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Education

Brown University, Providence, RI	Applied Mathematics	Ph.D. May 1998
Thesis title: <i>Algorithms for Large-Scale Parallel Simulation of Unsteady Incompressible Flows in Three-Dimensional Complex Geometries.</i>		
Brown University, Providence, RI	Applied Mathematics	M.S. May 1994
University of Vermont, Burlington, VT	Mathematics	M.S. May 1992
(Completed course requirements for M.S. in Computer Science.)		
Duke University, Durham, NC	Physics	B.S. May 1986 (Cum Laude)

Professional Experience

5/11-present	Full Professor, Department of Computer Science, University of Colorado at Boulder.
9/06-present	Computer Science Section Head, Computational and Information Systems Laboratory, NCAR.
9/06-present	Director, Computational Science Center, University of Colorado at Boulder.
8/06-present	Scientist III, Computational and Information Systems Laboratory, NCAR.
9/04-present	Affiliated Faculty, Department of Applied Mathematics, University of Colorado at Boulder.
8/02-5/11	Associate Professor, Department of Computer Science, University of Colorado at Boulder.
9/09-8/10	Faculty Director, Research Computing, University of Colorado at Boulder.
9/05-9/06	Numerical Methods Group Head, Computational and Information Systems Laboratory, NCAR.
4/04-9/06	Computer Science Group Head, Computational and Information Systems Laboratory, NCAR.
8/02-9/06	Faculty Guest, MCS Division, Argonne National Laboratory.
8/02-8/06	Scientist II, Computational and Information Systems Laboratory, NCAR.
9/01-8/02	Assistant Computer Scientist, MCS Division, Argonne National Laboratory.
9/00-8/02	Lecturer, Department of Computer Science, University of Chicago.
1/00-8/02	Fellow, Computation Institute, University of Chicago and Argonne National Laboratory.
6/98-9/01	Research Associate, Department of Computer Science, University of Chicago (Member of the DOE ASC Center for Astrophysical Thermonuclear Flashes).
6/98-9/01	Visiting Research Fellow, MCS Division, Argonne National Laboratory.
1/98-6/98	Teaching Fellow, Division of Applied Mathematics, Brown University.
9/94-1/98	Research Assistant, Division of Applied Mathematics, Brown University.
6/93-9/97	Teaching Fellow, Summer Studies Program, Brown University.
9/89-6/92	Teaching Assistant, Dept. of Computer Science and Dept. of Math. and Statistics, U. of Vermont.

Scientific and Technical Accomplishments

- Co-developer of incompressible flow solver NEK5000.
- Developer of the Tufo-Fischer parallel direct solver method (also known as the XXT method).
- Member of the development team for version 1.62 of FLASH, an adaptive mesh refinement reactive flow code.
- Member of the development team for HOMME, a high-order dynamical core development environment.
- Team leader for discontinuous Galerkin development in HOMME.
- Lead designer of a service oriented architecture for Grid-BGC, an end-to-end solution for terrestrial ecosystem modeling.
- Co-developer of immersive visualization system for NEK5000.

- Consortium leader for the acquisition of the IBM Blue Gene/L system Frost.
- Leader of the Research Systems Evaluation Team (ReSET) at NCAR.
- Manager of TeraGrid Operations at NCAR.
- Principal architect of the CU Janus supercomputer (#31 on the June 2010 Top500) and its co-designed facility.

Honors and Awards

05/09	Dean's Faculty Fellowship.
07/06	IBM Faculty Award.
05/06	Dean's Faculty Fellowship.
07/05	IBM Faculty Award.
06/05	Dean's Award for Professional Progress.
11/00	Gordon Bell Prize for FLASH, Special Category (with FLASH team).
11/99	Gordon Bell Prize for NEK5000, Special Category (with Dr. Paul Fischer).

Publications

Thesis

1. H.M. Tufo, "Algorithms for Large-Scale Parallel Simulation of Unsteady Incompressible Flows in Three-Dimensional Complex Geometries", Ph.D. Thesis, Brown University, May, 1998.

Journal

2. S. K. Mishra, M. Taylor, R. Nair, H.M. Tufo, and J. J. Tribbia, "Equivalent Resolutions of Dynamical Cores in CAM5 Framework", Atmospheric Science Letters, in preparation.
3. M. Woitaszek, B. Mayer, J. Garcia, and H.M. Tufo, "Grid-based Science Gateway Lifecycle Experiences", Journal of Grid Computing, in preparation.
4. S. K. Mishra, M. Taylor, R. Nair, H.M. Tufo, and J. J. Tribbia, "Examination of the Convergence of HOMME in CAM5", J. Climate Dynamics, in preparation.
5. S. K. Mishra, M. Taylor, R. Nair, P. H. Lauritzen, H.M. Tufo, and J. J. Tribbia, "Evaluation of the HOMME Dynamical Core in the Aqua-Planet Configuration of NCAR CAM4: Rainfall", Journal of Climate, in press.
6. J.M. Dennis, M. Levy, R.D. Nair, H.M. Tufo, and T. Voran, "Development of a Scalable Discontinuous Galerkin Atmospheric Model", International Journal of Computational Science and Engineering, 12 pages, in press.
7. S. K. Mishra, M. Taylor, R. Nair, H.M. Tufo, and J. J. Tribbia, "Performance of the HOMME Dynamical Core in the Aqua-Planet Configuration of NCAR CAM4: Equatorial Waves", Annales Geophysicae, 29, pp. 221-227, 2011.
8. B.J. Kadlec, H.M. Tufo, G.A. Dorn, "Knowledge-Assisted Visualization and Segmentation of Geologic Features using Implicit Surfaces", IEEE Computer Graphics and Applications, 30(1), pp. 30-39, 2010.
9. M.N. Levy, R.D. Nair and H.M. Tufo, "A High-Order Element-Based Galerkin Method for the Barotropic Vorticity Equation, Int. J. of Numer. Meth. Fluids, doi: 10.1002/fld.1874, 2009.
10. R.D. Nair, C.-W. Choi and H.M. Tufo, "Computational Aspects of a High-Order Discontinuous Galerkin Atmospheric Dynamical Core", Computers & Fluids, 38(2), 309-319, 2009.
11. B.J. Kadlec, H.M. Tufo, G.A. Dorn, and D.A. Yuen, "Interactive 3-D Computation of Fault Surfaces Using Level Sets", Vis Geosci., 13 (1), pp. 133-138, 2008.
12. J.M. Dennis and H.M. Tufo, "Scaling Climate Simulation Applications on IBM Blue Gene", IBM J. Res. & Dev., Vol. 52, No. 1/2, pp. 117-126, January/March 2008.

