Issue 28 – November 2025

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 guide to all of the exciting MSD sessions at this year's Fall AGU Meeting taking place from the 15th to 19th December in New Orleans. In this Newsletter, you will find a graphic and a table with detailed information on the specific talks and posters being presented throughout the week.

We also feature a research spotlight on Stefano Galelli, an Associate Professor at Cornell University working on the interaction between critical infrastructure systems and the natural environment. Be sure to also check out our recent and upcoming MSD CoP webinars!

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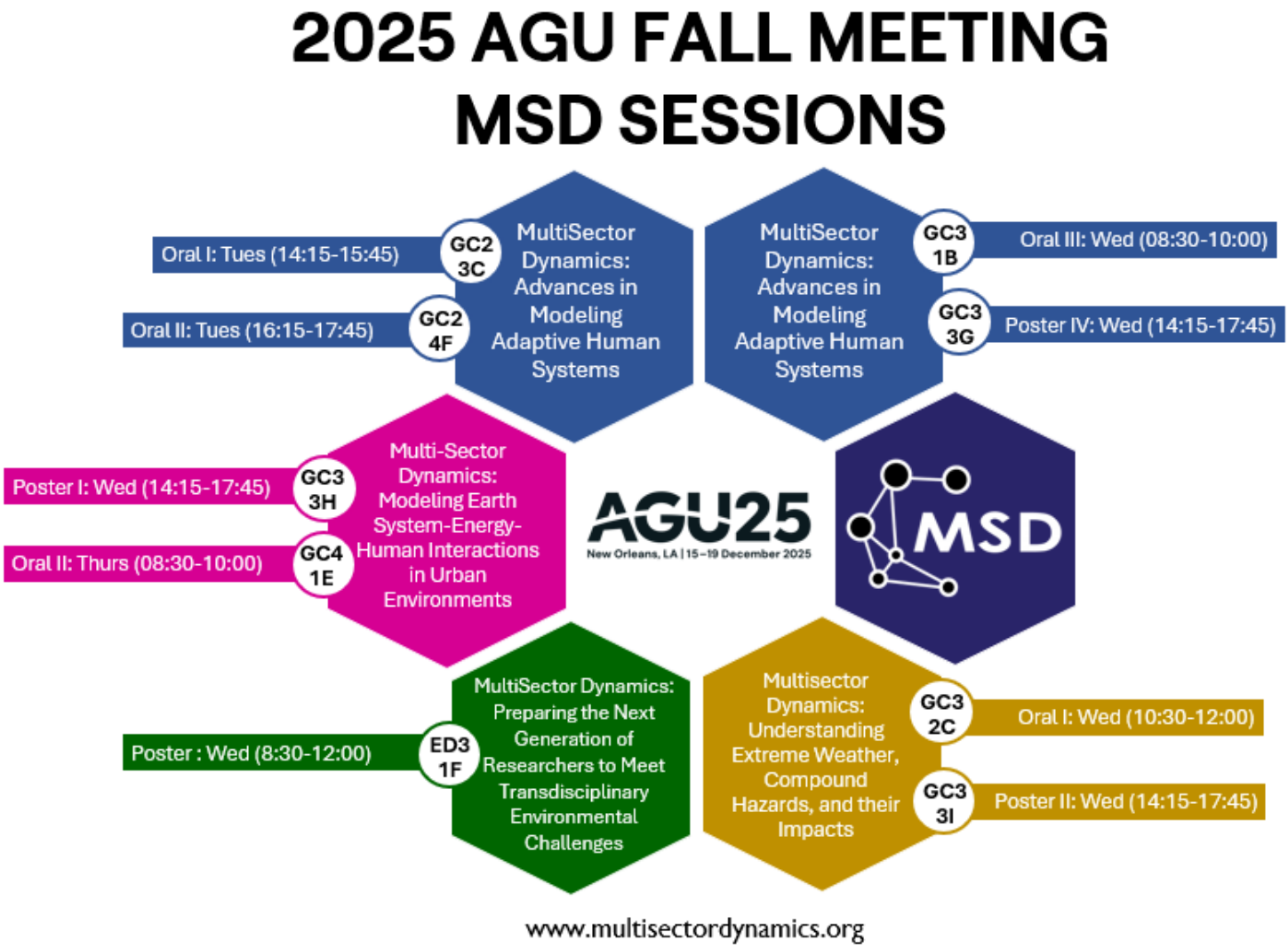
MSD Sessions at AGU 2025

We have developed a graphical summary to help you navigate this year's AGU schedule. On the following page, you will find a graphical summary guide indicating all the sessions (co-) organized by our Community of Practice. Pressing "CTRL + Click" on each session's box will take you to the session's page on the official AGU schedule. This year at AGU, we have a total of **five oral sessions** and **four poster sessions**.


