

MultiSector Dynamics Community

Welcome to the newsletter of the MultiSector Dynamics Community

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Hello MultiSector Dynamics (MSD) Community!

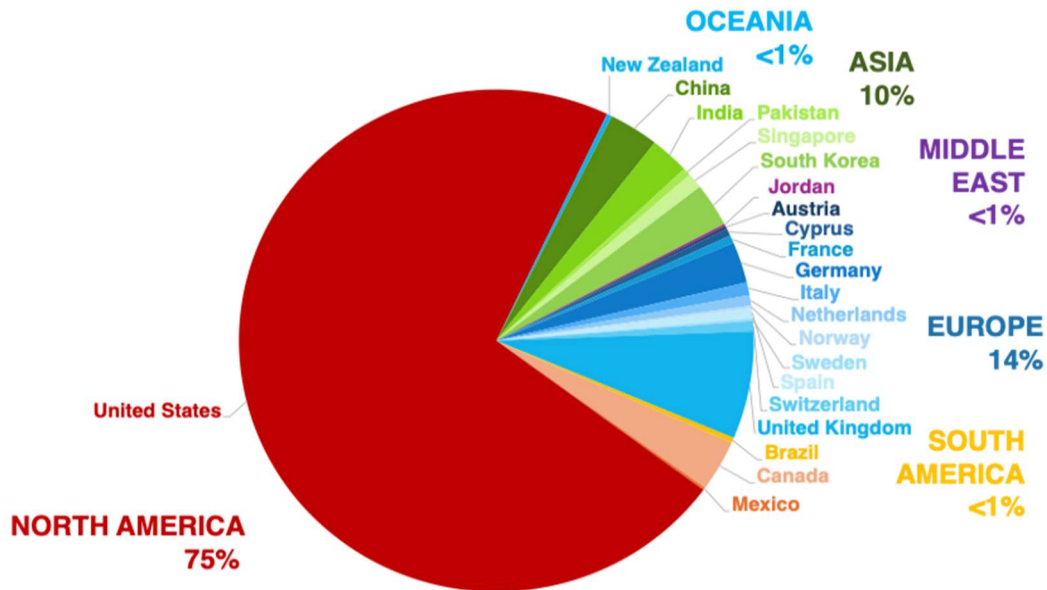
We have had an exciting start to 2024 packed full of events. In this issue, we provide a summary of our recent happenings, beginning with a recap of MSD at the 2023 Fall AGU Meeting. We are excited to announce two new Working Groups and our 2024 webinar series. We kicked off the webinar series in February focusing on how to improve the reproducibility of your work using GitHub Meta-Repos. No worries if you missed it live, we summarize it here and it's [on YouTube!](#)

We also highlight our own Human Systems working group co-chair Jim Yoon, who has been selected to join the 2024-26 New Voices cohort at the National Academies. Be sure to check out our research spotlight on Matt Sparks, a PhD candidate at the University of Waterloo!

www.multisectordynamics.org

MSD@AGU 2023 Recap

We want to thank everyone for making the MSD presence at the Fall 2023 AGU meeting so strong and exciting. This past 2023 Fall AGU continues our success in contributing to the Global and Environmental Change section's program (~10% of the total submissions). The MSD CoP helped coordinate 8 oral sessions and 9 poster sessions drawing on 144 abstracts. The sessions had 687 authors from 23 countries and 35% of the presenters were students. The student presentations included the Outstanding Student Presentation Award winning talk by [David Lafferty \(UIUC\)](#) entitled 'How do Downscaling and Bias-Correction Alter the Uncertainty Decomposition of Future Climate Projections?'. David is an active member of our Uncertainty Working Group. Nearly a third of the authors were international from 22 countries outside of the US.

