MultiSector Dynamics Community

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

Inside This Issue

Hello MultiSector Dynamics (MSD) Community!

In this issue, we summarize accepted MSD sessions at the 2023 AGU Fall Meeting. We also highlight researcher Julia Szinai from HyperFACETS as well as upcoming key events being organized by the MSD Community of Practice and summaries of successful past working group events.

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Accepted MSD Sessions at the AGU Fall 2023 Meeting

Following the success of the MSD CoP program in recent years, the MSD Community of Practice has 10 accepted 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 Session
Global Environmental Change (GEC)	Climate Security: Integration of Physical and Human Domain Research	Brian C O'Neill; Jill M Brandenberger	https://agu.confex.com/agu/fm23/prelim.cgi/Session/188985
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 Chegwidden, 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

Past Working Group Activity: **R202R Kickoff Webinar**

On June 14th, the new *Connecting MSD Research to Operations* ('R2O2R') Working Group held a kick-off webinar titled "Introducing the MSD Working Group on 'R2O2R' and Crowdsourcing Ideas from the Community". The interactive meeting included introductory talks from the Working Group Co-Chairs, David McCollum (ORNL) and Gokul Iyer (PNNL), and MSD Facilitation Team Liaison, Richard Moss (PNNL/Princeton), as well as lightning talks from MSD Community leaders, Bob Vallario (DOE Office of Science), Jennie Rice (PNNL), Kripa Jagannathan (LBNL), and David Lesmes (USGS). Over the two group discussion sessions, which were chaired by Jen Morris (MIT) and Jordan Kern (NCSU), the webinar's nearly 40 participants collaborated on shared documents in real time, taking stock of R2O2R-relevant activities across the community and crowdsourcing ideas for the Working Group's future activities and products. A video recording of the webinar can be found at the following link: **https://www.youtube.com/watch?v=CEpnpEtJe4k.**

The Working Group leadership team is currently combing through the feedback received and plans to be in touch with community members in the coming weeks, in order to push forward some new

initiatives. Those wishing to express their interest in joining the Working Group in some capacity (even in a light 'keep me in the loop' mode), may feel free to send an email to David, Gokul, or Richard, or complete the 'Join Us' form on the MSD website (**https://multisectordynamics.org/join-us/**).

The vision of the MSD R2O2R ('research-to-operations-to-research') Working Group is to elevate the visibility and amplify the societal impact of scientific advances emerging from the Multi Sector Dynamics Community of Practice, both within the United States and internationally. It aims to do so by identifying opportunities for collaborations with, delivering decision-relevant insights to, and learning from experts in the applied R&D and practitioner/decisionmaker spaces.

Call for 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"? Serving as a peer reviewer is a great way to contribute to the scientific research process. 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 either Pat Reed (**patrick.reed@cornell.edu**) or Nicole Jackson (**njacks@sandia.gov**) if you are interested in serving as a reviewer.

2023 GCAM Annual Meeting

Pacific Northwest National Lab's (PNNL) Joint Global Change Research Institute (JGCRI) held the 2023 GCAM Annual Meeting from June 6-8th to highlight recent advances in the development of the Global Change Analysis Model (GCAM), a global multisectoral model of long-term human activities including energy, agriculture, and water. Over 300 people registered for the fully virtual 3-day event, with attendees coming from 6 continents. Day 1 consisted of plenary-style overviews of recent scientific advancements related to GCAM. Day 2 included two interactive poster sessions with over 50 total posters on display and a complete overview of the GCAM 7.0 release, which coincided with the Meeting. The meeting concluded with a full day of virtual training sessions, led by JGCRI and other PNNL staff, offering four different tracks for meeting participants to learn how to use GCAM and a wide set of related tools which are maintained by PNNL. Numerous staff engaged with attendees to assist in the understanding and potential applications of these tools.

MSD-Live v2 Release

Check out new features in v2 of MSD-LIVE (**https://msdlive.org/**) that launched last Wednesday! Users are now able to use a simple command line interface (CLI) to upload and download large data files. You can also now upload nested folders of files.