2025 AGU FALL MEETING
MSD SESSIONS
Oral I: Tues (14:15-15:45)
GC2 3C
MultiSector Dynamics: Advances in Modeling Adaptive Human Systems
Oral II: Tues (16:15-17:45)
GC2 4F
MultiSector Dynamics: Advances in Modeling Adaptive Human Systems
GC3 1B
Oral III: Wed (08:30-10:00)
GC3 3G
Poster IV: Wed (14:15-17:45)
Poster I: Wed (14:15-17:45)
GC3 3H
Multi-Sector Dynamics: Modeling Earth System-Energy-Human Interactions in Urban Environments
Oral II: Thurs (08:30-10:00)
GC4 1E
AGU25
New Orleans, LA | 15–19 December 2025
MSD
Poster : Wed (8:30-12:00)
ED3 1F
MultiSector Dynamics: Preparing the Next Generation of Researchers to Meet Transdisciplinary Environmental Challenges
Multisector Dynamics: Understanding Extreme Weather, Compound Hazards, and their Impacts
GC3 2C
Oral I: Wed (10:30-12:00)
GC3 3I
Poster II: Wed (14:15-17:45)
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AGU Sessions Summary

Day/Date	Format	Time (CST)	Session
Tuesday (12/16)	Oral	14:15-15:45	**GC23C** MultiSector Dynamics: Advances in Modeling Adaptive Human Systems
		16:15-17:45	**GC24F** MultiSector Dynamics: Advances in Modeling Adaptive Human Systems
Wednesday (12/17) **Wednesday (12/17)**	Oral	08:30-10:00	**GC31B** MultiSector Dynamics: Advances in Modeling Adaptive Human Systems
		10:30-12:00	**GC32C** Multisector Dynamics: Understanding Extreme Weather, Compound Hazards, and their Impacts
	Poster	08:30-12:00	**ED31F** MultiSector Dynamics: Preparing the Next Generation of Researchers to Meet Transdisciplinary Environmental Challenges
		14:15-17:45	**GC33G** MultiSector Dynamics: Advances in Modeling Adaptive Human Systems
			GC33H Multi-Sector Dynamics: Modeling Earth System-Energy-Human Interactions in Urban Environments
			GC33I Multisector Dynamics: Understanding Extreme Weather, Compound Hazards, and their Impacts
Thursday (12/18)	Oral	8:30-10:00	**GC41E** Multi-Sector Dynamics: Modeling Earth System-Energy-Human Interactions in Urban Environments

MultiSector Dynamics Meet-Up at AGU 2025

Mode: In-person
***In-person location*:** Hall EFG (Poster Hall) Pod
Date and time: Wednesday, December 17th from 16:00-17:00 CST

All career stages are invited to join us for an informal meet-up at AGU 2025 on **Wednesday, December 17th at 16:00 CST**. This meet-up is hosted by the Early Career Working Group with the goal of fostering connections in the MSD community and related disciplines. For those attending AGU in-person, **the physical meeting point will be in the Hall EFG Pod** (the Poster Hall in the Convention Center). Following the hour of networking, we will invite folks to gather for an informal get-together and meal (location TBD). If you would like to connect with the Early Career Working Group for future events, please join **our mailing list**. For more information about this event contact Ana Dyreson (adyreson@mtu.edu) or Julia Szinai (jszinai@lbl.gov).

MSD Research Spotlight: **Stefano Galelli**

Dr. Stefano Galelli is a computational scientist working on the interaction between critical infrastructure systems and the natural environment. As a member of the MSD Community of Practice, he co-leads the Working Group on "AI for MSD Research".

Dr. Galelli is an Associate Professor in the School of Civil and Environmental Engineering at Cornell University, where he leads the Critical Infrastructure Systems (CIS) Lab. His career has spanned Europe, Asia, and North America. A graduate of Politecnico di Milano, Italy, he first established his career overseas in Singapore, where he worked as a Postdoctoral Research Fellow at the National University of Singapore and as a faculty member at the Singapore University of Technology and Design. After more than a decade in Asia, Dr. Galelli's career brought him to North America. His research is currently supported by the NSF, DOE, USGS, Schmidt Sciences, and the World Bank.

