



Fall 2026

GCLab Newsletter

Welcome to the 2026 edition of the GCLab newsletter!



What a year it has been. From exascale computing and AI-driven scientific workflows to real-time experiments and national-scale data infrastructure, the GCLab team has continued to push the boundaries of what is possible in high-performance and distributed computing.

But what makes me most proud is not simply what we accomplished—it is **how we accomplished it**. Our students and researchers worked side by side with collaborators at universities, national laboratories, scientific facilities, and industry. They published, presented, traveled, interned, graduated, started new careers, and, most importantly, learned from one another.

In the pages ahead, we celebrate some of those achievements: new projects such as PegasusAI, an exciting new chapter for the National Science Data Fabric, advances across our research portfolio, awards and publications, and the accomplishments of the people who make GCLab what it is.

Research is always a journey—full of ambitious ideas, unexpected challenges, and discoveries we could not have predicted when we started. I am incredibly proud of how far this team has traveled this year, and even more excited about where we are going next.



Taufer with Drs. Kin Wai NG and Jack Marquez

Enjoy our year in review, and thank you to everyone—students, alumni, colleagues, collaborators, and friends—who have been part of the journey.

Michela Taufer, Ph.D.

MathWorks Professor

University of Tennessee, Knoxville, U.S.A.

Electrical Engineering and Computer Science



<https://globalcomputing.group>



From Beamtime to Insight: GCLab and NSDF Connect Science in Real Time

What if data from a scientific instrument could be analyzed by remote computing and AI resources **while an experiment is still running**—and the results could help determine what to measure next?

That vision is becoming reality through the **National Science Data Fabric (NSDF)**. Led by Michela Taufer at the University of Tennessee, Knoxville, and Valerio Pascucci at the University of Utah, NSDF is building a national digital backbone that connects scientific data, computing, AI, and researchers across institutions and facilities.

This year marked an exciting new chapter for NSDF as the team expanded its expertise and reach. **Virginia Trueheart at the Texas Advanced Computing Center (TACC), X. Carol Song at Purdue University, and Alexandros Karargyris at MLCommons joined the leadership team**, strengthening NSDF across advanced computing infrastructure, AI, data, and community engagement.



Werner Sun, left, of Cornell, Michela Taufer of UTK and Marshall McDonnell of ORNL. Credit: Cornell University

At the same time, GCLab and NSDF moved full speed ahead in turning the vision of connected, real-time science into practice. A collaboration bringing together the **Cornell High Energy Synchrotron Source (CHESS), Oak Ridge National Laboratory (ORNL), the National Institute of Standards and Technology (NIST), and NSDF** connected a live scientific experiment with remote data infrastructure, computing, and AI capabilities.

During experiments at CHESS, measurements could move through a geographically distributed scientific loop and be analyzed in real time, with AI helping inform where the experiment should look next—all while the experiment was still underway. Each partner brought a complementary piece of the loop: **CHESS provided the scientific instrument and experimental environment; NIST contributed AI-driven decision capabilities; ORNL provided computing and workflow orchestration; and NSDF provided the digital backbone for moving data and intelligence across facilities.**

Together, these capabilities are changing the traditional model of **collect data, move it elsewhere, and analyze it later**. Instruments, AI, computing, and data infrastructure can instead work together while an experiment is happening—helping scientists use valuable experimental time more effectively and accelerate the path from measurement to insight.

One experiment. Multiple facilities.

A shared loop from measurement to intelligence—and back to the experiment.

National Science Data Fabric (NSDF):

NSF Awards #2609465, #2138811

Principal Investigators and Co-Directors:

Michela Taufer, University of Tennessee, Knoxville

Valerio Pascucci, University of Utah

Co-Principal Investigators:

