, TX, Jan. 15, 2019.
7. Woodward, C. S., "Time Integration," an invited presentation to the Argonne Training Program on Extreme-Scale Computing, St. Charles, IL, Aug. 2017.
8. C. S. Woodward, "Doing Mathematics in Real Life," an invited presentation to the Julia Robinson Mathematics Festival, Arroyo Secco Elementary School, Livermore, CA, April 18, 2017.
9. C. S. Woodward, "A Brief History of ParFlow," an invited presentation to the 1st ParFlow Developer Workshop, Bonn University and Research Center Juelich, Mar. 27, 2017.
10. Woodward, C. S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," an invited presentation to the Argonne Training Program on Extreme-Scale Computing, St. Charles, IL, Aug. 2016.

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11. C. S. Woodward, "Opponent Overview of Field for Thesis: Methods and Tools for Co-Simulation of Dynamic Systems with the Functional Mock-Up Interface by Christian Andersson," an invited presentation to the Centre for Mathematical Sciences, Lund University, Lund, Sweden, May 4, 2016.
 12. C.S. Woodward, "Tips for a Successful Interview," a presentation to the Texas A&M University SIAM Chapter student members, College Station, TX, March 7, 2016.
 13. Woodward, C. S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," an invited presentation to the "CASC Software" Short Course at Stanford University, Palo Alto, CA, June, 2015.
 14. Woodward, C.S., "From Groundwater Flow to Crystal Dislocation Dynamics: Solving Differential Equations for the Department of Energy," an invited presentation to the Rice University CAM Department Student Seminar Series, March 2014.
 15. Woodward, C. S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," an invited presentation to the Argonne Training Program on Extreme-Scale Computing, St. Charles, IL, Aug. 2014.
 16. C. S. Woodward and T. Critchlow, "Tips for a Successful Interview," a presentation given to the WhAM! A Research Collaboration Workshop for Women in Applied Mathematics: Numerical Partial Differential Equations and Scientific Computing, Minneapolis, MN, Aug. 2014.
 17. Woodward, C. S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," an invited presentation to the Argonne Training Program on Exascale Computing, St. Charles, IL, Aug. 2013.
 18. Woodward, C.S., "From Groundwater Flow to Crystal Dislocation Dynamics: Solving Differential Equations for the Department of Energy," an invited presentation to the IMA Careers for Women in Mathematics Conference, Minneapolis, MN, March 2013.
 19. Woodward, C. S., and J. Bennett, "Computational Science Panel," an invited presentation to the *Grace Hopper Celebration of Women in Computing*, Portland, OR, Nov. 2011.
 20. Woodward, C.S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," a presentation to the *DOE ACTS Toolkit Workshop*, Berkeley, CA, Aug. 2012. UCRL-PRES-213978.
 21. Woodward, C.S., "Tips for a successful Interview," a presentation to the LLNL ISCR summer students, July 2011. UCRL-PRES-144928.
 22. Woodward, C.S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," a presentation to the DOE ACTS Toolkit Workshop, Berkeley, CA, Aug. 2011. UCRL-PRES-213978.
 23. Woodward, C.S., "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," a presentation to the DOE ACTS Toolkit Workshop, Berkeley, CA, Aug. 2010.
 24. Woodward, C.S., "Tips for a successful Interview," a presentation to the LLNL ISCR summer students, July 2010.
 25. Woodward, C.S., "Nonlinear and Linear Solvers in ParFlow," ParFlow short course, Colorado School of Mines, Golden, CO, May 18, 2009, LLNL-PRES-413080.
 26. Invited panelist for a Professional Development panel at the SIAM Annual meeting discussing service and networking in the early research career, 2009.
 27. "Tips for a Successful Interview," a presentation to the LLNL Computation Summer Student Program, Livermore, CA, July 9, 2007.
 28. "Implicit Newton-Krylov Solvers for Large-Scale Nonlinear Problems," a presentation to the LLNL Computation Summer Student Program, Livermore, CA, July 30, 2007.
 29. "Implicit Newton-Krylov Solvers for Large-Scale Nonlinear Problems," a presentation to the LLNL Computation Summer Student Program, Livermore, CA, August 16, 2006.
 30. "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," a presentation to the DOE ACTS Toolkit Workshop, Berkeley, CA, August 23, 2006.
 31. Team-Based Research," a presentation given to the CSE Graduate Education Panel at the SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, Feb. 18-23, 2007.
 32. Terence Critchlow and Carol Woodward, "Tips for a Successful Interview," a lecture presented to the LLNL 2005 Summer Student Program.