Dr. Galelli's work examines the co-evolution of river basins and interconnected infrastructure systems, identifies emerging vulnerabilities, and provides robust solutions that balance resilience and sustainability. One major research direction is the development of computational models of human *behavior* and their integration into large-scale hydrologic models [1]. Recently, the CIS Lab released a dataset covering 1985–2023 monthly-to-weekly time series of reservoir storage for all large dams in mainland Southeast Asia. By synthesizing these data, it developed the first open-source hydrologic–water management model describing the impact of dam operations in the Mekong River Basin [2].

His second research theme is the development of computational frameworks that enable domain-specific models (e.g., water, energy) to interoperate through *cosimulation*, namely the composition of individual models to enable the global simulation of interconnected systems. This allows us to understand how dynamic interconnections shape systems' response and vulnerabilities. In the Greater Mekong Subregion, for example, Dr. Galelli and his team demonstrated that the joint operation of the hydropower network and power grid enables the restoration of environmental flows to downstream wetlands, a global biodiversity hotspot [3].

The main challenge ahead lies in scaling these data, models, and frameworks to the continental and global scales. Learn more about Dr. Galelli's CIS Lab on his website or connect with him on X.

Highlighted Articles:

[1] Galelli, S., Turner, S.W.D., Pokhrel, Y., Ng, J.Y., Castelletti, A., Bierkens, M., Pianosi, F., Biemans, H. (2025) Advancing the Representation of Human Actions in Large-Scale Hydrological Models: Challenges and Future Research Directions, Water Resources Research, 61(7), e2024WR039486.

[2] Eldardiry, H., Mahto, S.S., Fatichi, **S., Galelli**, S. (2025) VIC-Res Mekong: An opensource hydrological-water management model for the Mekong River Basink, Environmental Modelling & Software, 193, 106603.

[3] **Galelli**, S., Dang, T.D., Ng, J.Y., Chowdhury, A.F.M.K., Arias, M.E. (2022) Opportunities to curb hydrological alterations via dam re-operation in the Mekong. Nature Sustainability, https://doi.org/10.1038/s41893-022-00971-z.

Upcoming Webinar: Advances and Opportunities in Multisectoral Modeling of Critical Minerals and Materials

This panel will discuss various topics that center on the common theme of multisector modeling of critical minerals and materials (CMMs). The panel will begin with a discussion led by Dr. Iyer on the need for multisectoral modeling of CMMs that characterizes the multi-way feedbacks across CMM markets and other human and Earth systems. Dr. Qiu will then discuss capability enhancements to the Global Change Analysis Model (GCAM) to incorporate multisectoral CMM demands and implications of CMM availability constraints on energy demands, prices, and technology deployment. Next, Dr. Yarlagadda will provide insights into how potential supply vulnerabilities could affect future CMM supplies and prices. Dr. Stegen will then discuss innovative and alternative processes based on biology to recover CMMs from various sources. The panel will close out with comments from Dr. Iyer about future directions for multisectoral modeling of CMMs.

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

Webinar Summary on Generative agents: A new frontier for representing human actors and their behavior in MSD models.

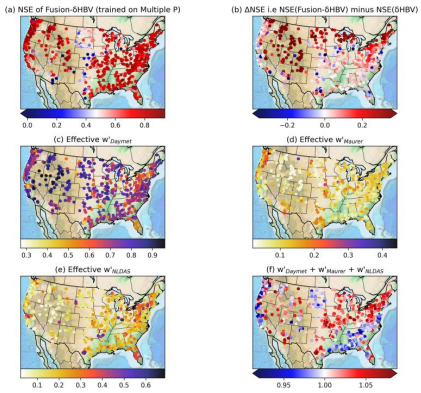
On November 13th, the MSD AI4MSD, Human Systems, and Uncertainty Working Groups co-hosted a webinar featuring two talks led by Dr. Cong Chen from Dartmouth College and Dr. Yangchao Zeng from the Karlsruhe Institute of Technology, Germany. The first discussion was guided by Dr. Chen, who presented a talk on Behavioral Generative agents for Energy Operations. Dr. Chen introduced a novel approach leveraging generative agents--artificial agents powered by large language models--to realistically simulate customer decision-making in dynamic energy operations. The second talk was led by Dr. Zeng who discussed the simulation of multiple human perspectives in socio-ecological systems using large language models. Dr. Zeng described a novel simulation system called HoPeS (Human-oriented Perspective Shifting) that enables users explore simulated socio-ecological systems (SESs) from a third-person observer's perspective while taking on any of the simulated stakeholder roles.

