# MultiSector Dynamics Community

## Inside This Issue



## Welcome to the newsletter of the **MultiSector Dynamics Community**

Hello MultiSector Dynamics (MSD) Community!

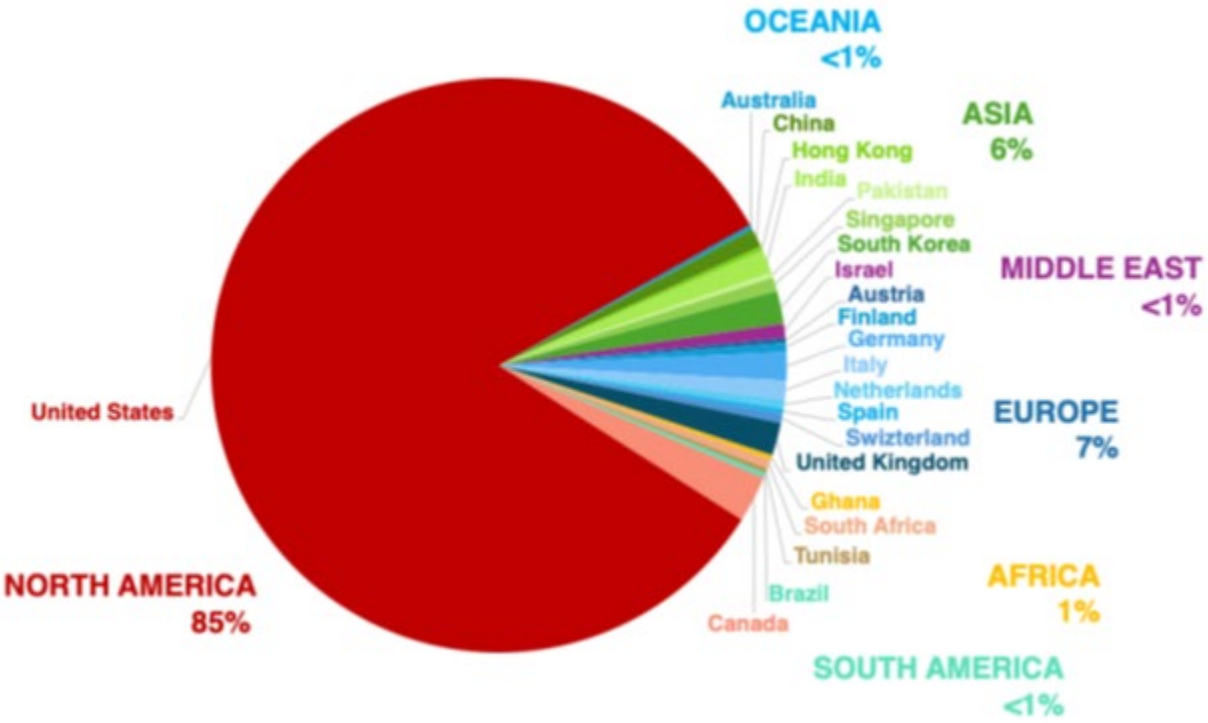
In this issue, we provide a summary of the 2025 AGU Fall Meeting that took place from 15th to 19th December in New Orleans, Louisiana.

We also feature a research spotlight on Gabriela Gesualdo, a postdoctoral Researcher at the Pennsylvania State University working at the intersection of artificial intelligence, droughts, and complex human-Earth systems. Be sure to also check out our recent and coming MSD community webinars – see all the details below!

www.multisectordynamics.org

# MSD@AGU 2025

Once again, MSD science had a major presence at the 2025 AGU Fall meeting, with the Community of Practice (CoP) hosting **five oral sessions** and **four poster sessions**. The MSD CoP sessions attracted 91 abstracts from a total of 379 authors, making it one of the largest coordinated topical areas overall in the AGU Global Environmental Change section. Out of all accepted oral and poster presentations, 17% of the authors came from countries other than the United States—with a total of 22 countries from all regions of the world represented. Consistent with the MSD's commitment to advance early career researchers, 33% of presenters were students.



# *MSD Research Spotlight:* **Gabriela Gesualdo**

*Dr. Gabriela Gesualdo is a postdoctoral scholar at Pennsylvania State University and studies the intersection between hydroclimatic extremes and complex human-Earth systems. As a member of the MSD Community of Practice (CoP), she supports the wider CoP as a core member of the Facilitation Team.*

Dr. Gabriela Chiquito Gesualdo is a hydrologist advancing the understanding of how hydrological extremes emerge, interact, and propagate within complex human–Earth systems. As a Postdoctoral Researcher in Geosciences at Pennsylvania State University, she investigates how compound and rapidly evolving hazards, particularly droughts, reshape adaptive capacity in a changing world. Her work spans interdisciplinary collaborations across the United States, Europe, and South America.