MSD Research Spotlight: **Julia Szinai**

Julia's research in HyperFACETS evaluates how climate mitigation strategies, climate impacts, and adaptation measures affect outcomes across the electricity system and its connected sectors, Julia aims to demonstrate the value of, and necessity for, planning for complex system interactions to increase resilience.

Julia Szinai is a postdoctoral fellow at Lawrence Berkeley National Lab, in the Earth and Environmental Sciences Area. She is also the new co-chair of the Early Career Development Working Group, and is excited to help support the success of early career researchers as future leaders of the MSD field. Julia's research focuses on climate change mitigation and adaptation of the electricity system and interdependent sectors, including water, transportation, and buildings. Julia has an interdisciplinary background, having earned a PhD in Energy and Resources, a Masters of Public Policy, and a BA in economics and Spanish, all from UC Berkeley. Throughout her graduate studies she researched at the Pacific Institute, Natural Resources Defense Council, and different areas of Berkeley Lab. Prior to graduate studies, she consulted in the energy and finance sectors and worked at an electric utility in long-term resource planning. In earlier MSD research, Julia studied the interplay between electricity decarbonization and transportation electrification, otherwise known as vehicle-grid integration. Through a novel linkage of an agent-based mobility model and a high-resolution electricity dispatch model, she quantified the achievable benefits of managed electric vehicle charging.

Julia's current research centers on the dual challenge faced by the electricity system as both a source of GHG emissions and an infrastructure system itself vulnerable to climate change impacts: decarbonizing generation, while also adapting to changing resource availability and demands. Climate change also affects the electricity system through its water sector interdependencies, especially in the Western US where the managed water system is energy-intensive and hydropower is a large source of electricity generation. However, the ways and extent that such multisector dynamics may exacerbate or offset climate change impacts and related adaptation strategies are unclear. In her research, Julia synthesized the fragmented literature and developed a generalized framework for understanding how climate change may affect the energy-water relationship. In a case study of California, she found that by the end-century—when climate impacts on water supply, air-conditioning demand, and hydropower are expected to be greatest—energy requirements of some water sector adaptation strategies may exceed the direct climate impacts on the energy system, demonstrating the value of cross-sectoral coordination to ensure efficient and reliable energy and water provision.

As part of the DOE HyperFACETS project, Julia is now linking climate, water management, and electricity system planning models, with guidance from water and energy stakeholders. Julia helped develop a Western US-wide, climatically-driven hydrology and water management model with a particular emphasis on estimating climate impacts on hydropower generation and water-related energy use. Under an ensemble of climate scenarios, model results indicate that in many key basins, streamflow decreases while reliance on groundwater increases to meet growing agricultural water demand. In the absence of adaptation measures, she finds that these changes lead to reduced hydropower generation and higher energy use related to water. Julia then uses a detailed electricity system model of the WECC region to evaluate how the electricity system could be planned to adapt to

a range of potential climate impacts and water sector interactions while transitioning to a carbon-free generation portfolio. Because these hydropower generation declines tend to occur during periods when electricity demand grows, initial results suggest that grid planners will need to invest in significant amounts of additional solar and battery infrastructure to maintain grid reliability and decarbonization goals.

Highlighted Articles:

[1] Szinai J, Deshmukh R, Kammen D, Jones A. Evaluating cross-sectoral impacts of climate change and adaptations on the energy-water nexus: a framework and California case study. Environmental Research Letters. 2020 December 16; 15(12):124065-. Available from: https://iopscience.iop.org/article/10.1088/1748-9326/abc378 DOI: 10.1088/1748-9326/abc378

[2] Siirila-Woodburn E, Rhoades A, Hatchett B, Huning L, Szinai J, Tague C, Nico P, Feldman D, Jones A, Collins W, Kaatz L. A low-to-no snow future and its impacts on water resources in the western United States. Nature Reviews Earth & Environment. 2021 October 26; 2(11):800-819. Available from: https://www.nature.com/articles/s43017-021-00219-y DOI: 10.1038/s43017-021-00219-y

[3] Yates D, Szinai J, Jones A. Modeling the Water Systems of the Western US to Support Climate-Resilient Electricity System Planning. Under Review. 2022 October 19. DOI:10.1002/essoar.10512623.1

Working Group Announcements

UC Working Group: The Uncertainty Quantification and Scenario Discovery working group will be hosting a webinar on structural uncertainty in MSD modeling in early September. The discussion will focus on uncertainty in integrated assessment models and agent-based models. The speakers will be Mark Dekker (Utrecht University), Alessandro Taberna (TU Delft), and Jim Yoon (PNNL). Exact date and time of the webinar are to be determined. Updates will be provided via the UQ/SD mailing list and website. If you are not already subscribed to our mailing list, you can join **here**.