13. A. St-Cyr, J.M. Dennis, C.J. Jablonowski, S.J. Thomas, and H.M. Tufo, "A Study of Adaptive Non-Conforming GCMs for Climate Modeling", *Monthly Weather Review*, 136(6), pp. 1898–1922, 2008.
14. G. Bhanot, J.M. Dennis, J. Edwards, W. Grabowski, M. Gupta, K. Jordan, R.D. Loft, J. Sexton, A. St-Cyr, S.J. Thomas, H.M. Tufo, T. Voran, R. Walkup, and A.A. Wyszogrodzki, "Early Experiences with the 360TF IBM Blue Gene/L Platform", *International Journal of Computational Methods*, 5(2), pp. 237-253, 2008.
15. R.D. Nair and H. M. Tufo, "Petascale Atmospheric General Circulation Models", *Journal of Physics: Conference Series*, 78, SciDAC 2007, IOP Publishing, doi: 10.1088/1742-6596/78/1/012078, 2007.
16. M.N. Levy, R.D. Nair, and H.M. Tufo, "High-Order Galerkin Methods for Scalable Global Atmospheric Models", *Computers and Geosciences*, 33(8), pp. 1022-1035, 2007.
17. V. Cheruvu, R.D. Nair, and H.M. Tufo, "A Spectral Finite Volume Transport Scheme on the Cubed Sphere", *Applied Numerical Mathematics*, 57(9), pp. 975-1080, 2007.
18. J.M. Dennis, A. Fournier, W. Spitz, A. St-Cyr, M. Taylor, S.J. Thomas, and H.M. Tufo, "High Resolution Mesh Convergence Properties and Parallel Efficiency of a Spectral Element Atmospheric Dynamical Core", *International Journal of High Performance Computing Applications*, Special Issue on Climate Modeling, Eds. J.B. Drake, P. Jones, and G. Carr., 19(3), pp. 225-245, 2005.
19. M. Hamady, T. Cheung, H.M. Tufo, R. Knight, "Using Structural Properties to Predict Behavior of Related Proteins: Does Protein Structure Influence Trypsin Miscoleavage?", *IEEE Engineering in Medicine and Biology Magazine* (http://emb-magazine.bme.uconn.edu/EMB_Main/Past_Issues/2005May/2005May.htm), May/June Issue, pp. 58-66, 2005.
20. G. Dimonte, A. Dimits, S. Weber, D.L. Youngs, A.C. Calder, B. Fryxell, J. Biello, L.J. Dursi, P. MacNiece, K. Olson, P. Ricker, R. Rosner, F.X. Timmes, H.M. Tufo, Y.-N Young, M. Zingale, M.J. Andrews, P. Ramaprabhu, S. Wunsch, C. Garasi, and A. Robinson, "A Comparison of High-Resolution 3D Numerical Simulations of Turbulent Rayleigh-Taylor (RT) Instability: Alpha-Group Collaboration", *Phys. Fluids*, 16(5), pp. 1668-1693, 2004. (4th most highly cited Physics of Fluids paper in the 2002-2007 period.)
21. S.J. Thomas, J.M. Dennis, H.M. Tufo, and P.F. Fischer, "A Schwarz Preconditioner for the Cubed-Sphere", *SIAM J. Sci. Comp.*, 25(2), pp. 442-453, 2003.
22. A.C. Calder, B. Fryxell, T. Plewa, R. Rosner, T. Dupont, J.O. Kane, H.F. Robey, B.A. Remington, R.P. Drake, G. Dimonte, M. Zingale, L.J. Dursi, F.X. Timmes, K. Olson, P. Ricker, P. MacNeice, and H.M. Tufo, "On Validating an Astrophysical Simulation Code", *ApJS*, 143, pp. 201-245, 2002.
23. M. Greiner, P.F. Fischer, and H.M. Tufo, "Two Dimensional Simulations of Enhanced Heat Transfer in an Intermittently Grooved Channel", *ASME J. Heat Transfer*, 124, pp. 538-545, 2002.
24. M. Greiner, P.F. Fischer, H.M. Tufo, and R.A. Wirtz, "Three Dimensional Simulations of Enhanced Heat Transfer in a Flat Passage Downstream from a Grooved Channel", *ASME J. of Heat Transfer*, 124, pp. 169-176, 2002.
25. M. Greiner, P.F. Fischer, and H.M. Tufo, "Numerical Simulations of Resonant Heat Transfer Augmentation at Low Reynolds Numbers", *ASME J. Heat Transfer*, 124, pp. 1169-1175, 2002.
26. H.M. Tufo and P.F. Fischer, "Fast Parallel Direct Solvers for Coarse Grid Problems", *J. Par. & Dist. Computing*, 61(2), pp. 151-177, 2001.
27. Y.-N. Young, H.M. Tufo, and R. Rosner, "On the Miscible Rayleigh-Taylor Instability: Mixing Layer Width Scaling in 2- and 3-D", *J. Fluid Mech.*, 447, pp. 377-408, 2001.

28. M. Zingale, F.X. Timmes, B. Fryxell, D.Q. Lamb, K. Olson, A.C. Calder, L.J. Dursi, P.M. Ricker, R. Rosner, P. MacNeice, and H.M. Tufo, "Helium Detonations on Neutron Stars", *ApJS*, 133, pp. 195-220, 2001.
29. B. Fryxell, M. Zingale, F.X. Timmes, D.Q. Lamb, K. Olson, A.C. Calder, L.J. Dursi, P. Ricker, R. Rosner, J.W. Truran, P. MacNeice, and H.M. Tufo, "Numerical Simulations of Thermonuclear Flashes on Neutron Stars", *Nuc. Phys. A*, 688, pp. 172-176, 2001.
30. M. Greiner, R.J. Faulkner, V.T. Van, H.M. Tufo, and P.F. Fischer, "Simulations of Three-Dimensional Flow and Augmented Heat Transfer in a Symmetrically Grooved Channel", *ASME J. of Heat Transfer*, 122 (4), pp. 653-660, 2000.
31. F.X. Timmes, M. Zingale, K. Olson, B. Fryxell, P. Ricker, A.C. Calder, L.J. Dursi, H.M. Tufo, P. MacNeice, J.W. Truran, and R. Rosner, "On the Cellular Structure of Carbon Detonations", *ApJ*, 543, pp. 938-954, 2000.
32. F.X. Timmes, K. Olson, P. Ricker, M. Zingale, B. Fryxell, P. MacNeice, H.M. Tufo, D.Q. Lamb, and R. Rosner, "FLASH: A Multidimensional Hydrodynamics Program for Modeling Astrophysical Thermonuclear Flashes", *ApJS*, 131, pp. 273-334, 2000.
33. R. Rosner, L.J. Dursi, B. Fryxell, D.Q. Lamb, C. Litwin, J. Niemeyer, K. Olson, H.M. Tufo, and Y.-N. Young, "Connecting Astrophysics to Laboratory Fluid Dynamics: Astrophysical Thermonuclear Flashes", *Computing in Science and Engineering*, 2 (2), pp. 33-41, 2000.

