Earth & Environmental Systems Modeling

2024 EESM PI Meeting

August 6-9, 2024

Bethesda North Marriott Hotel & Conference Center

Rockville, Maryland, USA

Date and Time: Tuesday, August 6, 2024, 1:00 p.m.-4:00 p.m.

Session Name: D. Impacts, Tipping Points and Systems Responses and Resilience

Room / Location: Linden Oak Room

Breakout Chairs: Luke Van Roekel, LANL (lvanroekel@lanl.gov) and Patrick Reed, Cornell (patrick.reed@cornell.edu)

Topic Leads: Bill Collins, LBNL; Aixue Hu, NCAR; Rob Nicholas; Andrew Roberts, LANL, Wilbert Weijer, LANL; Jim Randerson, UC Irvine; Paul Ullrich, LLNL; Jen Morris, MIT; Alexey Fedorov, Yale

Session Organization: Breakouts will facilitate discussion and will define Grand Challenges where collaborations across ESMD, RGMA, and MSD can offer significant advances. The sessions have been organized to explore the following themes and questions. Discussions will culminate in a report out on Grand Challenge opportunities for the EESM program.

Theme 1: Advancing Earth and Environmental Systems Modeling to Better Understand Major Planetary Tipping Points

- What is needed to make climate simulations and model data for planetary tipping points more decision relevant and actionable?
- What approaches are needed to make ultra large volume data analysis / storage / provenance possible and equitable/accessible to all researchers?

Theme 2: Advancing Regional Modeling to Better Capture Risks and Impacts

- What is needed to improve the decision relevance of regional projections and better capture system shocks?
- What are the bottlenecks for advancing regional modeling to better capture risks and impacts?

Theme 3: Advancing Human-Earth Systems Modeling to Better Understand Resilient Responses

- What is the next frontier in AI/ML tools to support large ensemble analyses of risk and resilience?
- How can we advance the richness and relevance of scenarios used to understand consequential drivers of resilience?

Theme 4: Designing ESMD, RGMA, and MSD Large Ensemble Risk and Resilience Experiments

- What are the most important outstanding challenges to better quantifying the risks for tipping points and providing early warnings?
- How can ESMD, MSD, RGMA more effectively collaborate to solve these challenges?
- What feedbacks from impacts/assessment models can be integrated back to climate models (perhaps direct coupling)?

Talks: 10-minute perspectives that draw from your research to address a theme and its questions
Posters: Opportunity to present technical details of the research in submitted abstracts. Abstract submitters are encouraged to present a poster even if they were selected to give a talk.

Breakout Session Agenda

Moderator: TBD
Rapporteur(s): TBD
Zoom Monitor: TBD

1:00 p.m.: Theme 1: Introduce Session Organization, Themes for Discussion, and Goals – Pat Reed, Cornell
1:10 p.m.: Theme 1: Progress toward understanding tipping points in Earth System Models – Luke Van Roekel, LANL
1:20 p.m.: Theme 1: Modulation of Regional Carbon Uptake by AMOC and Alkalinity Changes in the Subpolar North Atlantic under a Warming Climate – Qi Zhang, Georgia Tech
1:30-1:50 p.m.: Theme 1 Discussion
1:50 p.m.: Theme 2: Exploring the Spatially Compounding Multi-sectoral Drought Vulnerabilities in Colorado's West Slope River Basins – Patrick Reed, Cornell)
2:00 p.m.: Theme 2: Agricultural labor under future heat stress: productivity shocks and global agroeconomic consequences – Di Sheng, PNNL
2:10-2:30 p.m.: Theme 2 Discussion
2:30 – 2:45 p.m.: Break

Moderator: TBD
Rapporteur(s): TBD
Zoom Monitor: TBD

2:45 p.m.: Theme 3: Scenario storyline discovery for multi-actor human-natural systems confronting change – Antonia Hadjimichael, Penn State
2:55 p.m.: Theme 3: Sensitivity of Future Regional and Global Macroeconomic Activity to an International Energy Market Disruption – James Edmonds, PNNL
3:05-3:25 p.m.: Theme 3 Discussion
3:25-3:45 p.m.: Theme 4 Discussion
3:45-4:00 p.m.: Discussion Period – Session Synthesis & Grand Challenges Report Out Prep

Wednesday Poster Session

- #033 Exploring the Spatially Compounding Multi-sectoral Drought Vulnerabilities in Colorado's West Slope River Basins – Patrick Reed, Cornell
- #031 Progress toward understanding tipping points in Earth System Models – Luke Van Roekel, LANL
- #032 Sensitivity of Future Regional and Global Macroeconomic Activity to an International Energy Market Disruption – James Edmonds, PNNL
- #035 Scenario storyline discovery for multi-actor human-natural systems confronting change – Antonia Hadjimichael, Penn State
- #029 Agricultural labor under future heat stress: productivity shocks and global agroeconomic consequences – Di Sheng, PNNL
- #034 Modulation of Regional Carbon Uptake by AMOC and Alkalinity Changes in the Subpolar North Atlantic under a Warming Climate – Qi Zhang, Georgia Tech
- #030 Managing Water Supply- and Financial-Risk in the Colorado River Basin – Iain Burnett, UNC Chapel Hill