A recording of the webinar is now available on the **MSD YouTube channel**. Feel free to explore our, and other working groups' content on YouTube by subscribing to the **Multisector Dynamics Community channel**.

MSD Relevant Publications

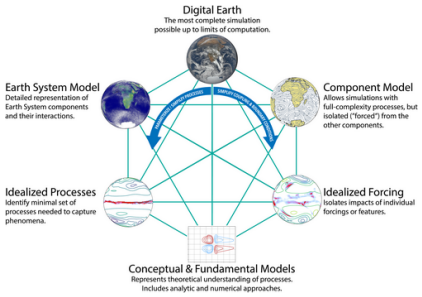
We have been posting and will be regularly updating select MSD relevant publications on the website, under the **Publications** page. If you have any publications you would like us to highlight, please email contact@multisectordynamics.org.

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



Improving differentiable hydrologic modeling with interpretable forcing fusion

High-Resolution National-Scale Water Modeling Is Enhanced by Multiscale Differentiable Physics-Informed Machine Learning



Why Idealized Models Are More Important Than Ever in Earth System Science

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:

PhD Student Opportunity Cornell University Focused on Managed Aquifer Recharge Investments

This project is focused on advancing the design and effectiveness of Managed Aquifer Recharge (MAR) investments in the Central Valley region of California. A key component of the project is to better understand how investment partnerships can be used to enhance water management in agriculture-intensive regions. The Cornell PhD will focus on exploring and evaluating MAR-based water supply portfolios' tradeoffs, resilience, and robustness. Candidates should have strong computational and programming skills, a background in surface and groundwater hydrology, experience in water resources systems modeling, and nterest in interdisciplinary research. This work is in collaboration with Alvar Escriva-Bou and Helen Dahlke (U of CA Davis), Megan Mullin (UCLA), and Greg Characklis (U of NC Chapel-Hill). To apply, please provide a cover letter with your qualifications and interests as well as an curriculum vitae to Dr. Patrick Reed (patrick.reed@cornell.edu). Candidates will be evaluated for Fall 2026 admission within Cornell's Environmental & Water Resources Systems graduate program for an August start date.

Postdoctoral Fellow in Geography, Mortality Impacts of Heat Waves at Dartmouth College

The Keller Research Group at Dartmouth College invite applications for a postdoctoral researcher with expertise in quantitative methods and research interests related to climate science. The successful candidate will be co-advised by Professors Justin Mankin (Geography) and Klaus Keller (Engineering) and become part of two collaborating transdisciplinary research groups. The postdoctoral fellow will co-lead research to improve the characterization and understanding of heat driven mortality risks and the design of strategies to manage these risks. Qualified candidates will have a strong quantitative background in relevant disciplines (e.g., applied math, operations research, statistics, engineering, epidemiology, or Earth sciences). We especially value applicants who are highly motivated to collaborate across more than one discipline. The fellow will enjoy ample opportunities to co-design their project portfolios and for transdisciplinary research collaborations. The position provides unique opportunities for research, education, outreach, decision support, and professional development.

Assistant Professor in Atmospheric Science at Northern Illinois University

The Department of Earth, Atmosphere and Environment at Northern Illinois University invites applications for an assistant, associate, or full professor in the field of atmospheric science. The position will begin in August of 2026 and may be offered as tenure track or with tenure, based on the candidate's documented record of achievement, and subject to approval from the Department, College, University, and NIU Board of Trustees. We are seeking a scholar whose research interests complement existing Department strengths in numerical modeling, weather extremes, artificial intelligence, analytics, or other related areas. The Department is particularly interested in candidates who can integrate applied atmospheric science using machine learning, statistics, or other forms of data analytics into their teaching and scholarship. The successful candidate is expected to seek external funding in support of scholarship; a successful applicant at the associate or full professor level should have a well-established record of externally funded research and teaching excellence.

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.