Book Chapters

34. H.M. Tufo and G. Cobb, "Computational Fluid Dynamics", in the *Encyclopedia of Parallel Computing*, D. Padua, ed., Springer-Verlag, in press.
35. E.R. Jessup, H.M. Tufo, and M.S. Woitaszek, "Building an HPC Watering Hole for Boulder Area Computational Science", *Lecture Notes in Computer Science*, 3515, pp. 91-98, 2005. (ICCS 2005 conference paper.)
36. E.R. Jessup and H.M. Tufo, "Creating a Sustainable High-Performance Scientific Computing Course", *Lecture Notes in Computer Science*, 3039, pp. 1242-1249, 2004. (ICCS 2004 conference paper.)
37. P.F. Fischer, N.I. Miller, and H.M. Tufo, "An Overlapping Schwarz Method for Spectral Element Simulation of Three-Dimensional Incompressible Flows", in *Parallel Solution of Partial Differential Equations*, P. Bjorstad and M. Luskin, eds., Springer-Verlag, pp. 159-180, 2000.

Conference Proceedings (Peer Reviewed)

38. H.M. Tufo, M.K. Patterson, M. Oberg, M. Woitaszek, G. Cobb, R. Strong, and J. Gutowski, "Janus: A Co-designed Facility and Supercomputer", In *SC'11: the 2011 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, Seattle, Washington, USA, November 2011. Submitted. (A ranking from ARC)
39. G. Cobb, H.M. Tufo, B. Roundtree, and B.R. de Supinski, "Transparent MPI Task Replication with MPIEcho", *Cluster 2011: Proceedings of the 2011 IEEE International Conference on Cluster Computing*, 8 pages, in preparation. (A ranking from ARC)
40. M. Oberg, M. Woitaszek, T. Voran, and H.M. Tufo, "A System Architecture Supporting High-Performance and Cloud Computing in an Academic Consortium Environment", *2011 International Supercomputing Conference*, 8 pages, 2011.
41. M. Woitaszek and H.M. Tufo, "Developing a Cloud Computing Charging Model for High-Performance Computing Resources", *The 10th IEEE International Conference on Computer and Information Technology (CIT 2010)*, 8 pages, 2010. (20% acceptance rate)
42. P. Marshall, M. Woitaszek, H.M. Tufo, R. Knight, D. McDonald, and J. Goodrich, "Ensemble Dispatching on an IBM Blue Gene/L for a Bioinformatics Knowledge Environment", *Many-Task Computing on Grids and*

- Supercomputers Workshop, SC'09, doi: 10.1145/1646468.1646481, 8 pages, 2009. (22.6% acceptance rate for conference)
43. B.J. Kadlec, G.A. Dorn, H.M. Tufo, "Interactive Visualization and Interpretation of Geologic Surfaces in 3-D Seismic Data", 79th Annual International Meeting, Society of Exploration Geophysicists, 4 pages, 2009.
 44. J. Cope, H.M. Tufo, N. Trebon, and P. Beckman, "Robust Data Placement for Urgent Computing", Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, Heterogeneity in Computing Workshop, 13 pages, 2009. (23% acceptance rate for conference)
 45. D. Leverman, M. Oberg, H.M. Tufo, and M. Woitaszek, "Experiences with Managed Hosting of Virtual Machines", 10th LCI International Conference on Linux Clusters, 9 pages, 2009.
 46. B.J. Kadlec, H.M. Tufo, and G.A. Dorn, "Medial Surface Guided Level Sets for Shape Exaggeration", Proceedings of the IASTED International Conference on Visualization, Imaging and Image Processing (VIIP 2008), Mallorca, Spain, 2008. ACTA Press, ISBN 978-0-88986-759-8, 5 pages, 2008.
 47. B.J. Kadlec and H.M. Tufo, "A 3-D Structure Tensor Approach to Medial Surface Extraction and Segmentation using Level Sets", Proceedings of the IASTED International Conference on Visualization, Imaging and Image Processing (VIIP 2008), Mallorca, Spain, 2008. ACTA Press, ISBN 978-0-88986-759-8, 6 pages, 2008.
 48. B.J. Kadlec, G.A. Dorn, and H.M. Tufo, "Confidence and Curvature-Guided Level Sets for Channel Segmentation", 78th Annual International Meeting, Society of Exploration Geophysicists, 4 pages, 2008.
 49. J. Cope and H.M. Tufo, "Supporting Storage Resources in Urgent Computing Environments", Proceedings of the IEEE International Cluster Conference 2008, Tsukuba, Japan, September, 6 pages, 2008. (30.4% acceptance rate) (A ranking from ARC)
 50. J. Cope and H.M. Tufo, "Adapting Grid Services for Urgent Computing Environments", Proceedings of the 3rd International Conference on Software and Data Technologies 2008 (ICSOF 2008), 8 pages, Porto, Portugal, July, 2008. (22.9% acceptance rate)
 51. J. Cope and H.M. Tufo, "A Data Management Framework for Urgent Geoscience Workflows", Proceedings of the International Conference on Computational Science 2008 (ICCS 2008), 9 pages, Krakow, Poland, June, 2008. (22% acceptance rate) (A ranking from ARC)
 52. M. Oberg, H. Tufo, and M. Woitaszek, "Exploration of Parallel Storage Architectures for a Blue Gene/L on the TeraGrid", 9th LCI International Conference on Linux Clusters, 17 pages, 2008.
 53. B. House, P. Marshall, M. Oberg, H.M. Tufo, M. Woitaszek, "Grid Service Hosting on Virtual Clusters", Proceedings of the 9th IEEE/ACM International Conference on Grid Computing, Tsukuba, Japan, September 2008. (19.8% acceptance rate) (A ranking from ARC)
 54. J. Cope, M. Oberg, H.M. Tufo, T. Voran, and M. Woitaszek, "High Throughput Grid Computing with an IBM Blue Gene/L", 2007 IEEE International Conference on Cluster Computing (Cluster 2007), doi: 10.1109/CLUSTR.2007.4629250, 8 pages, 2007. (A ranking from ARC)
 55. M. Woitaszek and H.M. Tufo, "Tornado Codes for MAID Archival Storage", IEEE/NASA Goddard Conference on Mass Storage Systems and Technologies (MSST 2007), doi: 10.1109/MSST.2007.33, 6 pages, 2007. (19% acceptance rate)
 56. J. Cope, T. Voran, M. Woitaszek, A. Boggs, S. McCreary, M. Oberg, and H.M. Tufo, "Experiences Deploying a 10 Gigabit Ethernet Computing Environment to Support Regional Computational Science", 8th LCI International Conference on Linux Clusters, 21 pages, 2007. (Best Student Paper Award) (19% acceptance rate)

