

MultiSector Dynamics Community

INSIDE THIS ISSUE

- [Professional Development Working Group Highlight](#)
- [Researcher Highlight: Jordan Kern](#)
- [AGU Fall Meeting Guide](#)
- [Upcoming Community Events](#)
- [MSD Job Listings](#)
- [MSD Publications](#)

Welcome to the newsletter of the MultiSector Dynamics Community

Hello MultiSector Dynamics (MSD) Community!

In this issue we are highlighting the MSD Professional Development and Education for Early Career Researchers Working Group. We are also featuring the work of Jordan Kern, an assistant professor at North Carolina State University. This issue also focuses on this year's AGU Meeting taking place December 13-17. Below you will find information on MSD sessions at AGU as well as general information about some of our upcoming community events, recent publications, and job postings.

www.multisectordynamics.org

Re-Introducing the Professional Development and Education for Early Career Researchers Working Group

After the first year of activity, we are re-introducing the Professional Development and Education for Early Career Researchers Working Group through this newsletter and an **Info Session on October 21st at 3PM ET** hosted through Zoom (sign up [here](#)). The working group on Professional Development and Education for Early Career Researchers seeks to further the scientific mission of MSD by supporting the growth and diversity of early career researchers in MSD and related fields. We seek to provide professional development opportunities to graduate students, post-doctoral researchers, and other early career researchers, and serve as a contact point for interdisciplinary education activities already taking place in the MSD community. In our first year we've highlighted the need for attention to DEI through our [presentations](#) at community webinars, highlighting that a diverse workforce that is supported by inclusive workplaces will more effectively solve today's complex, multi-sectoral challenges. For example, because climate change disproportionately impacts some of the same groups that are underrepresented in STEM fields, the social impacts of climate disasters will be better

understood by diverse research teams. Using the evidence-based practices that we have collected so far, we are now preparing a survey to distribute to the MSD community at large to understand what resources and events are desired to support early career researchers' success with an eye on DEI. We'll use this information to plan the focus of next year's events. We welcome anyone interested in learning more about our work to attend the info session and/or consider joining the working group.

Why would a busy STEM professional want to join this working group? Participation can help shape the MSD community as it grows and working group members have an opportunity to network across institutions and MSD projects, gain recognition for their work, and bring back best practices for DEI and early career professional development to their place of work. We not only encourage women and underrepresented minorities in STEM to participate, but also everyone who wants to learn about DEI and career development in their workplace. In our first year, we've valued the different contributions of early career researchers as well as senior scientists in our monthly meetings. Whether or not you join the working group, you can provide input on these important topics by responding to our upcoming survey.

Researcher Highlight: Jordan Kern

Jordan's group is making progress on a key MSD challenge, using higher spatio-temporal and sectoral resolutions to consider how conditions, processes, and dynamics at local scales influence the interactions and failure modes of systems and sectors at higher levels of aggregation. This work contributes to better understanding how the challenges faced by grid operators could be affected by evolving drought conditions and future system configurations affected by different investments in renewable technologies.