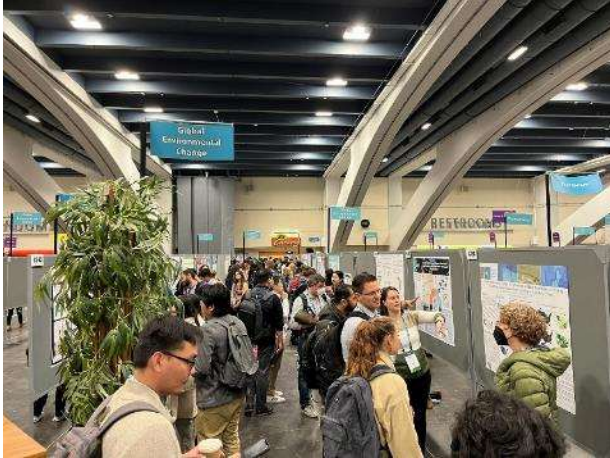


Breakdown of participants

The following themes that emerged across the MSD sessions:

- Challenges in confronting climate change complexity in risk frameworks
- Overcoming disconnects between energy system and climate modeling
- Needs for advancing energy transitions in the developing world
- Advances in emulation and uncertainty characterization in MSD systems
- Addressing the confluence between societal and environmental changes in urban systems
- Understanding the impacts of compounding hazards from weather extremes across sectors
- Better capturing energy-water-land interactions across scales
- Providing transdisciplinary training for the next generation of MSD researchers.

Our Early Career Development working group leveraged the huge turnout for our exciting poster sessions to organize a meet up for the MSD community to cap off the week with great conversations and fun in San Francisco.



MSD poster aisle at AGU 2023.



MSD meetup snapshot at AGU 2023.

Following the success of the MSD CoP program, we will again coordinate several MSD session proposals for the 2024 AGU Fall Meeting, aimed at bringing together researchers from around the world, presenting compelling MSD research, and accelerating the development of the MSD community. If you wish to contribute to this effort, [please follow the instructions to submit 2024 AGU Fall Meeting MSD session proposals](#).

New Working Groups Announcements

Working Groups are a central component of the MSD Community of Practice (CoP), where researchers from different disciplines, projects and institutions coordinate and innovate MSD research and support community development. The MSD Community of Practice is pleased to announce the establishment of two new Working Groups.

Artificial Intelligence Working Group



David Gold



Stefano Galelli



Jill Sturtevant

Our new working group will identify and quantify opportunities and risks associated with recent AI advances and their implementation in MSD science. Through webinars, trainings, conference sessions, and a community-wide data competition, our working group will investigate how AI can 1) expand the breadth and depth of data available for model development, 2) help us understand model structures,

and 3) support model diagnostics of coupled model chains. We will also explore AI techniques that expand the current tools available for control problems (e.g., Reinforcement Learning), thereby allowing us to operate and plan highly nonlinear and interconnected Human-Earth systems.

This working group is chaired by Stefano Galelli (Cornell University) and David Gold (Utrecht University), with communications support from Jill Sturtevant (Baylor University). Membership is open to all researchers and practitioners interested in exploring emerging AI applications in MSD research, both within the US and internationally. **Existing expertise in AI is not required to join this group, and we welcome new members interested in learning about how to apply and advance AI tools for MSD science.** We aim to create a diverse team of experts from multiple MSD-related disciplines. Group members can be from any sector and background, including academia, industry, and government at any career stage.

It is an exciting time for both AI and MSD research. If you're interested in exploring and advancing the latest AI innovations in MSD science, consider joining our group! To join, please contact Stefano Galelli (galelli@cornell.edu), David Gold (d.f.gold@uu.nl), or Jill Sturtevant (jill_sturtevant1@baylor.edu).

Equity Working Group



Rebecca Saari



Sarah Fletcher



Amanda Giang



Matt Sparks

This new working group aims to advance research on social equity in Multi-Sector Dynamics. The complex evolution of human-environment systems has important equity implications. Understanding these dynamics is essential to guiding infrastructure toward sustainable futures. While recent MSD research has progressed understanding of distributive impacts of interventions in human-environmental systems, important knowledge gaps remain. First, modeling advances are needed to capture distributive social impacts on systems with multiple stressors and interconnected risks. Second, there has been limited integration of modeling work with important related work in social sciences and humanities. Third, the equity implications of different collaborative knowledge processes have not been assessed. This WG will focus on assessing the current status of MSD equity research, identifying key research frontiers, and supporting community members in advancing these frontiers.

This working group is co-chaired by Sarah Fletcher (Stanford University), Amanda Giang (University of British Columbia), and Rebecca Saari (University of Waterloo). We welcome all interested in joining. We are interested in bringing together a group with diverse expertise and are particularly aiming to increase participation in the social science and humanities communities, serving as a bridge to fields currently underrepresented in MSD. Participants can be from any career stage and any sector, especially encouraging participation from community groups and practitioners. Similarly, working group members can have any level of background knowledge in social equity issues: we welcome those new to thinking about social equity issues in MSD research but interested in learning more. We encourage

participation from researchers who have been historically and systematically underrepresented in human-environment systems research.