57. J. Cope, H.M. Tufo, and M. Woitaszek, "An Extensible Service Development Toolkit to Support Earth Science Grids", 2nd IEEE International Conference on e-Science and Grid Computing, 8 pages, 2006. (A ranking from ARC)
58. P. Thornton, H. M. Tufo, N. Wilhelmi, M. Woitaszek, C. Hartsough, and J. Cope, "Grid-BGC: a Grid-enabled Research Platform for High-resolution Surface Weather Interpolation and Biogeochemical Process Modeling", NASA Earth Science Technology Conference 2006, 4 pages, 2006.
59. M. Woitaszek and H.M. Tufo, "Fault Tolerance of Tornado Codes for Archival Storage", 15th IEEE International Symposium on High Performance Distributed Computing, doi: 10.1109/HPDC.2006.1652139, 10 pages, 2006. (15.3% acceptance rate) (A ranking from ARC)
60. H.-W. Choi, R.D. Nair, and H.M. Tufo, "A Scalable High-Order Discontinuous Galerkin Method for Global Atmospheric Modeling", Parallel CFD 2006, 8 pages, 2006.
61. M. Oberg, H.M. Tufo, T. Voran, and M. Woitaszek, "Evaluation of RDMA over Ethernet Technology for Building Cost Effective Linux Clusters", 7th LCI International Conference on Linux Clusters, 13 pages, 2006.
62. A. Boggs, J. Cope, S. McCreary, M. Oberg, H.M. Tufo, T. Voran, and M. Woitaszek, "Improving Cluster Management with Scalable Filesystems", 7th LCI International Conference on Linux Clusters, 18 pages, 2006.
63. R.D. Nair and H.M. Tufo, "A Scalable High-Order Dynamical Core for Climate Modeling", International Conference on Mesoscale Process in Atmosphere, Ocean and Environment Systems (IMPA 2006), 2 pages, 2006.
64. P.F. Fischer, F. Loth, S.-W. Lee, H. M. Tufo, and H. Bassiouny, "Parallel Simulation of High Reynolds Number Vascular Flows", in Parallel Computational Fluid Dynamics: theory and applications, A. Deane et al. eds., Elsevier, pp. 219-226, 2006. (Proc. Parallel CFD 2005, College Park, Maryland, 2005.)
65. J. Cope, C. Hartsough, S. McCreary, P. Thornton, H. M. Tufo, N. Wilhelmi, and M. Woitaszek, "Experiences from Simulating the Global Carbon Cycle in a Grid Computing Environment", proceedings of the Fourteenth Global Grid Forum, 10 pages, 2005.
66. G. Almasi, G. Bhanot, D. Chen, M. Eleftheriou, B. Fitch, A. Gara, R. Germain, M. Gupta, M.C. Pitman, A. Rayshubskiy, J. Sexton, F. Suits, P. Vranas, B. Walkup, T.J.C. Ward, Y. Zhestkov, A. Curioni, W. Curioni, C. Archer, J.E. Moreira, R. Loft, H.M. Tufo, T. Voran, and K. Riley, "Early Experience with Scientific Applications on the BlueGene/L Supercomputer", proceedings of Euro-Par 2005, 11 pages, 2005. (31% acceptance rate) (A ranking from ARC)
67. J. Cope, C. Hartsough, P. Thornton, H. M. Tufo, N. Wilhelmi, and M. Woitaszek, "GridBGC: A Grid-Enabled Terrestrial Carbon Cycle Modeling System", proceedings of Euro-Par 2005, 10 pages, 2005. (31% acceptance rate) (A ranking from ARC)
68. J. Cope, M. Oberg, H.M. Tufo, and M. Woitaszek, "Shared Parallel File Systems in Heterogeneous Linux Multi-Cluster Environments", proceedings of the 6th LCI International Conference on Linux Clusters, 21 pages, 2005.
69. J.M. Dennis, M. Levy, R.D. Nair, H.M. Tufo, and T. Voran, "Towards an Efficient and Scalable Discontinuous Galerkin Atmospheric Model", proceedings of the 19th IEEE International Parallel & Distributed Processing Symposium, 8 pages, 2005. (32% acceptance rate) (A ranking from ARC)
70. J.J. Heys, C. DeGroot, T. Manteuffel, S. McCormick, and H.M. Tufo, "Modeling 3-D Compliant Blood Flow with FOSLS", proceedings of the 41st Annual Rocky Mountain Bioengineering Symposium, 8 pages, 2004.
71. M. Woitaszek, M. Oberg, and H.M. Tufo, "Selecting a Cluster for the Community Climate Systems Model", proceedings of the 5th LCI International Conference on Linux Clusters, 13 pages, 2004.

72. M. Greiner, P.F. Fischer, and H.M. Tufo, "Numerical Simulations of Resonant Heat Transfer Augmentation at Low Reynolds Numbers," proceedings of the ASME Int. Mech. Eng. Congress, 9 pages, November, 2001, New York.
73. A.C. Calder, B.C. Curtis, L.J. Dursi, B. Fryxell, G. Henry, P. MacNeice, K. Olson, P. Ricker, R. Rosner, F.X. Timmes, H.M. Tufo, J.W. Truran, and M. Zingale, "High-Performance Reactive Fluid Flow Simulations Using Adaptive Mesh Refinement on Thousands of Processors", proceedings of SC2000, 12 pages, 2000. (Gordon Bell) (25% acceptance rate) (A ranking from ARC)
74. P.F. Fischer and H.M. Tufo, "High-performance Spectral Element Algorithms and Implementations", in *Parallel Computational Fluid Dynamics: towards Teraflops, Optimization and Novel Formulations*, D. Keyes et al. eds., North-Holland, pp. 17-26, 2000. (Proc. Parallel CFD'99, Williamsburg, Virginia, 1999.)
75. H.M. Tufo and P.F. Fischer, "Terascale Spectral Element Algorithms and Implementations", proceedings of SC99, 14 pages, 1999. (Gordon Bell) (25% acceptance rate) (A ranking from ARC)
76. H.M. Tufo, P.F. Fischer, M.E. Papka, and K. Blom, "Numerical Simulation and Immersive Visualization of Hairpin Vortex Generation", proceedings of SC99, 10 pages, 1999. (25% acceptance rate) (A ranking from ARC)
77. H.M. Tufo, P.F. Fischer, M.E. Papka, and M. Szymanski, "Hairpin Vortex Formation, a Case Study for Unsteady Visualization", proceedings of the 41st CUG Conference, 10 pages, 1999.
78. S.J. Sherwin, C. Evangelinos, H.M. Tufo, and G.Em. Karniadakis, "Development of a Parallel Unstructured Spectral/hp Method for Unsteady Fluid Dynamics", in *Parallel Computational Fluid Dynamics: Recent Developments and Advances Using Parallel Computers*, D. R. Emerson et al. eds., Elsevier, 8 pages, 1999. (Proc. Parallel CFD'97, Manchester, England, 1997.)