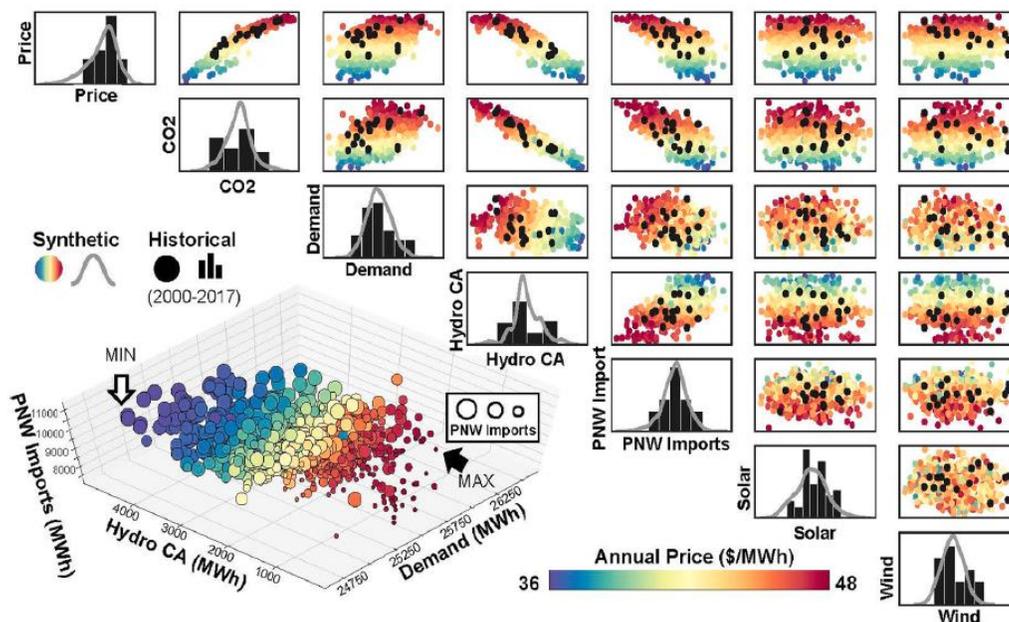
Jordan Kern is an assistant professor at North Carolina State University in the Department of Forestry and Environmental Resources. Jordan's group at NC State develops open source software for simulating electric power system operations under uncertainty, especially hydroclimatic extremes, and exploring system vulnerabilities from an environmental, engineering reliability, and financial/economic perspective. Jordan is a three-time graduate from the University of North Carolina at Chapel Hill (BS in Environmental Science, MS and PhD in Environmental Science and Engineering) where he was a research faculty from 2016-2018, before joining NC State. His research has been

supported by multiple National Science Foundation funding programs (Innovations at the Nexus of Food, Energy, and Water Systems; Coupled Natural Human Systems) and Department of Energy funding programs (ARPA-E, Bioenergy Technologies Office, Office of Science). He is an institutional lead on the DOE Office of Science funded Integrated Multi-sector Multiscale Modeling (IM3) project lead by Pacific Northwest National Laboratory (PNNL). As part of IM3, Jordan's team at NC State is collaborating with PNNL researchers (Nathalie Voisin, Kostas Oikonomou, Wenwei Xu) on the development of high-resolution grid operations models for each of the three major electric power interconnections in the U.S. (Western, Eastern, and the Electric Reliability Council of Texas). These models will be used to support large, integrated modeling experiments that evaluate the current and future vulnerability of the nation's power grids to population change, technology adoption, climate change and extreme weather. This follows on several years during which Jordan's group has been focused on the impacts of extreme weather on the grid and markets for electricity.

Power system operators meet constantly fluctuating electricity demand through coordinated operations of power plants, transmission lines, and other critical infrastructure. Even with physical redundancy built-in and emergency protocols in place, extreme weather events regularly overwhelm these measures and disrupt the tenuous balance between electricity supply and demand, resulting in outages

and dramatic increases in prices in wholesale electricity markets (the institutions that oversee the production and sale of electricity in most of the U.S.). At the same time, it is increasingly accepted that the electric power sector (responsible for 27% of greenhouse gas emissions in the U.S.) must expand and decarbonize by 2050. System operators are tasked with managing the effects of growing renewable energy penetration on wholesale electricity market dynamics and physical reliability, while contending with growing exposure to drought (e.g. reduced hydropower production); extreme temperatures (e.g. spikes in heating/cooling demand); wildfire (e.g. transmission line impacts and power shutoff and flooding (i.e. prolonged outages and damaged equipment).

Jordan's group explores the impacts of extreme weather on decarbonizing power systems by forcing grid operations models with a mixture of historical and expanded synthetic hydrometeorological data, as well as climate change projections. These data are passed through statistical and physical/engineering models that estimate spatially explicit, daily and hourly dynamics in electricity demand (load) and the availability of variable renewable energy and hydropower. The grid operations models then solve for the least cost schedule on a plant-by-plant basis and determine flows of electricity throughout the network, outputting high resolution spatial estimates of generation, emissions, and electricity prices. Jordan's group uses these types of simulations to assess physical, environmental/public health and economic risks for power sector participants, including utilities and customers.