Alexandros Karargyris, MLCommons

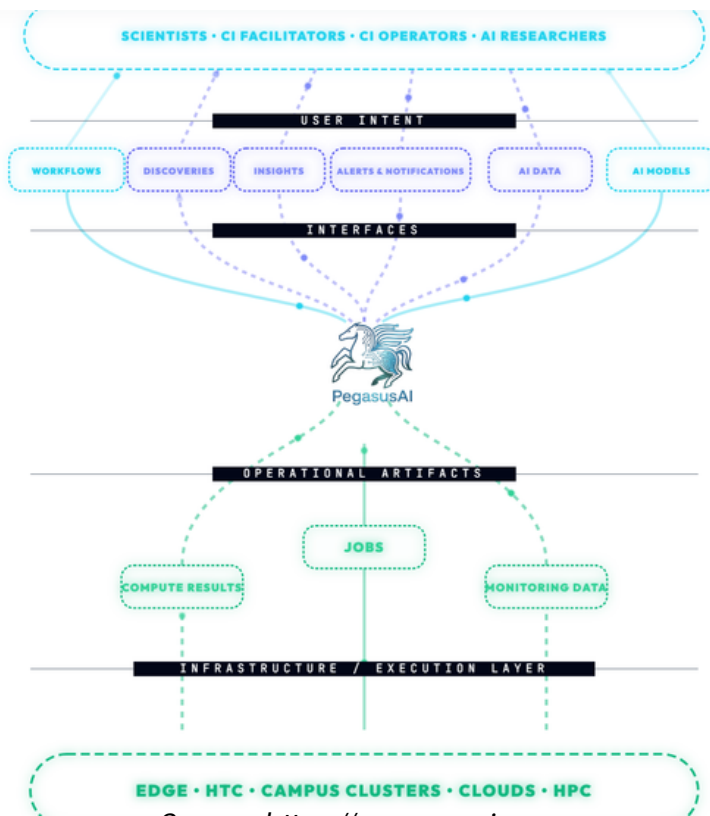
X. Carol Song, Purdue University

Virginia Trueheart, Texas Advanced Computing Center



Project Spotlight

Transforming Scientific Workflows: GCLab Co-Leads \$5M NSF PegasusAI Initiative



Source: <https://pegasus-ai.org>

For over two decades, the Pegasus Workflow Management System (WMS) has served as foundational national cyberinfrastructure, orchestrating millions of complex computational tasks for scientific applications ranging from gravitational-wave detection to earthquake modeling and genomics. Now, GCLab is helping shape the next generation of intelligent scientific workflows through **PegasusAI**, a \$5 million National Science Foundation initiative bringing artificial intelligence into scientific workflow management across HPC, cloud, and edge environments.

Led by Principal Investigator Ewa Deelman at the University of Southern California's Information Sciences Institute, PegasusAI builds on the success of Pegasus WMS to explore how AI can help scientists compose, execute, monitor, and adapt increasingly complex computational workflows. The project combines intelligent resource management, natural-language interaction, automated error recovery, and workflow analytics to make scientific computing more autonomous, resilient, and accessible.

At the University of Tennessee, Knoxville, **GCLab**, led by **Michela Taufer**, and the **EPIC Lab**, led by **Sai Swaminathan**, have joined forces on **PegasusAI**, bringing together complementary expertise in scientific workflows, high-performance computing, AI, and human-centered interaction. The UTK team is developing human-in-the-loop mechanisms that allow scientists to interact with and steer workflows using natural language, while also investigating performance analytics and AI techniques for detecting anomalies and understanding workflow behavior. A central goal is to ensure that AI-assisted decisions remain transparent and useful to scientists rather than becoming another "black box."

Through PegasusAI, GCLab and its collaborators are helping move scientific workflows beyond automation toward systems that can **learn, adapt, explain, and collaborate with scientists** throughout the discovery process.

Ready to explore how AI is redefining scientific computing? Visit the [official PegasusAI website](https://pegasus-ai.org) to learn more about the project, its research, and opportunities to get involved.

NSF award #2513101

Principal Investigator:

Ewa Deelman, University of Southern California,
Information Sciences Institute

Co-Principal Investigators:

Michela Taufer, University of Tennessee, Knoxville
Michael Zink, University of Massachusetts Amherst
Anirban Mandal, University of North Carolina at Chapel Hill
Sai Swaminathan, University of Tennessee, Knoxville

What was your graduate work about?

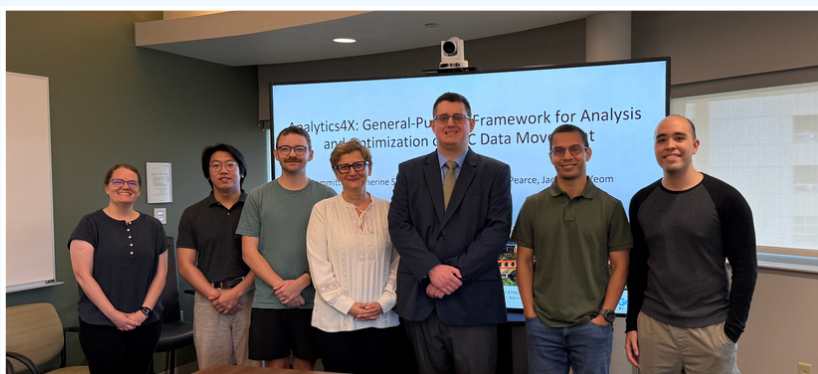
TY: My master's focused on fine-grained containerized environments for scientific workflows to achieve reproducibility and explainability.

IAN: My PhD research focused on understanding data movement in workflow-based applications. In particular, we found that data movement cannot be effectively understood or optimized by considering application performance, workflow execution, and storage behavior independently. These insights led us to design Analytics4X, a general-purpose, adaptable framework for studying data movement and orchestration across different workflows and data movement patterns.

What did you learn as a graduate student in GCLab that you want to share with your peers?

TY: I learned that research is not a straight line, and that making progress often means being comfortable with uncertainty. Ask questions early, test assumptions, and do not be discouraged when an idea or experiment fails—it usually teaches you what to try next.

IAN: Collaboration, communication, and diversity of ideas are critical for solving today's scientific challenges. Several projects I worked on during my PhD would never have come close to completion without the support of our incredible collaborators, strong communication between teams, and the breadth of ideas that everyone brought to the table.



Ian (3rd from right) with Taufer and GCLab members.



Ty (center) with Taufer and GCLab members.

Tell us what is next after graduation.

TY: I'm a software engineer in Microsoft's Azure Data organization, which builds Microsoft's cloud database and analytics products. I work specifically on Microsoft Fabric's telemetry infrastructure, building systems that collect and process operational data used to monitor the platform's reliability and performance at scale.

IAN: I will be joining Lawrence Livermore National Laboratory (LLNL) as a postdoc in the fall, where I will be working on several research efforts, including infrastructure for the use of surrogate AI in scientific applications.