Extended Abstracts and Posters (Peer Reviewed)

79. M. Woitaszek, H.M. Tufo, and E.R. Jessup, "Practical Cyberinfrastructure for High-Performance and Parallel Computing Education", *EduPar-11: The First NSF/TCPP Workshop on Parallel and Distributed Computing Education*, 25th IEEE International Parallel & Distributed Processing Symposium, 2011.

Technical Reports (Non-Peer Reviewed)

80. A. St-Cyr, C. Jablonowski, J.M. Dennis, H.M. Tufo, and S.J. Thomas, "A Comparison of Two Shallow Water Models with Non-Conforming Adaptive Grids: Classical Tests", pre-print, Feb 2007.

Presentations

A Petascale Capable Discontinuous Galerkin Dynamical Core for Climate Simulation, 2011 International Conference on Finite Elements in Flow Problems (FEF 11), Munich, Germany, March 23, 2011.

World's Largest HPC Cluster in a Container, IBM T.J. Watson, Yorktown Heights, New York, January 31, 2011. (Invited)

University of Colorado Partners With Dell to Create World's Largest HPC Cluster in a Container, SC'10 Dell Booth Talk, New Orleans, Louisiana, November 16, 2010. (Invited)

Spanning the Spectrum, University of Tennessee, Knoxville, Tennessee, September 15, 2010. (Invited.)

Spanning the Spectrum, Oak Ridge National Laboratory, Oak Ridge, Tennessee, September 15, 2010. (Invited.)

Developing a Cloud Computing Charging Model for HPC, CIT-10, Bradford, U.K., June 24, 2010.

Building for the Petascale, University of Tokyo, Tokyo, Japan, April 13, 2010. (Invited)

Energy Efficient Data Centers for HPC, How Lean and Green do we need to be?, SC'09 Panel, Portland, Oregon, November 19, 2009. (Invited)

More than a Big Machine: Why We Need Multiple Breakthroughs to Tackle Cloud Resolving Climate, Sun HPC Consortium, Portland, Oregon, November 14, 2009. (Invited.)

Climate Challenges in the Massively Parallel Era, IDC HPC Users Forum, Superior, CO, September 9, 2009. (Invited)

National Center for Atmospheric Research, University of Colorado at Boulder, Sun Partnership, Sun HPC Consortium, Hamburg, Germany, June 22, 2009. (Invited.)

Climate Models for the Massively Parallel Era, Imperial College, London, England, June 9, 2009. (Invited.)

Petascale Atmospheric General Circulation Models for CCSM, CCPP Science Team Meeting, Bethesda, MD, April 8, 2009. (Invited.)

DG-Based Atmospheric General Circulation Models, FEF-09, April 3, 2009.

Climate Models for the Massively Parallel Era, University of Tokyo, Tokyo, Japan, October 3, 2008. (Invited)

Climate Models for the Massively Parallel Era, ScalPerf '08, Bertinoro, Italy, September 11, 2008. (Invited)

Climate Models for the Massively Parallel Era, Hartree Center, Daresbury, England, July 14, 2008. (Invited)

Adapting Grid Services for Urgent Computing Environments, ICSOFT 2008, Porto, Portugal, July 6, 2008.

Fortran@50 Application / User Viewpoint, Fortran@50 Panel, SC'07 Panel, Reno, NV, November 15, 2007. (Invited)

Petascale Atmospheric General Circulation Models, Graduate University of the Chinese Academy of Sciences, Beijing, China, October 29, 2007. (Invited)

Petascale Atmospheric General Circulation Models, Supercomputing Center of the Chinese Academy of Sciences, Beijing, China, October 26, 2007. (Invited)

Petascale Atmospheric General Circulation Models, Parallel Computing 2007 Conference, Julich, Germany, September 4, 2007. (Invited)

Blue Gene/L and TeraGrid at NCAR - A Catalyst for Petascale Science, Computing in Atmospheric Sciences Workshop, Annecy, France, September 11, 2007. (Invited)

The Blue Gene/L System at NCAR - A Catalyst for Petascale Science, SP-XXL Summer Meeting, Munich, Germany, July 19, 2007. (Invited)

The Blue Gene/L System at NCAR - A Catalyst for Petascale Science, ScicomP 13, Munich, Germany, July 18, 2007. (Invited)

Enabling High Productivity Climate Science, University of Tokyo, Tokyo, Japan, April 22, 2007. (Invited)

Computational Science - Supporting NCAR's Mission as an Integrator, Supercomputing Center of the Chinese Academy of Sciences, Beijing, China, May 31, 2007. (Invited)

Geoscience Driven Challenges for the Petascale Era, IBM Deep Computing Institute External Advisory Board Meeting, Boulder, CO, November 8, 2006. (Invited)

A Discontinuous Galerkin Dynamical Core for Atmospheric Modeling, Department of Earth, Atmospheric and Planetary Sciences, M.I.T., Boston, MA, April 27, 2006. (Invited)

System Software Issues for the Future, 3rd BG/L Systems Software and Applications Workshop, Tokyo, Japan, April 20, 2006. (Invited)

HOMME: A High-Performance Scalable Atmospheric Modeling Framework, 12th SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, CA, February 23, 2006.

Experiences with Building a Grid Computing Environment for Simulating the Global Carbon Cycle, Earth System Modeling Framework (ESMF) on the Grid Workshop, 4th ESMF Community Meeting, Boston, MA, July 20, 2005. (Invited)

A Scalable Discontinuous Galerkin Atmospheric Model, Third M.I.T. Conference on Computational Fluid and Solid Mechanics, Boston, MA, June 16, 2005.