If you are interested in the intersection of social equity and MSD research, please consider joining our working group! To join or learn more, please reach out to any of the co-chairs: Sarah Fletcher (sfletcher@stanford.edu), Amanda Giang (amanda.giang@ubc.ca), and Rebecca Saari (rebecca.saari@uwaterloo.ca), or communications officer, Matt Sparks (matt.sparks@uwaterloo.ca).

MSD CoP Upcoming Webinar on Confronting Climate Change Complexity: Intersectionality, Integration, and Innovative Governance

The graphic features a dark blue background with a world map and network lines. At the top, the title 'Confronting Climate Change Complexity: Intersectionality, Integration, and Innovative Governance' is displayed in white. Below the title, the word 'Presenters' is centered. Four circular headshots of the presenters are arranged horizontally. To the right of the headshots, the date and time 'Thursday, March 28th 1:00-2:00 PM EST' are written in white. Below each headshot is the presenter's name and affiliation.

Confronting Climate Change Complexity: Intersectionality, Integration, and Innovative Governance

Presenters

Thursday, March 28th
1:00-2:00 PM EST

Katherine Mach
University of Miami

Linda Shi
Cornell University

Kripa Jagannathan
LBNL

Carlos Martin
Harvard University

Join Katherine Mach (University of Miami), Linda Shi (Cornell University), Kripa Jeganathan (Lawrence Berkeley National Lab), and Carlos Martin (Harvard University) on **Thursday March 28th from 1-2pm EST** for a Zoom panel discussion on confronting the complex aspects that arise due to climate change.

Abstract

Climate impacts increasingly unfold in interlinked systems of people, nature, and infrastructure. The cascading consequences are revealing sometimes surprising connections, and prospects for climate responses also depend on complex interactions. In this presentation, we will introduce key findings from the United States Fifth National Climate Assessment and build upon them to suggest a framework for understanding and responding to complex climate challenges. This approach involves: (1) integration of disciplines and expertise to understand how intersectionality shapes complex climate impacts and the wide-ranging effects of climate responses, (2) collaborations among diverse knowledge holders to improve responses and better encompass intersectionality, and (3) sustained experimentation with and learning about governance approaches capable of handling the complexity of climate change. We outline actionable steps for climate research to incorporate these pillars, as is increasingly necessary for confronting climate complexity and sustaining equitable, ideally vibrant climate futures.

Register in advance for this webinar

<https://cornell.zoom.us/meeting/register/tJMsd-mtrT0qEtX16INqcJM97IOH0mQIHH3x>

After registering, you will receive a confirmation email containing information about joining the meeting as well as the option to add it to your calendar.

R2O2R Working Group Announcement: Webinar on applied science for decision-making at the water-energy nexus

The MSD Connecting Research to Operations and Planning' (R2O2R) Working Group will hold a webinar on **April 30 from 1-2pm ET**, focusing on applied science for decision-making at the water-energy nexus. The event will include several talks followed by a moderated Q&A and discussion with the audience. Each of the speakers will reflect on several important aspects of their work as it relates to practitioner communities: application environment, scientific capabilities, science-application interface, and lessons learned. The goal is to draw cross-case inferences and generalizable insights that are relevant for the entire MSD community, no matter the core domain. Keep an eye out for more information and registration details in the near term.

More information will be available on the [MSD CoP website](#) in the coming weeks.

Register in advance for this webinar

<https://cornell.zoom.us/meeting/register/tJEof-qsrz0sHdYApcX0RwojB6FryzzgLOXR>

After registering, you will receive a confirmation email containing information about joining the meeting as well as the option to add it to your calendar.