Share something about yourself outside of work.

TY: Since I've moved out to the Pacific Northwest, I'm getting into backpacking.

IAN: I love travelling and learning about new places and cultures. The two most interesting places I've gone so far are Kobe, Japan, and Ometepe Island in Nicaragua.

Professional Recognition



HPDC 2025 Achievement Award: Taufer received the 2025 ACM HPDC Achievement Award for her contributions to volunteer computing and the advancement of high-performance computing. The award recognizes sustained and influential contributions to the field of high-performance parallel and distributed computing.

HPCwire 35 Legends 2025: Taufer was named one of HPCwire's 35 Legends of HPC for 2025, recognizing her leadership in championing reproducible high-performance computing and her broader contributions to the HPC community.



EECS Department Award for Excellence in Research: On April 30, 2026, Taufer received the 2026 Department of Electrical Engineering and Computer Science Award for Excellence in Research at the University of Tennessee, Knoxville, recognizing her research achievements and contributions to the university's research mission.

SCALE Award (CCGrid 2025): Taufer and collaborators were winners of the 18th IEEE International Scalable Computing Challenge, held in conjunction with IEEE/ACM CCGrid 2025, recognizing their work in real-world scalable computing.



Best Poster Award at IEEE eScience 2025: GCLab research led by Ian Lumsden and collaborators received the Best Poster Award at IEEE eScience 2025 for work on performance optimization of an exascale implicit kinetic plasma simulation on El Capitan. The work brought together researchers from GCLab and national-laboratory collaborators to advance performance portability and optimization for large-scale plasma simulations.



Research Grants & Project Awards

National Science Data Fabric (NSDF) — \$9M NSF Award: Taufer leads the new \$9 million NSF National Science Data Fabric: Democratized AI-Driven Scientific Discovery project. The three-year effort brings together UTK, Purdue University, the University of Utah, the Texas Advanced Computing Center, and MLCommons to develop national cyberinfrastructure connecting scientific data, computing, AI, and researchers across institutions and disciplines. UTK will receive approximately \$3.6 million of the total award. <https://news.utk.edu/2026/07/29/taufer-leads-team-awarded-9m-by-nsf-to-enable-us-transition-to-ai-driven-discovery/>

PegasusAI — \$5M NSF Award: GCLab is part of the new \$5 million NSF PegasusAI project, led by Ewa Deelman, with Taufer serving as a co-PI. PegasusAI is developing an AI-driven workflow management framework spanning edge, cloud, and HPC resources, with AI supporting workflow composition, intelligent scheduling, and real-time adaptation. <https://eecs.utk.edu/nsf-grant-powers-ai-innovations-in-nationwide-workflow-management/>

SAFARI — \$1.2M NSF Award: Taufer serves as PI of SAFARI (Scientific Analytics, Forensics, and Reproducibility for Workflows in CI), a \$1.2 million NSF project with USC co-PI Ewa Deelman. SAFARI integrates provenance, analytics, automated verification, and artifact management into scientific workflows to make complex computational and AI-driven research more transparent, trustworthy, and reproducible.

NEXUS-DM — \$600K NSF Award: Taufer leads NEXUS-DM (Networked Exchange for Dark Matter), a \$600,000 NSF project with the University of Colorado Denver. The project is creating a FAIR and open-science data commons for dark-matter research, combining accessible data infrastructure with AI/ML workflows and community tools for reproducible scientific discovery. <https://nsdf-fabric.github.io/nsdf-slac/>

OS-EARTH — NSF POSE Award: Research from GCLab also contributed to the launch of OS-EARTH, an NSF POSE project led by Jack Marquez with Taufer and Kin Ng as co-PIs. The project is building a sustainable open-source ecosystem around GEOTiled for scalable terrain and hydrology analysis, supporting applications including wildfire modeling, soil moisture analysis, and agriculture.

AI TechX Seed Grant (IBM Collaboration): Taufer and Research Assistant Professor Kin Ng received a \$60,000 inaugural AI TechX seed grant at UTK. In collaboration with IBM, the project investigates optimization of large language model inference for high-performance scientific applications, including wildfire risk assessment, earth science, and bioinformatics. <https://eecs.utk.edu/ai-techx-funds-taufer-ngs-ibm-collaboration/>

[Learn more about GCLab's current research projects.](#)

Computing Research Association (CRA) Board of Directors:

Taufer joined the **CRA Board of Directors**, contributing to national-level leadership and discussions shaping the future of computing research, education, and the research ecosystem.

International Keynotes: GCLab research received significant international visibility through a series of invited keynotes by Taufer. She presented **“Designing for Trust, Transparency, and Efficiency in Scientific Computing”** at HPDC 2025 and SCA 2026 and is delivering the keynote at **Euro-Par 2026** in Pisa. These talks highlight the group's research at the intersection of performance, reproducibility, trustworthy computing, and AI-driven scientific workflows.

Open Accelerated Computing Summit Keynote: Taufer delivered the keynote **“Accelerating Trust and Transparency in Scientific Computing at Scale”** at the 2025 Open Accelerated Computing Summit, highlighting approaches for making increasingly complex scientific computing systems more transparent, reproducible, and trustworthy.