Cyberinfrastructure Strategic Plan, NCAR Directors' Retreat, Boulder, CO, June 13, 2005. (Invited)

Towards an Efficient and Scalable Discontinuous Galerkin Atmospheric Model, 19th IEEE International Parallel & Distributed Processing Symposium, Denver, Colorado, April 8, 2005.

Early Experiences with the 360TF IBM BlueGene/L Platform, International Workshops on Advances in Computational Mechanics, Tokyo, Japan, November 5, 2004. (Invited)

Improved Transport Processes for CCSM, Climate Change Prediction Program PI Meeting, Seattle, Washington, October 19, 2004. (Invited)

Terascale Spectral Element Algorithms and Implementations, SCI Distinguished Lecture Series, University of Utah, Salt Lake City, Utah, February 21, 2003. (Invited)

Spectral Element Methods for the Shallow Water Equations, SIAM Conference on Computational Science and Engineering (CSE03), San Diego, CA, February 10, 2003. (Invited)

Terascale Spectral Element Algorithms and Implementations, European Center for Research and Advanced Training in Scientific Computation (CERFACS), Toulouse, France, December 12, 2002. (Invited)

High Performance Spectral Element Methods for Simulation of Transition in Vascular Flows, Scaling to New Heights Workshop, Pittsburgh Supercomputing Center, Pittsburgh, PA, May 20, 2002.

Stroke Busters in Turbulent Blood Flow, SC'02, November 20, 2002. (Invited)

Scalable Tools, Solvers, and Performance, Adaptive and High-Order Methods with Applications in Turbulence Workshop, Geophysical Turbulence Program of NCAR, Boulder, Colorado, February 4, 2002. (Invited)

A High Performance Nonconforming Spectral Element Code for Simulating Incompressible Flows on Thousands of Processors, 13th International Conference on Domain Decomposition Methods (DD13), Lyon, France, October 10, 2000. (Invited)

Numerical Study of Hairpin Vortices Induced by a Hemispherical Roughness Element, 20th International Congress of Theoretical and Applied Mechanics, Chicago, Illinois, August 30, 2000.

A Spectral Element Code for Incompressible Hydrodynamics, 1st ASCI Scalability Workshop, Santa Fe, New Mexico, May 11, 2000. (Invited)

A Parallel Direct Solver Package for Coarse-Grid Problems, 6th Copper Mountain Conference on Iterative Methods, Copper, Colorado, April 7, 2000.

Terascale Spectral Element Algorithms and Implementations, SC99, Portland, Oregon, November 18, 1999. (Gordon Bell Talk)

Hairpin Vortex Formation, a Case Study for Unsteady Visualization, 41st Cray Users' Group Conference, Minneapolis, Minnesota, May 27, 1999.

Press

- “Internet2 speeds up faculty research”, Daily Camera, May 30, 2005.
http://www.dailycamera.com/bdc/buffzone_news/article/0,1713,BDC_2448_3816909,00.html.
- “NCAR tries out smaller, ‘cool’ new computer”, Daily Camera, April 7, 2005.
http://www.dailycamera.com/bdc/science/article/0,1713,BDC_2432_3681774,00.html.
- “NCAR's Scientific Computing Division researches ultimate algorithms, computer architecture”, HPCwire, January 7, 2005. <http://www.tgc.com/hpcwire/WW/05/0107/109027.html>.
- "Stroke Busters in Turbulent Blood Flow", Pittsburgh Supercomputing Center Annual Research Report, October 30, 2002. www.psc.edu/science/2002/tufo/stroke_busters_in_turbulent_blood.html.
- Image on the cover of *Physics Today*, 55 (2), February 2002. <http://www.aip.org/pt/vol-55/iss-2/current.html>.
- "Blood-Vessel Simulations Provide Valuable Data for Doctors", Argonne National Laboratory Logos Magazine, 20(2), Summer 2002. <http://www.anl.gov/OPA/logos20-2/blood01.htm>.

Professional Service

Department, College, and University

- Boulder Campus Cyberinfrastructure Board, September 2010 – present.
- Research Computing/Cyberinfrastructure Committee, January – June 2010.
- Reviewer for the 2008, 2009, and 2010 CU Boulder Campus Innovative Seed Grant Program.
- Interdisciplinary Computational Science and Engineering Initiative Steering Committee, January – December 2008.
- Founder of the Computational Science Center (<http://csc.cs.colorado.edu/>).
- CS Department's Numerical Analysis Ph.D. Preliminary Examination Committee, September 2002 – present.
- CS Department's Graduate Committee, September 2002 – August 2006 and September 2007 – present.
- Task Force Member, Colorado Initiative in Molecular Biotechnology, January 2004 – July 2008.
- CS Department's Computer Operations Committee, September 2004 – May 2005.
- CS Department's Computer Science Education Lab (CSEL) steering committee, September 2003 – May 2004.
- CS Department's faculty search committee in the area of Bioinformatics, spring 2004.
- Organizer of the CS Department's 2004, 2005, 2006, 2009, and 2010 Ph.D. Recruitment Weekends. Co-organizer, Doug Sicker (2004, 2005), Rick Han (2009), and Evan Chang (2010).
- Wrote successful student fee proposal to support the CSEL. Proposal included infrastructure plan for evolving the CSEL into a casual and welcoming workspace with wireless access as well as computing, storage, and printing services.

Community

- Microsoft Technical Computing Executive Advisory Council, January 2010 – present.
- TeraGrid Resource Allocation Committee (TRAC), January 2010 – present.
- UCAR/NCAR/UCP Distinguished Achievement and Outstanding Accomplishment Awards Jury, September 2010 – present. (Three-year appointment.)
- Organizer of the NCAR CISL Seminar Series, August 2006 – present.
- Golden Energy Computing Organization (GECO) advisory committee. January 2008 – present.
- NCAR Data Center Project Executive Committee, September 2005 – July 2007.
- NCAR SCD Lightning (Linux Cluster) Procurement Technical Committee, December 2003 – April 2004.
- NCAR Advanced Study Program reviewer.
- Member of NCAR's Geophysical Turbulence Program.
- Tutorial Chair for IEEE Cluster 2011. (2011)