MSD CoP GitHub Meta-Repository Webinar Summary

On 22-February the MSD CoP hosted a webinar on using meta-repositories to document the data and code underpinning MSD experiments. The webinar was led by Chris Vernon, Casey Burleyson, Mengqi Zhao, and Jennie Rice – all from PNNL. The webinar was attended by more than 40 researchers from the MSD community and beyond. It covered the role of open science in the MSD community, the origins and purpose of meta-repositories, and step-by-step instructions and best practices for building a meta-repository starting from [the GitHub template that can be found here](#). Presenters provided links to numerous examples and discussed the role of meta-repositories in the IM3 project's open science mandates. It concluded with project management recommendations on how to include meta-repositories in publication workflows. The audience engaged in an active back-and-forth Q&A session where they raised detailed questions about using meta-repositories in MSD-relevant work sponsored by DOE and other agencies. A recording of the webinar will be made available shortly on the MSD CoP YouTube channel. This recording is now available on [YouTube](#).

To catch up on past webinars, hit "Subscribe" to follow us on [YouTube](#).

Reference

Vernon, C. R., Burleyson, C., Rice, J., & Zhao, M. (2024, March 5). MSD CoP Webinar: Using Meta-Repositories To Facilitate Open Science in MSD Research. MSD-LIVE Data Repository.

<https://doi.org/10.57931/2318731>



Call for Earth's Future Special Collection Peer Reviews

Are you interested in lending your expertise to the [Earth's Future Special Collection](#)

"Multi-Sector Dynamics: Advancing Complex Adaptive Human-Earth Systems Science in a World of Interconnected Risks"? We are welcoming new paper submissions until 12/31/24 and please consider serving as a peer reviewer. We welcome anyone who is interested and especially encourage early career

researchers (e.g., advanced graduate students and postdocs) to serve as reviewers. Please contact Pat Reed (patrick.reed@cornell.edu) if you are interested in serving as a reviewer.



Multi-Sector Dynamics: Advancing Complex Adaptive Human-Earth Systems Science In a World of Interconnected Risks

MSD CoP Member Highlight: Jim Yoon

Jim Yoon, a member of the MSD scientific steering group and co-chair of the MSD Human Systems Working Group, was selected to join the 2024-26 New Voices cohort at the National Academies of Sciences, Engineering, and Medicine, alongside 25 other outstanding early- and mid-career researchers across the country. The New Voices program aims to expand the diversity of expertise engaged in the work of the National Academies while developing a network of U.S. leaders to address national and global challenges. Jim is particularly interested in using the role to broadcast and connect MSD science to National Academies activities and dialogues. Read more about Jim in the [PNNL](#) and [National Academies](#) briefings.



MSD Research Spotlight: Matt Sparks



Matt is studying the health and equity implications of adaptation to air pollution. He is a Ph.D. Candidate working with Associate Professor Rebecca Saari in the Department of Civil and Environmental Engineering at the University of Waterloo. Matt previously completed his Bachelor's degree in Civil Engineering at the University of Massachusetts at Amherst and his master's degree in Civil Engineering at the University of Western Ontario. Matt previously worked in engineering consulting, where he specialized in structural restoration and building performance improvements.

Matt's doctoral research focuses on reducing the public health burden of air pollution by limiting people's exposure to outdoor fine particulate matter (PM_{2.5}). He combines his knowledge of atmospheric and building sciences to explore PM_{2.5} exposures. He investigates individual decision-making strategies to assess when, and how effectively, people might change their behavior to reduce their air pollution exposure. He also investigates large-scale strategies to reduce ambient PM_{2.5} exposure, such as mitigating climate change and improving building quality.

In their recent paper, “Health and Equity Implications of Individual Adaptation to Air Pollution in a Changing Climate”, Matt and his colleagues modeled the frequency of air quality alerts in the United States under potential future climate change scenarios using an integrated economic, earth system, and air quality model. To do so, they defined the metric “air quality alert days per year” (ADY) as the number of local days with an AQI value over 100 driven by PM_{2.5}. Matt and his team found that nationally, the population-weighted average ADY per year increase substantially in the absence of climate change mitigation policy. They found that these increases in ADY were highest in the Eastern half of the country, with varying effects on different demographic groups.

After calculating these increases in ADY, Matt and his collaborators looked at how individuals could adapt to reduce their risk of adverse health effects from PM_{2.5}. To do so, they modeled behavior with four decision-making strategies and calculated the costs and protective health benefits associated with each one. Matt and his collaborators then looked at how climate change mitigation policy would affect ADY and adaptation effectiveness. They found that a mitigation policy that meets the Paris targets would reduce ADY and people’s adaptation costs while also protecting those who are unable to adapt. They summarized that equitably protecting human health from air pollution under climate change requires both mitigation and adaptation promotion.

