

MultiSector Dynamics Community

Welcome to the newsletter of the MultiSector Dynamics Community

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Hello MultiSector Dynamics (MSD) Community!

In this issue, we focus on the Inaugural MSD Workshop taking place at UC Davis on October 3rd-5th, 2023 and are now accepting abstracts through June 2nd. There will be a May 18th MSD webinar to provide more information on the workshop. We are announcing a new Call for Papers in Earths' Future. We are also highlighting researcher David Lafferty from PCHES. You will also find information on proposed sessions at the 2023 AGU Fall Meeting proposed by the MSD community, and some key events being organized by the MSD Community of Practice.

www.multisectordynamics.org

Inaugural MSD Workshop takes place October 3-5, 2023

The MultiSector Dynamics (MSD) Community of Practice is excited to announce that the [Inaugural MSD Workshop](#) will take place on **October 3-5, 2023** at UC Davis. The workshop aims to bring together members of the MSD community of practice to advance understanding of the co-evolution of human and natural systems and build the next generation of tools that bridge sectors, scales, and systems to realize a more resilient and equitable future. The theme of the workshop is "**Advancing Complex Adaptive Human-Earth Systems Science in a World of Interconnected Risks**".

The workshop will host approximately 100 attendees, with a large focus on students and early career scientists (Ph.D. received within the past 10 years). Workshop goals, along with a preliminary agenda and a list of preliminary thematic breakout sessions are provided below.

Workshop attendees will be selected based on the submission of an abstract, a biosketch and a workshop-leveraging plan that demonstrate novel research relevant to the MSD workshop cross-cutting themes and the capacity to advance the workshop objectives. The deadline for the **application to attend** the MSD Workshop is **June 2nd, 11:59pm PT**. Please apply using the [MSD Workshop application form](#). Limited funds are available to waive registration fees and for travel awards. These funds will be distributed based on the evaluation of the abstract, biosketch and workshop leveraging plan.

Workshop goals

1. Integrating students and early career scientists to high-level MSD research
2. Fostering collaborations opportunities across the MSD Community of Practice
3. Integrating the different MSD Working Groups
4. Dissemination existing MSD models, data, and methods
5. Networking and interdisciplinary collaboration opportunities
6. Developing manuscripts for the Earth's Future special issue '[Multi-Sector Dynamics: Advancing Complex Adaptive Human-Earth Systems Science in a World of Interconnected Risks](#)'

Preliminary agenda

Day 1:

- Morning: plenary presentations identifying the workshop goals and the cross-cutting challenges and themes to be discussed in the breakout/planning sessions
- Afternoon: poster session and networking activities

Day 2:

- Morning: thematic breakout sessions
- Afternoon: thematic breakout sessions and plenary breakout sessions reporting

Day 3:

- Morning: thematic planning sessions
- Afternoon: thematic planning sessions and plenary planning sessions reporting

Thematic breakout/planning sessions

We anticipate the following breakout/planning sessions to address the following cross-cutting challenges and themes in MSD research:

- Inspiring operational relevance in MSD research related to climate change and energy transition
- Better capturing human actors and their responses to emergent risks in MSD systems
- Understanding how human and natural system drivers and uncertainties at different scales combine to shape global-to-local dynamics
- Challenges and approaches to represent and analyze equity in MSD research
- Using AI to advance the modeling of complex adaptive Human-Earth systems

The structure and format of the workshop, as well as the thematic breakout/planning sessions listed above, may evolve in the coming months as the Technical Program Committee further refines the workshop agenda.

Register for Workshop Informational Webinar

To learn more about the goals for this Inaugural MSD Workshop and provide feedback to the organizers please join us for an informational webinar **May 18th, 12-1pm PT (3-4pm ET)**.

To join the webinar please register here:

https://cornell.zoom.us/meeting/register/tJwucO-prDliGtfjfKpYGRN_xty0KzeC3eRS



MSD Special Collection at Earths' Future

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

We are proud to announce that our Community of Practice is leading another [Call for Papers at Earths' Future](#).