Keynotes, Leadership & Research Visibility



Meet our Team



2026-27 GCLab members

Dr. Michela Taufer, Director & Professor

Dr. Kin Wai NG, Research Assistant Professor

Dr. Ran Elgedawy, Postdoctoral Researcher

Dr. Aashish Pandey, Postdoctoral Researcher

Kin Hong NG, Research Scientist

Regan Sanz, Junior Software Engineer

Walter Jay Ashworth, Doctoral Student

Befikir Bogale, Doctoral Student

Connor Browne, Doctoral Student

Steven Dao, Doctoral Student

Druva Dhakshinamoorthy, Doctoral Student

Duncan McFarlane, Master's Student

Chandler Weeks, Master's Student

Angelina Ju, Undergraduate Student

Ian Finotti, Visiting Scholar

Rajasi Gore, Visiting Scholar

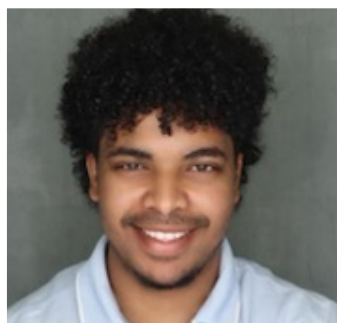
Jessica Walker, Project Manager

Grace Wisser, Assistant Director

2026 Summer Internships



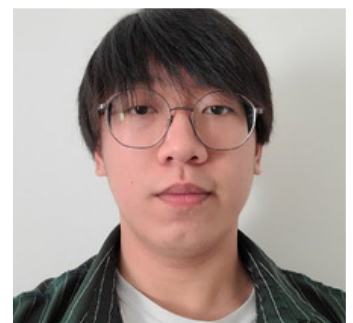
Walter Jay Ashworth



Befikir T. Bogale



Connor Browne



Steven Dao



Year in Review GOL Recap



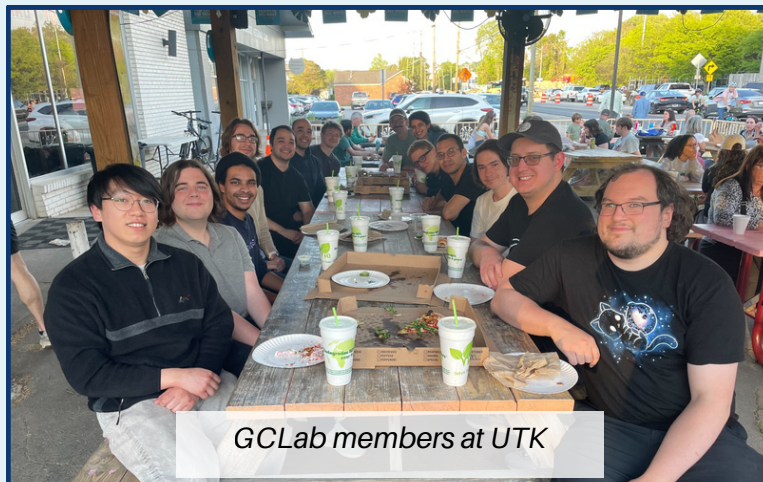
SC '25, St. Louis MO



HPSF Conference, Chicago, IL



CHESS Cornell University,
Ithaca, NY



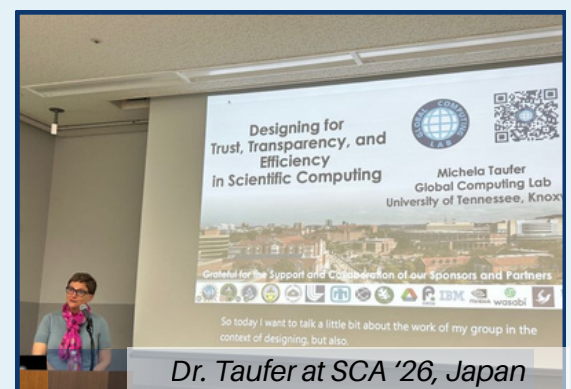
GCLab members at UTK



Dr. Taufer at IEEE-CCGRID-2026
in Sydney, Australia



Computing at ORNL Core Universities AI
Workshop 2025



Dr. Taufer at SCA '26, Japan



Sponsors



2025–2026 Journal Articles

Click the DOI to link to the article

[1] Pawel Poczekajlo, Ewa Deelman, Michela Taufer, Pawel Gepner, Leonid Moroz, Jerzy Krawiec, and Andrzej Przybyl. Low-latency Hybrid CORDIC Framework on FPGAs. *Journal of Computational Science*, 99:102933, 2026.

<https://doi.org/10.1016/j.jocs.2026.102933>

[2] Michael Sutherlin, Christine R. Kirkpatrick, Valerio Pascucci, and Michela Taufer. Lowering barriers and raising engagement: Stewardship lessons from faculty at primarily undergraduate institutions using national cyberinfrastructure. *Comput. Sci. Eng.*, 28(1):105–111, 2026. <https://doi.org/10.1109/MCSE.2026.3665291>

[3] Michela Taufer, Valerio Pascucci, Christine R. Kirkpatrick, and Ian T. Foster. Strategic investments in data democratization for scientific innovation. *Int. J. High Perform. Comput. Appl.*, 40(1):115–119, 2026.