Matt’s current research takes a closer look at how people and air pollution interact. He is investigating how people’s exposure to ambient PM_{2.5} is affected by their behavior and circumstances, and how this can inform protective interventions. This aligns with Matt’s goal as a researcher, which is to protect people’s health from air pollution through both societal and individual-level changes.

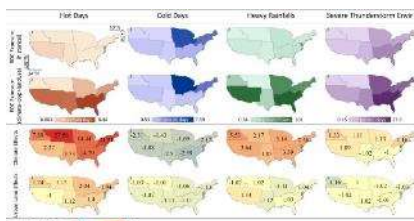
Highlighted Article:

- 1 Sparks, Matt S., et al. “Health and equity implications of individual adaptation to air pollution in a changing climate.” Proceedings of the National Academy of Sciences 121.5 (2024): e2215685121.

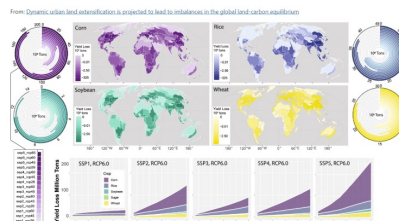
MSD Relevant Publications

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.

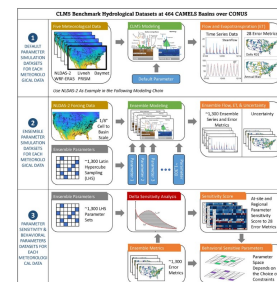
Below you can find some of the publications posted most recently:



[Urban land patterns can moderate population exposures to climate extremes over the 21st century](#)



[Dynamic urban land intensification is projected to lead to imbalances in the global land-carbon equilibrium](#)



[Characterizing uncertainty in Community Land Model version 5 hydrological applications in the United States](#)

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 postings:

[R&D Engineer 2 – 127028 at UC San Diego Center for Western Weather and Water Extremes \(CW3E\)](#)

The Center for Western Weather and Water Extremes (CW3E) is leading the development and implementation of new research and applications capabilities focused on extreme weather and climate events in the Western US. CW3E is developing and implementing weather and climate observations, numerical models, machine learning algorithms, and decision support tools focused on atmospheric and land-surface conditions related to extreme events and their impacts. CW3E is an interface between UCSD departments, other universities around the country and local, state, and federal agencies, in the operation, utilization and expansion of a new state-of-the-art weather observing network recently deployed in California. A key program of the Center is Forecast Informed Reservoir Operations (FIRO), with goals to develop, demonstrate, and implement tools, including enhanced monitoring, and science that enable more effective management of reservoirs. CW3E's mission is to provide 21st century water cycle science, technology, and outreach to support effective policies and practices that address the impacts of extreme weather and water events on the environment, people, and the economy of Western North America. To learn more, refer to the center's webpage at cw3e.ucsd.edu.

[Postdoctoral Associate in Environmental Data Analysis at Penn State](#)

The Department of Geosciences at Penn State University is announcing a Postdoctoral Associate position in data analytics for environmental and health outcomes. The successful candidate will play a central role in the DOE-funded Baltimore Urban Integrated Field Laboratory, with the opportunity to collaborate on other data analytics projects. The postdoc will be co-advised by Dr. Antonia Hadjimichael and Dr. Michael Waring (Drexel University) and is expected to work closely with collaborators from Penn State, Drexel, and Johns Hopkins, as well as other institutions.

[Graduate Research Assistant in Civil and Environmental Engineering at Lehigh University](#)

The Department of Civil and Environmental Engineering at Lehigh University has a Ph.D. position available as early as Fall 2024 for the topic that focuses on a human-centered floor risk management modeling framework. The successful candidate will be co-supervised by Professor Ethan Yang in the Department of Civil & Environmental Engineering and Professor David Casagrande in the Department of Sociology & Anthropology and gain experience in Protective Action Decision Model, Protection Motivation Theory, 2D inundation models, and agent-based models. The successful candidate will also interact with faculty, scientists, and graduate students with diverse backgrounds in computer science, applied mathematics, biostatistics, and economics in the Catastrophe Modeling Center at Lehigh.

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.