Her research is driven by a central challenge: droughts are no longer isolated events, but dynamic, interconnected processes that intensify quickly and cascade across systems. A key focus of her work is flash droughts, fast-developing events driven by the interaction of precipitation deficits, high evaporative demand, and land–atmosphere feedback. By systematically evaluating multiple detection approaches across the United States, she reveals critical inconsistencies among existing indicators and advances multi-indicator, sector and regionally adaptive frameworks that improve early warning and support proactive water management [1].

Beyond rapid-onset events, Dr. Gesualdo's work addresses the growing risk of compound droughts, where extremes co-occur across regions, amplifying impacts and economic losses. She develops new approaches to quantify the spatial co-occurrence of hydrological droughts at the watershed scale, revealing patterns of synchronized risk. These insights support emerging strategies such as regional coordination and risk pooling, moving beyond traditional approaches to drought mitigation [2].

More recently, Dr. Gesualdo has integrated artificial intelligence into drought research using natural language processing (NLP). By mining large-scale text datasets, her work extracts detailed information on the timing, location, and societal impacts of drought events. In collaboration with Professor Mariana Madruga de Brito's group at Helmholtz Centre for Environmental Research (UFZ), this effort is helping build one of the first large-scale databases of flash drought impacts in the United States, addressing critical data gaps and enabling impact-based modeling and decision support.

Looking ahead, her research advances the concept of complex hydrological risk, integrating hazards, vulnerabilities, and responses to support more resilient and adaptive water systems under accelerating extremes. Connect with her on LinkedIn.

**Highlighted Articles**:

[1] Gesualdo, G. C. & Hadjimichael, A. (2025). Beyond one-size-fits-all: a path toward region-specific flash drought monitoring and management. Environmental Research Water. https://doi.org/10.1088/3033-4942/ae1bca

[2] Gesualdo, G. C., Benso, M. R., Mendiondo, E. M., & Brunner, M. I. (2024). Spatially compounding drought events in Brazil. Water Resources Research, 60, e2023WR036629. https://doi.org/10.1029/2023WR036629

# Upcoming Webinar: Data-Driven Monitoring of Inland Waters Using Remote Sensing


This panel will feature two presentations that center on the common theme of using data-driven remote sensing methods to monitor inland water. Dr. Riggs will lead the first discussion on characterizing operational signatures of reservoirs with the SWOT satellite, which enables insights into the variability of reservoir and river boundaries. The second discussion led by Dr. King will demonstrate the recently published USGS data products that advance remote sensing of inland water quality. He will also demonstrate examples on applying these data products to support water quality decision-making in the United States.

You can **register for the webinar here**, after which you will receive a Zoom link and Calendar invite!

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# Upcoming Webinar: Advances in MSD-LIVE to Support the MSD Community of Practice

The MultiSector Dynamics Living, Intuitive, Value-adding, Environment (MSD-LIVE; msdlive.org) is a cloud-based data management system and advanced computing platform that enables MSD researchers to document and archive their data, run their models and analysis tools, and share their data, software, and workflows within the MSD Community of Practice. Recently, several high-profile datasets have attracted many new users to MSD-LIVE.

This webinar has two goals: 1) To refamiliarize the MSD community and new users with the components of the platform (e.g., the data repository, model training notebooks, and data dashboards) and to highlight examples of how these components are advancing MSD science and 2) To demonstrate new features in v3 of the platform, released in late 2025. The main new feature in v3 is the ability to interactively explore data in MSD-LIVE without downloading it. MSD-LIVE users can now click a button in our data repository and launch a blank Jupyter notebook with access to the underlying data on AWS. Users can use the notebook to write analysis, visualization, or subsetting routines that process the data directly on the AWS cloud. We also added a GitHub integration feature that allows users to share analysis or visualization code they develop with the community of MSD-LIVE users. The webinar will wrap up with a look at what's coming next for MSD-LIVE in 2026.

You can **register for the webinar here**, after which you will receive a Zoom link and Calendar invite!