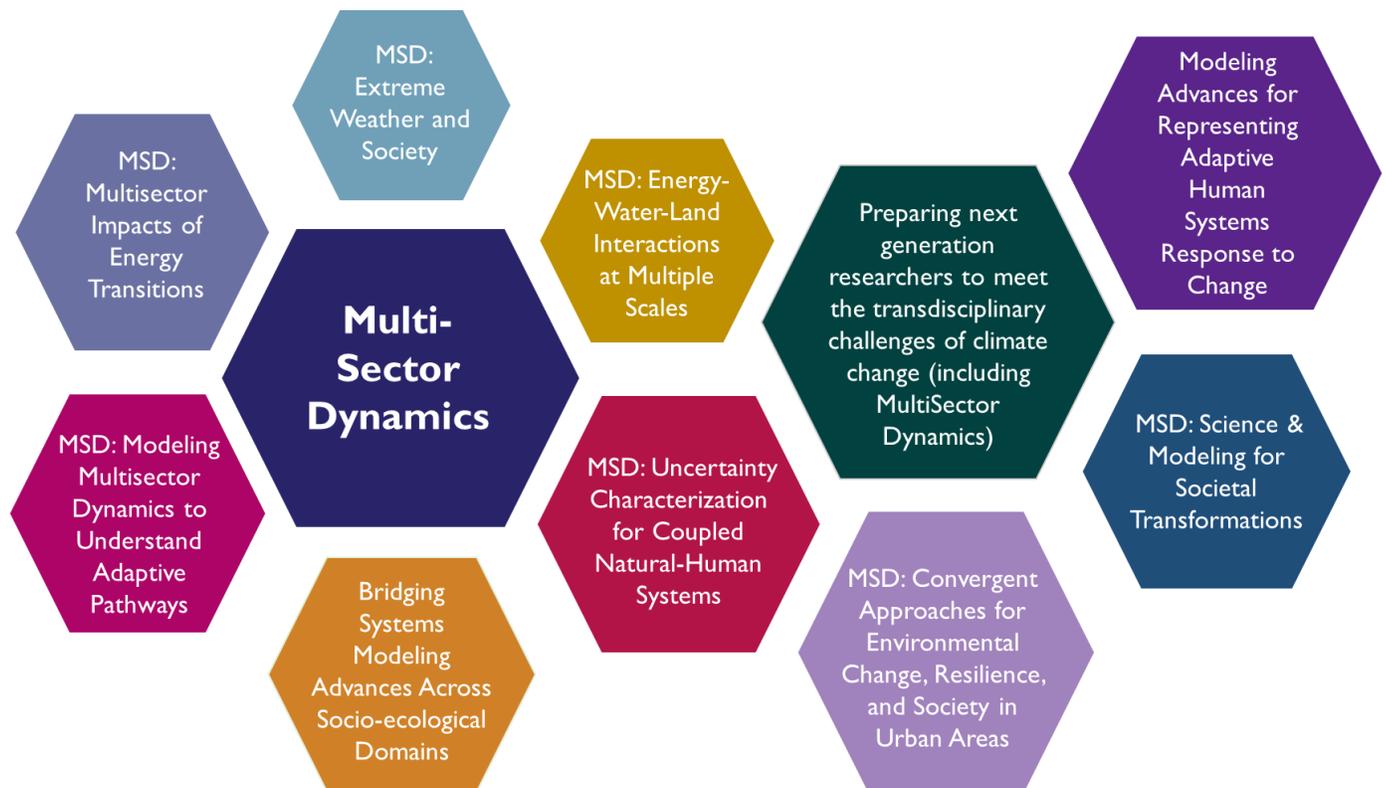
Highlighted articles:

1. Wessel, J., Kern, J.D., Voisin, N., Oikonomou, K., Haas, J. (in revision). "Technology pathways could help drive the U.S. West Coast grid's exposure to hydrometeorological uncertainty." *Earth's Future*.
2. Hill, J., Kern, J.D., Rupp, D., Voisin, N., Characklis, G. (in revision). "The Effects of Climate Change on Interregional Electricity Market Dynamics on the U.S. West Coast" *Earth's Future*.
3. Su, Y., Kern, J.D., Reed, P., Characklis, G. (2020). "Compound Hydrometeorological Extremes Across Multiple Timescales Drive Volatility in California Electricity Market Prices and Emissions". *Applied Energy*.
4. Kern, J.D., Su, Y., Hill, J. (2020). "A retrospective study of the 2012-2016 California drought and its impacts on the power sector." *Environmental Research Letters*.
5. Su, Y., Kern, J.D., Denaro, S., Hill, J., Reed, P., Sun, Y., Cohen, J., Characklis, G. (2020). "An open source model for quantifying risks in bulk electric power systems from spatially and temporally correlated hydrometeorological processes". *Environmental Modelling and Software*. Vol. 126.

AGU Fall Meeting 2021

This year's AGU meeting will be taking place between December 13-17 and will be split between virtual and in-person sessions.

You can find registration information at the [AGU Fall Meeting website](#). A graphical summary of the current MSD sessions can be found below.



Upcoming Community Events

There are several events organized by our working groups this fall, which you can find on our [website calendar](#). The *Facilitating FAIR Data* working group will be organizing a webinar on **October 12th**, with a focus on the Geospatial Analytics for Multisectoral Urban Teleconnections ('gamut') R package and its use in analyzing point and nonpoint source water contamination affecting the 100 largest U.S. cities. You can learn more about this event [here](#). As mentioned in the working group highlight section, the Professional Development and Education for Early Career Researchers Working Group is holding an Info Session on **October 21st at 3PM ET**. You can sign up for this event [here](#). To find out more about other community events, make sure to [register through our website](#) and sign up for working group updates.

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:

Environmental Science and Policy Assistant/Associate/Full Professor – RSMAS

The Department of Environmental Science and Policy at the University of Miami's Rosenstiel School of Marine and Atmospheric Science seeks to fill a tenure-track faculty position in environmental science and policy. [Read more ...](#)

Senior Research Scientist, MultiSector Dynamics Modeling

The Atmospheric Sciences and Global Change Division at Pacific Northwest National Laboratory (PNNL) and its Joint Global Change Research Institute (JGCRI), a collaboration with the University of Maryland, seek one or more early career research scientists with experience in modeling energy-water-land interactions at regional to global and annual to century scales. [Read more ...](#)

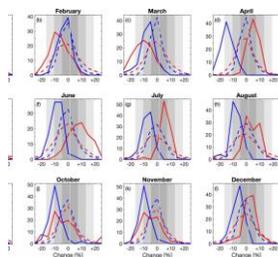
PhD opportunities: Developing model-based tools for the resilience of water resources

The Australian National University is offering two exciting opportunities for interdisciplinary researchers with skills in mathematical or computational modelling to undertake PhD programs at the Fenner School of Environment and Society. [Read more ...](#)

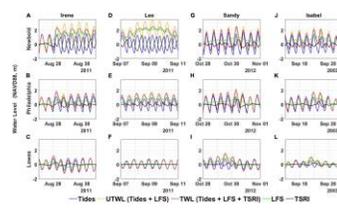
MSD Publications

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

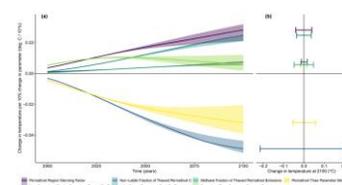
Below you can find some of the publications posted most recently:



Multiscale effects masked the impact of the COVID-19 pandemic on electricity demand in the United States



Characterizing the Non-linear Interactions Between Tide, Storm Surge, and River Flow in the Delaware Bay Estuary, United States



A permafrost implementation in the simple carbon-climate model Hector

This newsletter has been edited by Rohini Gupta, Antonia Hadjimichael, 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.