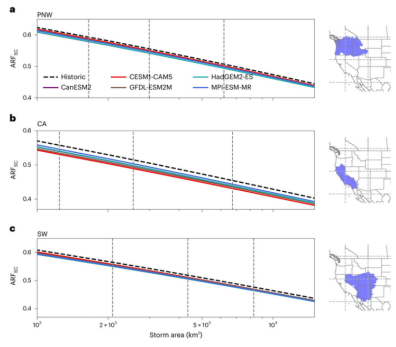
Early Career Development Working Group: There have been some structural changes to the MSD Working Group on Early Career Development. The co-chairs are now Julia Szinai from LBNL and Tom Wild from PNNL. Members in other leadership positions include Ana Dyreson (Professional Development Coordinator), Matthew Binsted (Research Manager) and Mengqi Zhao (Communications Officer).

Energy Transitions Working Group: The MSD working group on Multisector Impacts of Energy Transitions has a new co-chair, Dr. Arvind Ravikumar. Dr. Ravikumar is the co-Director of the Energy Emissions Modeling and Data Lab (EEMDL) at the University of Texas at Austin and a Research Associate Professor in the Department of Petroleum and Geosystems Engineering. He has published over 40 articles in peer-reviewed journals, primarily in the areas of greenhouse gas emissions measurements and energy systems analysis. Dr. Ravikumar has been a lead investigator for several large-scale, field campaigns in the US and Canada on methane emissions from oil and gas supply chain and evaluating new technologies for monitoring greenhouse gases. He routinely advises state and federal governments, provides expert testimony in Congress on greenhouse gas emissions from energy supply chains, and currently serves on the US Department of Transportation's Gas Pipeline Advisory Committee. Dr. Ravikumar is a non-resident fellow at the Payne Institute for Public Policy at the Colorado School of Mines and graduated with a Ph.D. from Princeton University.

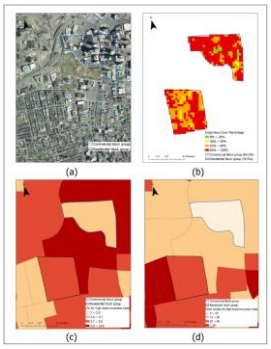
MSD Relevant Publications

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.

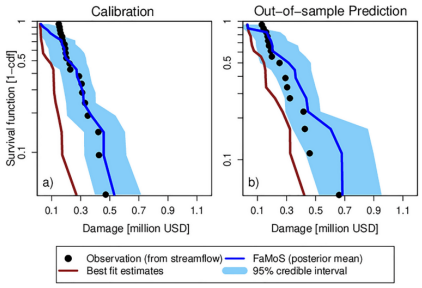
Below you can find some of the publications posted most recently:



Sharpening of cold-season storms over the western United States



Landscape metrics regularly outperform other traditionally-used ancillary datasets in dasymetric mapping of population



Neglecting Model Parametric Uncertainty Can Drastically Underestimate Flood Risks

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:

Postdoc Position in Climate Risk Management – Thayer School of Engineering, Dartmouth College

A full-time postdoc position is available at the Thayer School of Engineering at Dartmouth College to join the Keller research group. The successful candidates will become part of a transdisciplinary research group in the area of climate risk management.

Assistant Professor in Climate Risk and Decision-Making

The Department of Geosciences, the Institutes for Energy and the Environment, and the Earth and Environmental Systems Institute of the Pennsylvania State University, University Park, Pennsylvania invite applications for a tenure-track faculty position in Climate Risk and Decision-Making at the Assistant Professor level.

This newsletter has been edited by Rohini Gupta 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.