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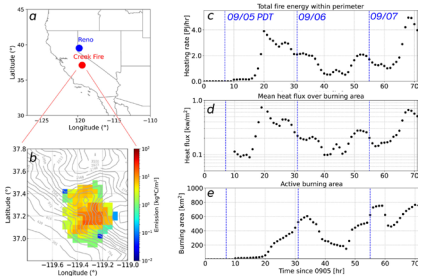
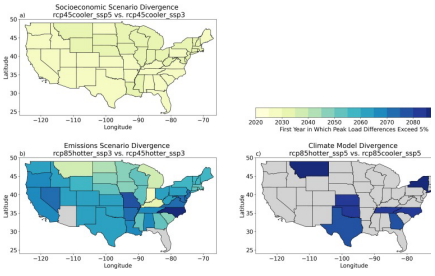
# MSD Relevant Publications

We have been posting and will be regularly updating select MSD relevant publications on the website, under the **Publications** page. If you have any publications you would like us to highlight, please email contact@multisectordynamics.org.

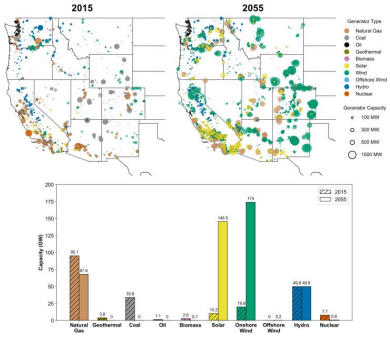
Below you can find some of the publications posted most recently:



Simulating Pyrocumulonimbus Clouds Using a Multiscale Wildfire Simulation Framework



When do different scenarios of projected electricity demand start to meaningfully diverge?




Investigating the effects of cooperative transmission expansion planning on grid performance during heat waves with varying spatial scales

# MSD Job Listings

Our website features a **careers page** that lists available MSD-focused positions at all levels. If you'd like to post a position to be featured in this page, please email us at: contact@multisectordynamics.org. Here are some of our latest posts:

## Associate Director at the RAND Global and Emerging Risks Research Division

RAND is seeking candidates for the role of Associate Director, Global and Emerging Risks. This position reports to the Vice President and Director, Global and Emerging Risks. The Associate Director plays a central role in formulating and overseeing the division's strategic plan, research agenda, talent recruitment, strategic engagement, business development and fundraising efforts, and partnerships with RAND's other research divisions and operational units.

## Postdoctoral Research Associate in AI for Building Energy Systems at PNNL

The Building Simulation and Design Group (BS&DG) is seeking a Postdoctoral Research Associate – AI for Building Energy Systems. The successful candidate will be accountable to Project and/or Task Managers for performing assigned roles, following applicable project and field procedures, and completing assigned tasks on time and within budget. The candidate will also be accountable to the Group Leader and Team Leader for staff performance and development, operational discipline, and project execution. This role will support AI-enabled building energy systems research under DOE mission areas, with applications that may include building energy modeling, code compliance checking, permitting, large-scale performance data analysis, workflow automation, building controls and operations, workforce training, data mining, and AI-enabled software tools. The successful candidate will join multi-disciplinary project teams and contribute to research on AI methods, computational methods, and technical workflows for building research, analysis, and decision making, while growing toward increased technical independence.

## Earth Systems Data Manager at ETH Zurich, Switzerland

There are an ever-increasing amount and diversity of Earth observations collected from satellites, airborne instruments, in-situ measurement networks, and high-resolution climate modeling data produced at C2SM. Harnessing these data effectively is essential for advancing our understanding of the Earth system. C2SM in collaboration with Swiss National Supercomputing Centre (CSCS) is extending its data services and is building a petabyte-scale data lake consisting of highly diverse observational and model data.

To address this challenge, a robust data management framework is being developed to make rapidly growing Earth-system datasets accessible and usable for the scientific community. We are looking for an Earth Systems Data Manager to play a pivotal role in shaping this framework. This technical position focuses on identifying observational datasets relevant to Earth science research across disciplines, curating and documenting data collections to ensure quality and scientific value, and establishing metadata and access standards to support data discovery and reproducibility. Working closely with researchers and developers from C2SM, ETH, CSCS, as well as national and international institutions, the successful candidate will support operating and advancing the data platform, assist interdisciplinary projects that integrate multiple data sources, and use high-performance computing resources to manage and process large environmental datasets such that they are ready to be used for research.

This newsletter has been edited by Lillian Lau and the Community of Practice Facilitation Team. This and all previous newsletters can be accessed at the Newsletters page of our website. If you have any suggestions, concerns or other feedback about this newsletter or the MSD website, please email contact@multisectordynamics.org.