

Extremes and Impacts Breakout

- Led by **Angie Pendergrass, Jesse Norris** and **Kevin Reed**.
- 17 talks across 3 sessions.
- 5 min talks followed by 20-30 mins discussion related to each subtopic.
- Topics ranging from variability and evaluation of precipitation extremes, tropical cyclones, drought, and marine heatwaves in models and observations were discussed.

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- This week's discussions built on the discussions from 2 years ago!
- Addressing the Grand Challenge Question:

What interactions across spatial and temporal scales drive extreme and impactful events, and how can we leverage understanding of such interactions to better comprehend, quantify, and predict extreme and impactful events?

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Current Challenges and Research in RGMA since previous White Paper:

- Quantification and evaluation of precipitation extremes in models remains a significant challenge (i.e., spatiotemporal).
- Research across RGMA has sought to understand how large-scale forcing and natural variability impacts the statistics and characteristics of a variety of extreme event types.
- Impact-relevant metrics and data for droughts have been investigated.

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Research Gaps and Future Directions:

- Continued need for impact-relevant metrics for the broad portfolio extremes within RGMA, Multi-Sector Dynamics, and even other agencies.
- Expand research to a broader portfolio of compound extremes, such rain-on-snow events, sequential events and concurrent extremes (e.g., marine and land heatwaves).
- The synthesizing of extreme event tracking efforts should continue across RGMA to enable a broader and more effective quantification and comparison of observations to models.

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Research Gaps and Future Directions:

- Expand research on extremes in the coupled Earth system, especially related to interactions across components (e.g., ocean and land), with an emphasis on understanding the role of surface-atmosphere interactions in driving variations in extremes.
- Continue to emphasize building fundamental physical understanding of extreme and impactful events and the environmental conditions they are associated with.