- Program Committee for the 1st International Workshop on Advances in High-Performance Computational Earth Sciences: Applications and Frameworks (IHPCES) in conjunction with the 11th International Conference on Computational Science. (2011)
- Technical Program Committee for the IEF International Conference on Frontier Computing – Theory, Technologies and Applications. (2010)
- Program Committee for the IEEE 10th International Conference on Computer and Information Technology. (2010)
- Program Committee for the IEEE 12th International Conference on Computational Science and Engineering. (2009)
- Program Committee for the IEEE 11th International Conference on Computational Science and Engineering. (2008)
- Steering Committee, 11th LCI International Conference on Linux Clusters. (2010)
- Conference Chair and Steering committee, 10th LCI International Conference on Linux Clusters. (2009)
- Technical Program Chair and Steering Committee, 9th LCI International Conference on Linux Clusters. (2008)
- Program Committee, 8th LCI International Conference on Linux Clusters. (2007)
- Program Committee, 7th LCI International Conference on Linux Clusters. (2006)
- Program Committee, 6th LCI International Conference on Linux Clusters. (2005)
- Program Committee for the 9th IEEE International Conference on Computational Science and Engineering
- Poster Chair and Program Committee, 2007 IEEE International Conference on Cluster Computing (Cluster 2007).
- Organized a mini-symposium entitled, “Iterative Solvers for Geoscience Applications”, for the Eighth Copper Mountain Conference on Iterative Methods. Co-organizer, Steve Thomas.
- Reviewer for SIAM Review.
- Reviewer for SIAM Journal on Scientific Computing.
- Reviewer for AIAA Journal.
- Reviewer for the Journal of Computational Physics.
- Reviewer for the Sixth IEEE Symposium on Parallel and Distributed Systems.
- Reviewer for the 6th, 7th, and 8th LCI International Conference on Linux Clusters.
- Reviewer for the SIAM International Conference on Computational Science (ICCS) 2005.

Teaching

- Proposed CSCI 5576, the graduate version of CSCI 4576, High-Performance Scientific Computing. Designed to satisfy CS breadth requirements and serve as a core course for various computational science programs created in recent years (e.g., in Applied Mathematics). Obtained Department and College approval in 2003. Final Graduate School approval given in January 2004 and first taught in spring 2004.
- Revised CSCI 4576/5576, High-Performance Scientific Computing, to include detailed MPI tutorial, parallel algorithms and architectures lectures, Grid computing, TeraGrid resources, and the Computational Science Center’s computing facilities.
- Developed a course entitled Introduction to Scientific Computing, which I subsequently taught for 4 years at Brown University.
- Developed a course entitled Introduction to Parallel Computing and a course entitled Fundamentals of Computer Programming II (C++) that I taught at the University of Chicago.
- Holder of a teaching certificate from Brown University’s Sheridan Center for the Advancement of College Teaching.

Professional Research Associates

- Christoph Erath, Ph.D. in Numerical Mathematics, University of Ulm, Ulm, Germany, 2010. August 2010 – present.
- Saroj Mishra, Ph.D. in Atmospheric Science, Indian Institute of Science, Bangalore, India, 2009. December 2008 – present.
- Hae-Won Choi, Ph.D. in Mechanical Engineering, University of Toronto, Toronto, Canada, 2005. June 2005 – May 2008. (Currently a Scientist at the Queen’s-RMC Fuel Cell Research Centre.)
- Jack Chen, Ph.D. in Atmospheric Sciences, University of Washington, 2005. September 2005 – May 2008. (Currently a Project Scientist at NCAR.)

- Vani Cheruvu, Ph.D. in Mathematics, Indian Institute of Technology, Madras, India, 2000. October 2004 – October 2005. (Currently a Research Scientist at FSU.)
- Sean McCreary, M.S. degrees in Computer Science and Astrophysical, Planetary, and Atmospheric Sciences, University of Colorado at Boulder, 1995/1994. November 2004 – September 2007.
- Adam Boggs, B.S. degree in Computer Science, University of Colorado at Boulder, February 2006 – October 2007. (Currently at Left Hand Networks.)

Graduate Students

- Dmitry Duplyakin, Ph.D. candidate in Computer Science. (Advisor)
- Guy Cobb, Ph.D. candidate in Computer Science. (Advisor)
- Paul Marshall, Ph.D. candidate in Computer Science. (Advisor)
- Theron Voran, Ph.D. candidate in Computer Science. (Advisor)
- Matthew Woitaszek, Ph.D. in Computer Science. (Advisor - Currently a Scientist II at NCAR.)
- Jason Cope, Ph.D. in Computer Science. (Advisor - Currently a Postdoc at ANL.)
- Michael Levy, Ph.D. in Applied Mathematics. (Advisor - Currently a Postdoc at Sandia.)
- Ben Kadlec, Ph.D. in Computer Science. (Advisor - Currently a Senior Computational Scientist at TeraSpark Corporation.)
- Jon Hurst, M.S. in Computer Science. (M.S. Thesis Advisor)
- Elizabeth Fischer, M.S. in Computer Science. February 2005 – June 2006. (Research Assistant)
- Dilmohan Narula, M.S. in Telecommunications, June 2009 – May 2010. (Research Assistant)
- Venkatachalapati Rayipati, M.S. in Telecommunications, May 2010 – July 2010. (Research Assistant)
- Jon Lusk, M.S. candidate in Computer Science, Aug 2010 – present. (Research Assistant)
- John Dennis, Ph.D. in Computer Science. (Thesis Committee)
- Ernesto Prudencio, Ph.D. in Computer Science. (Thesis Committee)
- Hassa Alsukhni, Ph.D. in Electrical and Computer Engineering. (Thesis Committee)
- Stefan Muzala, Ph.D. in Electrical and Computer Engineering. (Thesis Committee)
- Alex Settle, Ph.D. in Electrical and Computer Engineering. (Thesis Committee)
- Joshua Kihm, Ph.D. in Electrical and Computer Engineering. (Thesis Committee)
- Serguei Ovtchinnikov, Ph.D. in Computer Science. (Thesis Committee)
- Micah Hamady, Ph.D. candidate in Computer Science. (Thesis Committee)
- Josh Nolting, Ph.D. in Applied Mathematics. (Thesis Committee)