Open for Submissions: 5 May 2023

Submission Deadline: 31 December 2024

Special Collection Organizers:

Patrick Reed, Cornell University

Nicole D. Jackson, Sandia National Laboratories

Katharine Mach, University of Miami

Nicholas P. Simpson, University of Cape Town

Nathalie Voisin, Pacific Northwest National Laboratory

Jennifer Morris, Massachusetts Institute of Technology

Special Collection Abstract:

Climate change, energy transitions, and sustainable development goals are not independent challenges. Individually and collectively, these challenges encompass diverse sectors, services, and changes across global-to-local scales that have tremendous societal implications. Moreover, the underlying human-Earth system dynamics involved in meeting these challenges emerge across the underlying geophysical, biophysical, economic, and socio-technical systems that govern their evolution. Scientific innovations are needed to advance our understanding of the evolution, implications, and effectiveness of human responses to these interdependent challenges. This special collection is seeking contributions that advance our understanding of transformative human-Earth system changes, their opportunities, as well as their risks. Transdisciplinary and multisectoral perspectives are needed to better understand how investments over the next decade shape vulnerability, resilience, and sustainability tradeoffs longer term. These investments need to be robust given the potential for unprecedented transitions and shocks. More broadly, this special collection seeks to advance complex adaptive human-Earth system science to better understand how humans can respond to deeply uncertain influences to realize a more resilient and equitable future.



Introducing the New Working Group on Connecting MSD Research to Operations

Save the Date: Wednesday **June 14, 1:00-2:30 PM EDT**

INAUGURAL MEETING OF MSD's newest working group, [Connecting MSD Research to Operations](#)

This inaugural meeting will include short introductory talks from WG and MSD Community leaders, a panel discussion on R2O2R in MSD research, and breakout groups to crowdsource interests and ideas for the WG's agenda. A detailed agenda is forthcoming.

Please register here:

https://cornell.zoom.us/meeting/register/tJYtcuCvqDwtHd3_1P4enixqYEI1BbrgTJ0Z.

For further information contact David McCollum [mccollumdl@ornl.gov] Gokul Iyer [gokul.iyer@pnnl.gov], or Richard Moss [rmoss@princeton.edu].

MSD Research Spotlight: David Lafferty

David's research is focused on understanding the influence of climate uncertainty in models of coupled human-environment systems. Specifically, the research aims to identify the uncertainties and potential biases associated with using downscaled climate model projections to provide high-resolution and accurate information about future climate and weather conditions at regional and local scales. The outcomes of this research will help impact modelers and decision-makers better manage the risks of climate change.



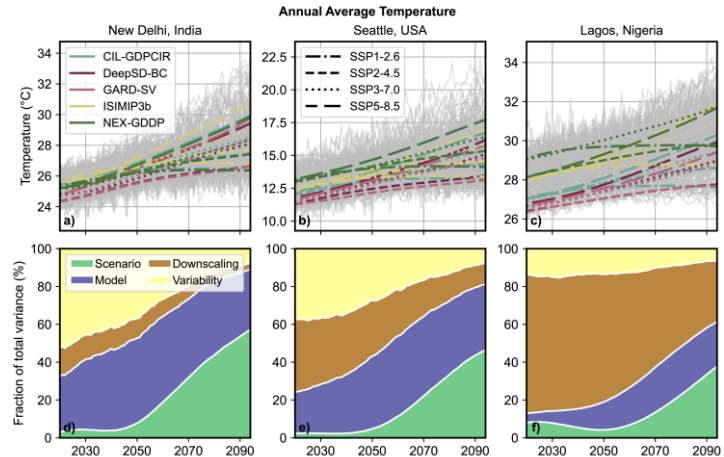
David Lafferty is a Ph.D. candidate working with Professor Ryan Sriver in the Department of Atmospheric Sciences at the University of Illinois Urbana-Champaign. David's research seeks to understand the influence of climate uncertainty in models of coupled human-environment systems. Before his graduate studies, David earned a bachelor's degree in physics from the University of Glasgow, UK, and a master's degree in physics from Ruprecht-Karls-Universität Heidelberg, Germany.

Quantifying and managing the risks of a changing climate requires a robust understanding of how climate change will manifest at regional and local scales. To this end, impact modelers and decision-makers in both the public and private spheres often rely on downscaled climate model projections to provide high-resolution and accurate information about future climate and weather conditions. David's Ph.D. research focuses on the uncertainties and potential biases of this approach. Working with collaborators as part of the Program on Coupled Human and Earth Systems (PCHES), David incorporates the expertise of hydrologists, economists, and engineers into his research to facilitate uncertainty analyses that are targeted at specific sectoral outcomes. For example, in one paper, David and coauthors show how potential biases in projections of US corn yields are driven by the representation of seasonal extreme heat in the underlying climate projections [1].