 33. Woodward, C.S., "Computational Science Opportunities at LLNL," an invited panel representation for *Industry Panel: Opportunities for Mathematicians and Computational Scientists* at *SIAM Annual Meeting*, Portland, OR, July 12-16, 2004.
 34. Woodward, C.S., "The Administrative Career Track: Pros, Cons, and Factors," an invited mini symposium presentation for the *Association for Women in Mathematics Workshop*, Portland, OR, July 2004.
 35. Terence Critchlow and Carol Woodward, "Tips for a Successful Interview," a lecture presented to the LLNL 2003 Summer Student Program.
 36. Terence Critchlow and Carol Woodward, "Tips for a Successful Interview," a lecture presented to the LLNL 2002 Summer Student Program.

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37. Woodward, C. S. and T. J. Critchlow, "Some Tips on a Successful Interview," a presentation to the *LLNL summer student program*, August 2001.
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Posters

1. Carol S. Woodward, Daniel R. Reynolds, David J. Gardner, and Cody J. Balos, "Enabling Simulations with SUNDIALS Time Integrators and Solvers," a poster presentation to the LLNL Computing Directorate External Review Committee, April 2022.
2. C. S. Woodward, D. R. Reynolds, A. C. Hindmarsh, D. J. Gardner, C. J. Balos, "SUNDIALS Suite of nonlinear and Differential / Algebraic Equation Solvers," a poster given to the SIAM Annual Meeting, held virtually, July 2020.
3. C. S. Woodward, "FASTMath Time Integration Activities," a poster presented to the DOE SciDAC Program PI Meeting, Rockville, MD, July 16, 2019.
4. C. S. Woodward, H. Wan, S. Zhang, C. J. Vogl, V. Larson, P. Stinis, P. Rasch, X. Zeng, "Improving Numerical Robustness and Physical Consistency of Atmospheric Physics Parameterizations," a poster presented to the DOE SciDAC Program PI Meeting, Rockville, MD, July 16, 2019.
5. C. S. Woodward, D. R. Reynolds, A. C. Hindmarsh, D. J. Gardner, C. J. Balos, and S. Peles, "SUNDIALS: Suite of Nonlinear and Differential-Algebraic Solvers," a poster given to the Exascale Computing Project Annual Meeting, Houston, TX, Jan. 16, 2019.
6. Carol S. Woodward, Hui Wan, Shixuan Zhang, Christopher Vogl, Panos Stinis, David J. Gardner, Xubin Zeng, Vince Larson, and Balwinder Singh, "Improving Time-step Convergence in an Atmosphere Model with Simple Physics," a poster presented to the Earth and Environmental System Modeling Principal Investigator's Meeting, Potomac, MD, Nov. 5-9, 2018.
7. C. S. Woodward, "FASTMath Time Integration Activities," a poster presentation to the SciDAC PI Meeting, Rockville, MD, July 23-24, 2018.
8. C. S. Woodward, D. R. Reynolds, and D. J. Gardner, "Enabling Time Integrators for Exascale Through SUNDIALS, SUite of Nonlinear and Differential-ALgebraic Solvers," a poster presentation given to the Exascale Computing All Hands Meeting, Knoxville, TN, Feb. 7, 2018.
9. C. S. Woodward, D. R. Reynolds, D. J. Gardner, L. E. Banks, S. Peles, and A. C. Hindmarsh, "Software Productivity Strategies for the SUNDIALS Suite of Time Integrators and Nonlinear Solvers," an invited poster presentation to the SIAM Conference on Computational Science and Engineering, Atlanta, GA, Mar. 2, 2017.
10. Woodward, C. S., P. M. Caldwell, K. J. Evans, and D. J. Gardner, "Nonlinear Solver Research for Implicit Solutions of Climate Dynamics and Physics," a poster presentation to AXICCS Workshop, Rockville, MD, September 12 – 13, 2016.
11. David J. Gardner, Daniel R. Reynolds, and Carol S. Woodward, "SUNDIALS: Suite of Nonlinear and Differential/algebraic Equation Solvers," a poster presentation to the ICERM Topical Workshop on Solution Methods for Large-Scale Nonlinear Systems and Their Applications, Providence, RI, Sept. 1, 2015.
12. Daniel R. Reynolds and Carol S. Woodward, "SUNDIALS: Suite of Nonlinear and Differential/algebraic Equation Solvers," a poster presentation at the SIAM Conference on Computational Science and Engineering, Salt Lake City, UT, March 2015
13. Carol S. Woodward, Daniel R. Reynolds, and Andy Salinger, "FASTMath Nonlinear and ODE Solver Technologies," a poster presentation to the SciDAC PI Meeting, Alexandria, VA, Jul 30, 2014.