Undergraduate Students

- Alejandro Cantarero, B.S. in Applied Mathematics. August 2004 – May 2005. (Senior Thesis Advisor)
- Sarah Macumber, B.S. in Applied Mathematics. August 2004 – May 2005. (Senior Thesis Advisor)
- Markus Eret, B.S. candidate in Computer Science. (Senior Thesis Committee)
- Michael Oberg, B.S. candidate in Electrical and Computer Engineering. August 2003 – July 2007. (REU Student)
- Wes Hofman, B.S. in Computer Science. October 2004 - April 2005. (REU Student)
- Brandon Werdel, B.A. in Mechanical Engineering. June 2005 – May 2007. (REU Student)
- Ezra Waterland, B.S. in Computer Science. August 2004 – May 2007. (REU Student)
- Eliot Armstrong, B.S. in Astronomy. June 2004 - January 2005. (REU Student)
- Bobby House, B.S. in Computer Science, January 2006 – May 2007. (REU Student)
- Eric Schoeller, B.S. in Computer Science, January 2006 – May 2007. (REU Student)
- Ben Fell, B.S. in Computer Science, January 2008 – May 2009. (Earn-Learn Student)
- Ian Shorrock, B.S. candidate in Studio Arts, August 2007 – present. (REU Student)
- Dustin Leverman, B.A. in Economics, August 2007 – May 2008. (NCAR Student)
- Sirisha Akkala, B.S. in Computer Science, August 2008 – December 2008. (REU Student)
- Brad Walker, non-degree student in Computer Science, June 2009 – November 2009. (Research Assistant)
- Eric Baer, B.S. candidate in Computer Science, September 2010 – December 2010. (Earn-Learn Student)

Support

- NSF, “Enabling, Enhancing, and Extending Petascale Computing for Science and Engineering”, 1/1/2013-12/31/2016, \$30,000,000, CU - \$0, pending.
- DOE, “A Petascale Non-Hydrostatic Atmospheric Dynamical Core in the HOMME Framework”, 9/1/2011-8/31/2014, CU - \$1,547,436, H.M. Tufo (PI), pending.
- NSF, “Collaborative Proposal: CDI-Type II: Knowledge Environment for Exploring Microbial and Structural Evolution”, 10/1/2011-9/30/2015, CU - \$1,582,774, H.M. Tufo (PI), R. Knight, and N. Pace, pending.
- NSF, “CSR:Medium:Collaborative: Stochastically Robust Resource Allocation for Computing”, 10/1/2009 – 9/30/2012, CSU - \$1,042,470, H.J. Siegel (PI), T. Maciejewski, A. Rosenberg, CU - \$125,024, H Tufo (PI), NCAR - \$31,972 R. Loft (PI).
- NSF MRI, “Acquisition of a Supercomputer by the Front Range Computing Consortium”, \$2,796,500, 8/1/08 – 7/31/12. Tufo (PI), Syvitski, Julien, Loft, Mandel.
- DOE BER, “Toward a Non-Hydrostatic HOMME”, \$580,000, 9/1/2009 - 8/31/2011. Tufo (PI), Nair, Lauritzen.
- DOE SciDAC, “Petascale Atmospheric General Circulation Models for CCSM”, \$1,475,906, 8/15/07 – 8/14/11. Tufo (PI), Nair, Dennis, St-Cyr, and Tribbia.
- IBM Faculty Award, “Developing Scalable Weather and Climate Applications for IBM Linux Power Systems and the Next Generation of IBM Advanced Architectures”, \$20,000. Gifted in July 2006.
- IBM Faculty Award, “Developing Next Generation Weather and Climate Applications for IBM Linux Power and BlueGene Systems”, \$30,000. Gifted in July 2005.
- IBM Shared University Research, “Developing Next Generation Weather and Climate Applications on IBM Linux Power Systems”, \$590,033. Tufo (PI), Loft, and Thomas. Gifted in January 2005. Equipment serves at front end to Frost system and is still in use.
- IBM Shared University Research, “Equipment for Bio-Fluid Flow Investigation”, \$154,808. Tufo (PI), Cai, Manteuffel, McCormick, Loft, Thomas, and Fischer. Gifted in September 2004.
- DOE SciDAC, “Improved Transport Processes for CCSM”, \$683,100, 9/15/04 – 9/14/07. Tufo (PI), Nair, and Rasch.
- NSF MRI, “Collaborative Research: Acquisition of an IBM BG/L Supercomputer”, \$1,053,558, 7/1/04 – 6/30/07. CU Boulder - Tufo (PI), Cai, Farhat, Manteuffel, and McCormick; NCAR – Loft (PI), Coen, Grabowski, and Thomas; CU Denver - Mandel (PI) and Knyazev.
- NSF ITR, “Collaborative Research: An Integrated Simulation Environment for High-Resolution Computational Methods in Electromagnetics with Biomedical Applications”, \$1,000,000, 1/15/04 - 1/14/08. UNM - Warburton (PI) and Hagstrom; Arizona - Gelb (PI), Brio, and Renaut; CU Boulder - Tufo (PI); Brown - Hesthaven (PI).
- NASA AIST, “Implementing an Efficient Supercomputer-Based Grid Compute Engine for a High-Resolution, High-Volume Terrestrial Carbon Cycle Model”, \$1,272,116, 8/1/03 - 7/31/06. Thornton (PI) and Tufo.
- NSF CMG, “An Adaptive Mesh, Spectral Element Formulation of the Well-Posed Primitive Equations for Climate and Weather Simulations”, \$501,006, 10/1/02 - 9/30/05. Thomas (PI) and Tufo.
- DOE/Sandia, “LDRD: Massively Parallel Scalable Atmosphere Model”, \$650,000, 10/1/03 - 9/30/06. Spatz (PI), Taylor, Boslough, Thomas, and Tufo.
- NSF NRAC, “Simulation of Transition in Vascular Flows”, 850,000 SUs cumulative on the TCS system at the Pittsburgh Supercomputing Center, 4/1/02 - 3/31/05. Tufo (PI), Fischer, Loth, and Bassoiony.
- UCAR, Faculty Support, \$54,000, 9/1/02 - 5/31/04.
- UCAR, Student Fellowship, \$4,336, 2/19/03 - 9/31/03.
- CU, Dean's Award for Professional Progress, \$5,000. 2005.
- Received \$61,000 from NCAR and \$181,000 from Oliver McBryan’s NSF ARI grant to purchase the 132-processor Linux cluster, Hemisphere, 2003.
- Received \$3,000 in equipment from Intel Corporation to expand the Hemisphere cluster, 2004.

Software

- XXT and XYT parallel direct solver packages for coarse-grid problems on 10,000s of processors. Currently included in the latest distribution of PETSc.
- GS gather-scatter communication package performs nearest-neighbor communication operations (e.g., direct stiffness summation). Has built-in support for numerous commutative and associative binary operations as well user-defined operations.

- NEK5000 flow code simulates unsteady incompressible flows. Handles general two- and three-dimensional flow configurations, supports a broad range of boundary conditions, and provides multiple-species transport. Winning 1999 Gordon Bell entry.
- High-Order Methods Modeling Environment (HOMME). Atmospheric dynamical core for climate modeling. Included in CCSM4 release.
- FLASH, an adaptive mesh refinement reactive flow code used to study astrophysical thermonuclear explosions.