<https://doi.org/10.1177/10943420251383612>

[4] Dhroov Pandey, Jack D. Marquez*, Michela Taufer, and Sanjukta Bhowmick. Application of graph alignment techniques for identifying sources of non-determinism in MPI simulations. *Int. J. High Perform. Comput. Appl.*, 40(3):367–382, 2026. <https://doi.org/10.1177/10943420251398118>

[5] Jack Marquez, Michel Cuendet, Silvina Caino-Lores*, Trilce Estrada, Ewa Deelman, Harel Weinstein, and Michela Taufer. Increasing the efficiency of ensemble molecular dynamics simulations with termination of unproductive trajectories identified at runtime. *J. Phys. Chem. A*, 129(9):2317–2324, 2025.

<https://doi.org/10.1021/acs.jpca.4c05182>

2025–2026 Refereed Conferences, Symposiums and Workshops

[1] Kin Wai Ng, Francesco Antici, Nigel Tan, Befikir Bogale, Caleb Han, Florence Tama, Osamu Miyashita, Bogdan Nicolae, and Michela Taufer. Merkle-Tree Weight Snapshot Deduplication for NN Training Provenance. In *Proceedings of the 35th International Symposium on High-Performance Parallel and Distributed Computing (HPDC)*, page TBD. ACM, June 2026. (Acceptance rate: 281/40, (14.5%)).

[2] Connor Browne, Nigel Tan, Scott Luedtke, Taufer, Michela, and Brian Albright. Modernizing VPIC-Kokkos I/O: From Legacy Binary Output to Adaptive HDF5 Workflows. In *Proceedings of the 35th International Symposium on High-Performance Parallel and Distributed Computing*, page 589–591. Association for Computing Machinery, 2026. (Short Paper).

[3] W. Jay Ashworth, Ian Lumsden, Jim Garlick, Mark Grondona, Olga Pearce, Stephanie Brink, Daniel Milroy, Tapasya Patki, Tom Scogland, and Taufer, Michela. Flux fiction: Hopping toward storage graph scheduling with el capitan’s rabbits. In *Proceedings of the 35th International Symposium on High-Performance Parallel and Distributed Computing*, page 600–602. Association for Computing Machinery, 2026. (Short Paper).

[4] Taufer, Michela, Rafael Ferreira da Silva, Benjamin Mintz, Milad Abolhasani, Rosa M. Badia, Ewa Deelman, Robert G. Moore, and John Shalf. A2SD: Accelerating Scientific Innovation Through Autonomous Discovery Systems. In Sarah Neuwirth, Arnab Kumar Paul, Tobias Weinzierl, and Erin Claire Carson, editors, *High Performance Computing*, volume 16091 of *Lecture Notes in Computer Science*, pages 668–674, Cham, 2026. Springer Nature Switzerland.

[5] Nigel Tan, Scott V. Luedtke, Michela Taufer, and Brian Albright. Bridging Performance Portability and Scalability for Plasma Simulations on Heterogeneous Systems. In *Proceedings of the 10th International Workshop on Performance, Portability, and Productivity in HPC (P3HPC) at SC25*, pages 1–10, St. Louis, MO, USA, November 16–21 2025. IEEE.



2025–2026 Refereed Conferences, Symposiums and Workshops

- [6] Ian Lumsden, Stefano Markidis, Andong Hu, Ivy Peng, Luca Pennati, Dewi Yokelson, Stephanie Brink, Olga Pearce, Tom Scogland, Hariharan Devarajan, Bronis R. de Supinski, Gian Luca Delzanno, and Michela Taufer. Performance Optimization of an Exascale Implicit Kinetic Plasma Simulation on El Capitan. In Proceedings of the 21st IEEE International Conference on e-Science (eScience), pages 1–2, Chicago, IL, USA, September 8–12 2025. IEEE. (Short Paper and Best Poster Winner).
- [7] W. Jay Ashworth, Jack Marquez, and Michela Taufer. Visualizing Temperature Hotspots and Their Impact Using the NEX-GDDP-CMIP6 Dataset. In Proceedings of the 21st IEEE International Conference on e-Science (eScience), pages 1–2, Chicago, IL, USA, September 8–12 2025. IEEE. (Short Paper).
- [8] Gabriel Laboy, Ian Lumsden, Jack Marquez, Kin Wai NG Lugo, Rodrigo Vargas, and Michela Taufer. A Modular, Cross-Platform Toolkit for High-Resolution Terrain Parameter Analysis. In Proceedings of the 21st IEEE International Conference on eScience (eScience), Chicago, IL, USA, September 2025. IEEE Computer Society. (Acceptance Rate: 33/98, 33.6%).
- [9] Dewi Yokelson, Stephanie Brink, Jason Burmark, Michael McKinsey, Befikir Bogale, Ian Lumsden, Michela Taufer, Tom Scogland, and Olga Pearce. Cross-architecture performance analysis using the raja performance suite. In Proceedings of the 54th International Conference on Parallel Processing (ICPP 2025), San Diego, CA, USA, September 2025.
- [10] Rafael Ferreira da Silva, Milad Abolhasani, Dionysios A. Antonopoulos, Laura Biven, Ryan Coffee, Ian T. Foster, Leslie Hamilton, Shantenu Jha, Theresa Mayer, Benjamin Mintz, Robert G. Moore, Salahudin Nimer, Noah Paulson, Woong Shin, Frédéric Suter, Mitra Taheri, Michela Taufer, and Newell R. Washburn. A Grassroots Network and Community Roadmap for Interconnected Autonomous Science Laboratories for Accelerated Discovery. In Proceedings of the Workshop on Workflows, Intelligent Scientific Data, and Optimization for Automated Management (WISDOM), in conjunction with ICPP 2025, San Diego, CA, USA, September 2025.
- [11] Raul Sirvent, Rocio Carratala-Saez, Amal Gueroudji, Tanzima Islam, Line Pouchard, and Michela Taufer. Reproducibility for hpc and distributed environments: Committees, nondeterminism, performance and workflows. In Proceedings of the 3rd ACM Conference on Reproducibility and Replicability (ACM REP), Vancouver, Canada, July 2025. ACM.
- [12] W. Jay Ashworth, Ian Lumsden, Jim Garlick, Mark Grondona, Olga Pearce, Stephanie Brink, Dewi Yokelson, Daniel Milroy, Tapasya Patki, Thomas Scogland, and Michela Taufer. Flux Emulator: First Insights into Optimizing Scheduling for Exascale HPC. In Proceedings of the 34th International Symposium on High-Performance Parallel and Distributed Computing (HPDC), pages 1–2, Notre Dame, IN, USA, July 20–23 2025. ACM. (Short Paper).
- [13] Gabriel Laboy, Paula Olaya, Jack Marquez, Michael Sutherlin, Rodrigo Vargas, and Michela Taufer. Advancing the GEOTiled Framework Through Scalable Terrain Parameter Computation. In Proceedings of the 34th International Symposium on High-Performance Parallel and Distributed Computing (HPDC), pages 1–2, Notre Dame, IN, USA, July 20–23 2025. ACM. (Short Paper).
- [14] Zackary Malkmus, Nigel Tan, Ian Lumsden, Kevin Assogba, M. Mustafa Rafique, Bogdan Nicolae, and Michela Taufer. On Optimizing Checkpoint Restoration for HPC Applications: Leveraging Merkle Trees and Asynchronous I/O. In Proceedings of the 34th International Symposium on High-Performance Parallel and Distributed Computing (HPDC), pages 1–2, Notre Dame, IN, USA, July 20–23 2025. ACM. (Short Paper).