In more recent work, David and his advisor, Ryan Sriver, leverage the outputs of several different downscaled ensembles from the Coupled Model Intercomparison Project Phase 6 (CMIP6) to understand how different sources of uncertainty combine to affect the representation of decision-relevant climate hazards [2]. By applying a simple variance decomposition approach at global scale,

they partition projection spread among four factors to show that the uncertainty associated with downscaling can often be more important than other sources such as emissions scenario uncertainty and climate model uncertainty. Their results show that downscaling is particularly important for near-term projections, projections involving precipitation, or projections of climate extremes, and suggest that sampling from more than one downscaled ensemble may be advisable in these cases.

Since 2021, David has also been a member of the MSD Working Group on Uncertainty Quantification and Scenario Development. He was part of a multidisciplinary team of authors that contributed to the Working Group's recent review paper outlining the challenges and opportunities of uncertainty analysis for multi-sector systems [3]. In addition to discussing the climate-related uncertainties that form the central theme of David's Ph.D. research, the paper covers a broad array of topics relevant to multi-sector analysis, including endogenous model calibration and uncertainty, and scenario discovery for high-dimensional output spaces.



For his remaining Ph.D. research, David is working with PCHES collaborators to extend the CMIP6 uncertainty characterization approach to analyze soil moisture and crop yield outcomes in the central US. He is also involved in a parallel PCHES project aiming to develop a stylized multi-sector modeling framework that can serve as an uncertainty quantification method testbed as well as for didactic purposes.

Website: david0811.github.io

Twitter: @DavidCLafferty

Highlighted Articles:

[1] Lafferty, D.C., Sriver, R.L., Haqiqi, I., Hertel, T.W., Keller, K., Nicholas, R.E. (2021). Statistically bias-corrected and downscaled climate models underestimate the adverse effects of extreme heat on U.S. maize yields. *Commun Earth Environ* 2, 196. <https://doi.org/10.1038/s43247-021-00266-9>

[2] Lafferty, D.C. and Sriver, R.L. (2023) Downscaling and bias-correction contribute considerable uncertainty to local climate projections in CMIP6. ESS Open Archive. April 30, 2023. <https://doi.org/10.22541/essoar.168286894.44910061/v1>

[3] Srikrishnan, V., Lafferty, D.C., Wong, T.E., Lamontagne, J.R., Quinn, J.D., Sharma, S., et al. (2022). Uncertainty analysis in multi-sector systems: Considerations for risk analysis, projection, and planning for complex systems. *Earth's Future*, 10, e2021EF002644. <https://doi.org/10.1029/2021EF002644>

Key Upcoming Events

The MSD CoP is currently coordinating and planning a variety of community events for this spring and summer.

May 2023: The MSD CoP is hosting an informational webinar for the Inaugural MSD Workshop (taking place in October, 2023 at UC Davis) on **May 18th, 3-4pm ET**. You can register at the following link [\[https://cornell.zoom.us/meeting/register/tJwucO-prDliGtfjKpYGRN_xty0KzeC3eRS\]](https://cornell.zoom.us/meeting/register/tJwucO-prDliGtfjKpYGRN_xty0KzeC3eRS).



June 2023: The new R2O2R (Research to Operations to Research) Working Group is hosting an inaugural meeting **June 14th, 1:00-2:30pm ET** to introduce the Working Group. It will include introductory talks by community members and a panel discussion [registration: https://cornell.zoom.us/meeting/register/tJYtcuCvqDwtHd3_1P4enixqYE11BbrgTJ0Z].

The Urban Systems Working Group is hosting an invited seminar **June 27th, 11am ET** with Dr. Harini Nagendra.