14. Arsenlis, A., S. Aubry, G. Hommes, C. Woodward, D. Gardner, D. Reynolds, "ParaDiS: Parallel Dislocation Dynamics," in "Impact of FASTMath Solver Technologies on Scientific Applications," a poster to the SciDAC PI Meeting 2013, Rockville, MD, July 2013.
15. Woodward, C. S., A. Arsenlis, S. Aubry, G. Hommes, M. Rhee, "Nonlinear Solvers for Dislocation Dynamics," a contributed poster to the SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, PA, June 2013.
16. Woodward, C. S., "Numerical Convergence Study of Selected Burn Calculations," a poster presented to *NEDPC*, Oct. 2011.
17. Reynolds, D., A. Salinger, B. Smith, and C. Woodward, "FASTMath Nonlinear Solver and Time Integration Tools," a contributed poster to the SciDAC PI Meeting 2012, Rockville, MD, Sept. 2012.
18. J. M. Connors, J. W. Banks, J. A. F. Hittinger, and C. S. Woodward, "Quantifying numerical error in hydrodynamic simulations," a poster presented at the LLNL Science and Technology Advisory Board meeting, March, 2011. LLNL-POST-471283.
19. P. A. Lott, H. C. Elman, K. J. Evans, X. S. Li, A. G. Salinger, and C. S. Woodward, "Recent Progress in Nonlinear and Linear Solvers," a poster presentation to the SciDAC 2011 Conference, Denver, CO, July 10-14, 2011. LLNL-POST-490289.
20. Woodward, Carol S., Reed M. Maxwell, Julie K. Lundquist, Jeff Mirocha, Steven G. Smith, and Andrew F. B. Tompson, "Wind Energy Resource Assessment Using Coupled Groundwater-Land-Surface Atmospheric Models," poster presentation at American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2009.
21. Hittinger, J. A. F. and C. S. Woodward, "Numerical Convergence Behavior and Calculation Verification of Weapon-Relevant Calculations (U)," a poster presented at the NECDC 2008.

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22. Woodward, C.S., P. N. Brown, K. E. Grant, P. Nowak, and M. Zika, "On the Use of Nonlinear Residuals for Assessing Nonlinear Convergence and Timestep Selection in Radiation-Hydrodynamic Calculations," a poster presented to the NECDC 2008.
 23. C. S. Woodward, R. M. Maxwell, J.K. Lundquist, J. D. Mirocha, S.G. Smith, F. K. Chow, S. J., Kollet, "Wind energy resource assessment using coupled groundwater-land-surface atmospheric models," a poster presented to the AGU Winter Meeting, San Francisco, CA, Dec. 2009, LLNL-POST-409464.
 24. "Early Results of B Division Code Verification," a poster given to the NECDC 2006, Los Alamos, NM, Oct. 23-27, 2006.
 25. Woodward, C.S., "Computational Science Opportunities at Lawrence Livermore National Laboratory," an invited poster for the DOE Computational Science Graduate Fellowship Annual Meeting, Washington, D.C., July 2004. UCRL-BR-205160.
 26. Carol S. Woodward, P. Brown, et.al, "SUNDIALS: Suite of Nonlinear and Differential/Algebraic Equation Solvers," a poster presentation to the SciDAC PI meeting, Napa, CA, March 10, 2003.
 27. S. Ashby, C. Baldwin, W. Bosl, S. Carle, R. Falgout, R. Hornung, R. Maxwell, N. Rosenberg, D. Shumaker. S. Smith, A. Tompson, and C. Woodward, *Modeling Groundwater Flow Through Heterogeneous Porous Media on Massively Parallel Computers*, a poster presented at SuperComputing 97, November 1997.
 28. Woodward, C.S., "Analysis of Numerical Methods for Variably Saturated Subsurface Flow," a poster presentation to the Workshop on Advanced Simulation of Subsurface Flow and Contaminant Transport, North Carolina Supercomputing Center. December 1996.
 29. Woodward, C.S., "Numerical Methods for Variably Saturated Subsurface Flow," a poster presentation to the Julia Robinson Celebration of Women in Mathematics. Mathematical Sciences Research Institute. July 1996.
 30. Woodward, C.S., C. Dawson, and M.F. Wheeler, "A Two-Grid Finite Difference Scheme for Nonlinear Parabolic Equations," a poster presentation to the Workshop on Iterative Methods for Large Scale Nonlinear Problems, Utah State University. September 1995.