2025–2026 Refereed Conferences, Symposiums and Workshops

- [15] Kin Wai Ng, Orcun Yildiz, Tom Peterka, Florence Tama, Osamu Miyashita, Catherine Schuman, and Michela Taufer. Energy-Efficient Neural Network Training for Scientific Datasets with Advanced Similarity Analytics and Orchestration. In Proceedings of the International Conference on Computational Science (ICCS), page 1–15, Singapore, July 7–9 2025. Springer.
- [16] Befikir Bogale, Ian Lumsden, Dalal Sukkari, Dewi Yokelson, Stephanie Brink, Olga Pearce, and Michela Taufer. Surrogate Models for Analyzing Performance Behavior of HPC Applications Using RAJAPerf. In Proceedings of the International Conference on Computational Science (ICCS), page 1–8, Singapore, July 7–9 2025. Springer.
- [17] Ali Khan, Nigel Tan, Jack Marquez, Sanjukta Bhowmick, and Michela Taufer. ParaDyMS: Parallel Dynamic Motif Counting at Scale. In Proceedings of the 25th IEEE International Symposium on Cluster, Cloud and Internet Computing (CCGRID), Tromsø, Norway, May 2025. IEEE Computer Society. (Acceptance Rate: 55/219, 25%).
- [18] Nigel Tan, Scott V. Luedtke, Michela Taufer, and Brian J. Albright. Achieving Scalable and Portable Performance in Plasma Simulations. In Proceedings of the 25th IEEE International Symposium on Cluster, Cloud and Internet Computing Workshops (CCGridW), pages 1–3, Gjøvik, Norway, May 12–15 2025. IEEE Computer Society. (TCSC SCALE Challenge Paper Finalist - Winner).
- [19] Aashish Panta, Amy Gooch, Giorgio Scorzelli, Michela Taufer, and Valerio Pascucci. Scalable Climate Data Analysis: Balancing Petascale Fidelity and Computational Cost. In Proceedings of the 25th IEEE International Symposium on Cluster, Cloud and Internet Computing Workshops (CCGridW), pages 1–3, Gjøvik, Norway, May 12–15 2025. IEEE Computer Society. (TCSC SCALE Challenge Paper Finalist).