Proposed MSD Sessions at the AGU Fall 2023 Meeting

Following the success of the MSD CoP program in recent years, the MSD Community of Practice coordinated and submitted 9 session proposals for the 2023 AGU Fall Meeting aimed at bringing together researchers from around the world, presenting compelling MSD research and accelerating the development of the MSD community:

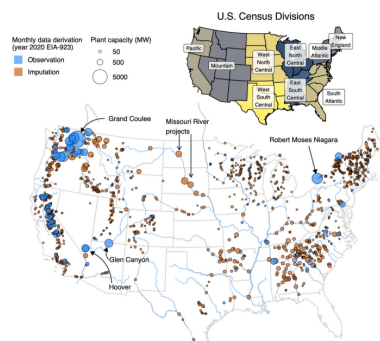
AGU Section	Session Title	Conveners	Link to Submitted Session Proposal
Global Environmental Change (GEC)	Multi-sector Dynamics: Adapting Energy Systems to a Changing Climate by Overcoming Disconnects Between Energy System and Climate Modeling	Michael Craig, Oriana Chegwidde, Ana Dyreson, Srihari Sundar	https://agu.confex.com/agu/fm23/prelim.cgi/Session/185019
Global Environmental Change (GEC)	Multi-sector Dynamics: Energy-Water-Land Interactions at Multiple Scales	Zarrar Khan, Thomas Bernard Wild, Adriano Vinca, Makoto Taniguchi	https://agu.confex.com/agu/fm23/prelim.cgi/Session/184928
Global Environmental Change (GEC)	Multi-sector Dynamics: Science & Modeling for Societal Transformation	Patrick M Reed, Jennifer F Morris, Enayat A. Moallemi, Jan H. Kwakkel	https://agu.confex.com/agu/fm23/prelim.cgi/Session/184990
Global Environmental Change (GEC)	Multi-sector Dynamics: Sustainable Energy Transitions in the Developing World	Wei Peng, Arvind P Ravikumar, Ranjit Deshmukh, Xinyuan Huang	https://agu.confex.com/agu/fm23/prelim.cgi/Session/186459
Global Environmental Change (GEC)	Multi-sector Dynamics: Uncertainty Characterization for Coupled Natural-Human Systems	Vivek Srikrishnan, Jonathan Lamontagne, Riddhi Singh, Stefano Galelli	https://agu.confex.com/agu/fm23/prelim.cgi/Session/186969
Global Environmental Change (GEC)	Multi-Sector Dynamics: Extreme Weather and Society	Deeksha Rastogi, Erwan Monier, Nicole Jackson, Mona Hemmati	https://agu.confex.com/agu/fm23/prelim.cgi/Session/187837
Global Environmental Change (GEC)	Multi-sector Dynamics: Confluence of Societal and Environmental Change in Urban Areas	Melissa R Allen, Pouya Vahmani, Matei Georgescu, Lynée Turek-Hankins	https://agu.confex.com/agu/fm23/prelim.cgi/Session/188100
Global Environmental Change (GEC)	Multi-sector Dynamics: Advances in Modeling Adaptive Human Systems Response to Change.	Jim Yoon, Christian J. A. Klassert, Jillian M. Deines, Jasmin Heilemann	https://agu.confex.com/agu/fm23/prelim.cgi/Session/189170

Education	Preparing next generation researchers to meet transdisciplinary environmental challenges (MultiSector Dynamics)	Ana Dyreson, Julia Szinai, Thomas Bernard Wild, Morgan Edwards	https://agu.confex.com/agu/fm23/prelim.cgi/Session/191119
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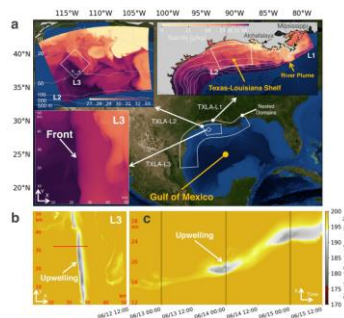
MSD Relevant Publications

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.

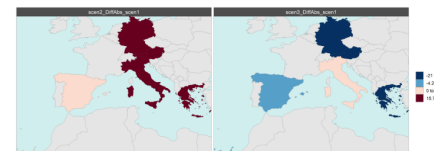
Below you can find some of the publications posted most recently:



[Revised monthly energy generation estimates for 1,500 hydroelectric power plants in the United States](#)



[Rapid vertical exchange at fronts in the Northern Gulf of Mexico](#)



[rmap: An R package to plot and compare tabular data on customizable maps across scenarios and time](#)

This newsletter has been edited by Sequoia Alba 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.