2025–2026 Reports

- [1] Aashish Panta, Giorgio Scorzelli, Amy Ashurst Gooch, Werner Sun, Katherine S. Shanks, Suchismita Sarker, Devin Bougie, Keara Soloway, Rolf Verberg, Tracy Berman, Glenn Tarcea, John Allison, Michela Taufer, and Valerio Pascucci. Large data acquisition and analytics at synchrotron radiation facilities. CoRR, abs/2602.05837, 2026. URL: <https://arxiv.org/abs/2602.05837>
- [2] Stefano Markidis, Andong Hu, Ivy Peng, Luca Pennati, Ian Lumsden, Dewi Yokelson, Stephanie Brink, Olga Pearce, Thomas RW Scogland, Bronis R de Supinski, Gian Luca Delzanno, and Michela Taufer. Exascale Implicit Kinetic Plasma Simulations on El Capitan for Solving the Micro-Macro Coupling in Magnetospheric Physics. arXiv preprint arXiv:2507.20719, 2025. URL: <https://arxiv.org/abs/2507.20719>
- [3] Amy Roberts, Jack Marquez, Kin Hong NG, Kitty Mickelson, Aashish Panta, Giorgio Scorzelli, Amy Gooch, Prisca Cushman, Matthew Fritts, Himangshu Neog, Valerio Pascucci, and Michela Taufer. The Making of a Community Dark Matter Dataset with the National Science Data Fabric. arXiv preprint arXiv:2507.13297, 2025. URL: <https://arxiv.org/abs/2507.13297>
- [4] Rafael Ferreira da Silva, Milad Abolhasani, Dionysios A. Antonopoulos, Laura Biven, Ryan Coffee, Ian T. Foster, Leslie Hamilton, Shantenu Jha, Theresa Mayer, Benjamin Mintz, Robert G. Moore, Salahudin Nimer, Noah Paulson, Woong Shin, Frédéric Suter, Mitra Taheri, Michela Taufer, and Newell R. Washburn. A grassroots network and community roadmap for interconnected autonomous science laboratories for accelerated discovery. June 20, 2025. URL: <https://arxiv.org/abs/2506.17510>
- [5] Michela Taufer, Rada Mihalcea, Matthew Turk, Dan Lopresti, Adam Wierman, Kevin Butler, Sven Koenig, David Danks, William Gropp, Manish Parashar, Yolanda Gil, Bill Regli, Rajmohan Rajaraman, David Jensen, Nadya Bliss, and Mary Lou Maher. Now More Than Ever, Foundational AI Research and Infrastructure Depends on the Federal Government. arXiv preprint arXiv:2506.14679, 2025. URL: <https://arxiv.org/abs/2506.14679>

2025 – 2026 Posters and Abstracts (not in proceedings)

- [1] Endalkachew Abebe Kebede, Gabriel Laboy, Paula Olaya, Michela Taufer, Holly A. Michael, Kevin Bhimani, and Kyle Frankel Davis. High-Resolution Global Mapping of Irrigated Areas Using Remote Sensing and Machine Learning. In American Geophysical Union Conference (AGU) Fall Meeting 2025, pages 1–1, New Orleans, USA, December 2025.
- [2] Jack Marquez, Kin Wai NG, Gabriel Laboy, Paula Olaya, Rodrigo Vargas, and Michela Taufer. Scalable and Optimized Terrain Parameter Computation with the GEOTiled-SG Framework. In American Geophysical Union Conference (AGU) Fall Meeting 2025, pages 1–1, New Orleans, USA, December 2025.
- [3] Kin Wai NG, Jack Marquez, Gabriel Laboy, Endalkachew Kebede, Holly Michael, Kyle Frankel Davis, and Michela Taufer. An Interface for Data Curation and Mapping of Irrigated Areas Using Active Learning. In American Geophysical Union Conference (AGU) Fall Meeting 2025, pages 1–1, New Orleans, USA, December 2025.
- [4] Befikir Bogale, Olga Pearce, Stephanie Brink, David Boehme, Ignacio Laguna, Jason Burmark, Ian Lumsden, Tom Scogland, and Michela Taufer. An Approach for Correlating Compiler Optimizations With Runtime Performance. In Poster at the 34th ACM/IEEE International Conference on High Performance Computing, Networking, Storage, and Analysis (SC). IEEE Computer Society, November 2025.
- [5] Ian Lumsden, Michela Taufer, Stephanie Brink, Olga Pearce, Hariharan Devarajan, Jae-Seung Yeom, and Tom Scogland. Analytics4X: General-Purpose Framework for Analysis and Optimization of HPC Data Movement. In Poster at the 34th ACM/IEEE International Conference on High Performance Computing, Networking, Storage, and Analysis (SC). IEEE Computer Society, November 2025.

2025 – 2026 Keynotes

- Sep 2026 — "Designing for Trust, Transparency, and Efficiency in Scientific Computing." 16th International Conference on Parallel Processing and Applied Mathematics (PPAM), Poznań, Poland.
- Aug 2026 — "Designing for Trust, Transparency, and Efficiency in Scientific Computing." Euro-Par Conference, Pisa, Italy.
- Jan 2026 — "Designing for Trust, Transparency, and Efficiency in Scientific Computing." SCA 2026 Workshop on Data Reduction and Energy-Aware Data Movement, Osaka, Japan.
- Oct 2025 — "Accelerating Trust and Transparency in Scientific Computing at Scale." 2025 Open Accelerated Computing Summit (Virtual Conference).
- Jul 2025 — "Designing for Trust, Transparency, and Efficiency in Scientific Computing." 34th ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC), Notre Dame, IN, USA.

2025 – 2026 Invited Talks

- Jun 2026 — "From Beamtime to Insight: An Open NSDF Pattern for Real-Time Adaptive Deformation Mapping." 2nd Advancing Autonomous Scientific Discovery Workshop, Hamburg, Germany.
- Apr 2026 — "Down the Rabbit Hole of Reproducible AI." Salishan Conference on High Speed Computing, Gleneden Beach, Oregon, USA.



2025–2026 Invited Talks

Mar 2026 — "From Beamtime to Insight: An Open NSDF Pattern for Real-Time Adaptive Deformation Mapping." SOS27 Workshop, Santa Barbara, USA.

Oct 2025 — "Enabling Autonomous Labs: The NSDF-ORNL Partnership for Real-Time Scientific Discovery." CI Compass FAIR Working Group Seminar (Virtual).

Sep 2025 — "Designing for Trust, Transparency, and Efficiency in Scientific Computing: HPC Nondeterminism, Scalable Checkpointing, and AI-Driven Workflows." Scalable Approaches to High Performance Computing (ScalPerf), Bertinoro, Italy.

Aug 2025 — "Enabling Autonomous Labs: The NSDF-ORNL Partnership for Real-Time Scientific Discovery." Smoky Mountain Conference (SMC), Chattanooga, TN, USA.

Aug 2025 — "Enabling Autonomous Labs: The NSDF-ORNL Partnership for Real-Time Scientific Discovery." ORNL Neutron Sciences Conference (Indico), Knoxville, TN, USA.

Aug 2025 — "Empowering Autonomous Laboratories with the National Science Data Fabric." WIRED Grid Resilience Symposium, Calgary, Canada.

Jul 2025 — "Empowering Autonomous Laboratories with the National Science Data Fabric." *Data, Workflows, Agents, Reasoning, and Frameworks (DWARF) Track at Trillion Parameter Consortium (TPC) Conference*, San Jose, CA, USA.

Jun 2025 — "AI is More Than Just Models: From Provenance to Pattern Mining to Energy-Efficient Training." *ISC High Performance Conference*, Hamburg, Germany.

Jun 2025 — "Maximizing Returns on Investment of the National Science Data Fabric: Steering Autonomous Experiments, from Zoom to Science in 5 Months." *1st Advancing Autonomous Scientific Discovery Workshop*, Hamburg, Germany.

May 2025 — "Overview of the National Science Data Fabric and its Achievements." *All-Hands Meeting, San Diego Supercomputer Center*, San Diego, CA, USA.

May 2025 — "Reimagining Performance and Reproducibility in the Post-Moore Era: Innovations in Checkpointing and Workflow Management." *JLESC Meeting, Argonne National Laboratory*, Lemont, IL, USA.

Apr 2025 — "Overcoming Access and Utilization Challenges with a Unified Data Fabric for Scientific Discovery." *University of California, Merced* (Virtual).

Apr 2025 — "Flux Fiction: Simulating HPC Scheduling Without Running a Single Job." *HPC Conference*, Salishan, OR, USA.

Mar 2025 — "Overcoming Access and Utilization Challenges with a Unified Data Fabric for Scientific Discovery." *University of Wyoming*, Laramie, WY, USA.

Jan 2025 — "On the Need for Solutions to Address Scientists' Pain Points." *Lawrence Livermore National Laboratory*, Livermore, CA, USA.

2025 – 2026 Minisymposium Speaker

Jun 2026 — "The Making of a Community Dark Matter Dataset with the National Science Data Fabric." Platform for Advanced Scientific Computing (PASC) Conference, June 29–Jul 1, 2026. Bern, Switzerland.

Jun 2025 — "Optimizing Data Movement in Multiscale MD Workflows: A Performance Study of MuMMI and DYAD." Platform for Advanced Scientific Computing (PASC) Conference, June 16–18, 2025. Brugg, Switzerland.

Jun 2025 — "Reimagining Performance and Reproducibility in the Post-Moore Era: Innovations in Checkpointing and Workflow Management." Platform for Advanced Scientific Computing (PASC) Conference, June 16–18, 2025. Brugg, Switzerland.

Jun 2025 — "Maximizing Returns on Investment of the National Science Data Fabric: Steering Autonomous Experiments from Zoom to Science in 5 Months." Platform for Advanced Scientific Computing (PASC) Conference, June 16–18, 2025. Brugg, Switzerland.

2025 – 2026 Tutorials and Lectures

Jan 2026 — "Harnessing HPC and AI for Interactive Analysis and Visualization of Large Scientific Datasets with the National Science Data Fabric (NSDF)." 26th IEEE International Symposium on Cluster, Cloud, and Internet Computing, Sydney, Australia.

Jul 2025 — "Enabling Scientific Discovery: Harnessing the Power of the National Science Data Fabric for Large-Scale Data Analysis." ACM Europe Summer School on HPC Computer Architectures for AI and Dedicated Applications, Barcelona Supercomputing Center, Barcelona, Spain.

Jul 2025 — "Analytics4NN: Accelerating Neural Architecture Search through Modeling and High-Performance Computing Techniques." Interdisciplinary School on Machine Learning and Artificial Intelligence for Science, ETH Zurich Campus Heilbronn, Heilbronn, Germany.

Jun 2025 — "Enabling Scientific Discovery: Harnessing the Power of the National Science Data Fabric for Large-Scale Data Analysis." International Parallel and Distributed Processing Symposium (IPDPS), Milan, Italy.

2025 – 2026 Birds of a Feather (BOFS)

Nov 2025 — Rafael Ferreira da Silva, Ian Foster, Thomas Gibbs, Noah Paulson, and Michela Taufer. "Autonomous Science Network: Interconnected Autonomous Science Labs Empowered by HPC and Intelligent Agents." BoF Session at the IEEE/ACM International Conference for High-Performance Computing, Networking, Storage, and Analysis (SC), St. Louis, MO, USA.

Jun 2025 — Raúl Sirvent, Rocío Carratalá-Sáez, Line Pouchard, and Michela Taufer. "Reproducibility and Provenance." BoF Session at the HPC ISC Conference, Hamburg, Germany.

