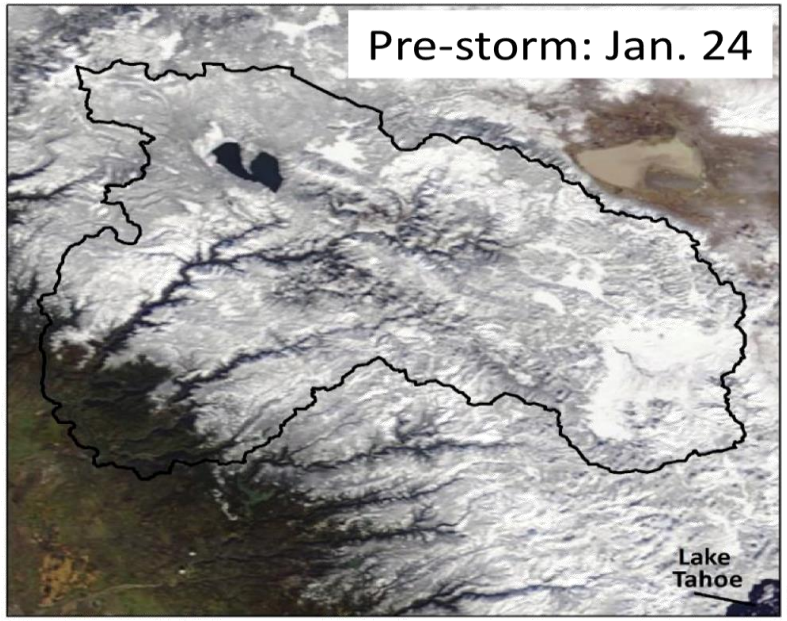
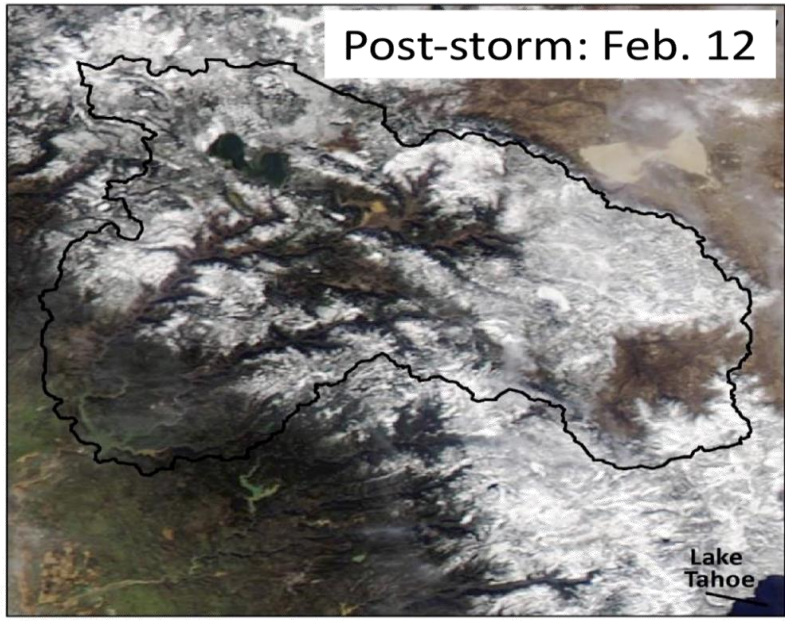
The Shifting Scales of Western US Landfalling Atmospheric Rivers Under Climate Change





Henn et al., 2020

”[In Feb 2017], Lake Oroville received an average year’s runoff (4.4 million-acre-feet) in about 50 days”
CA Dept. of Water Resources

Alan Rhoades *Research Scientist, Lawrence Berkeley National Laboratory*

Andrew Jones[1], Mark Risser[1], Abhishekh Srivastava[2],
Huanping Huang[1], Travis O’Brien[3,1], Christina Patricola[4,1],
Paul Ullrich[2,1], Michael Wehner[1], Yang Zhou[1], and Colin Zarzycki[5]

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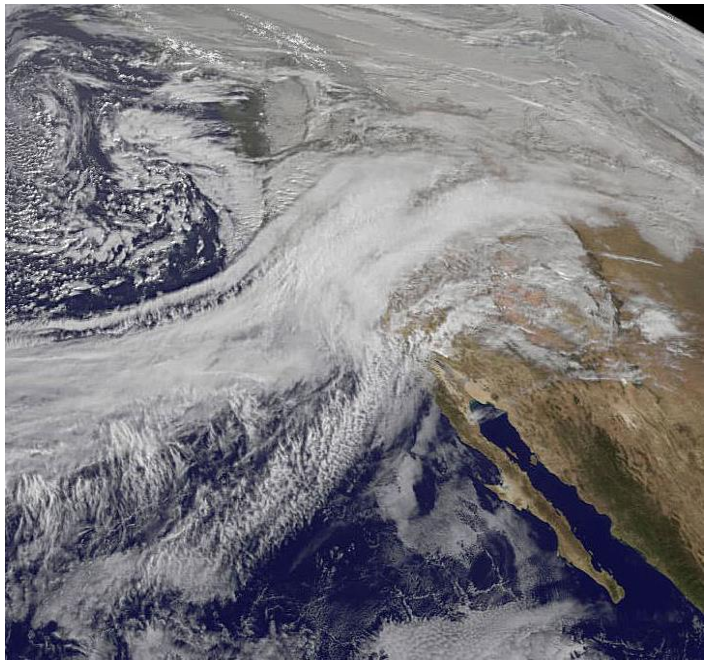
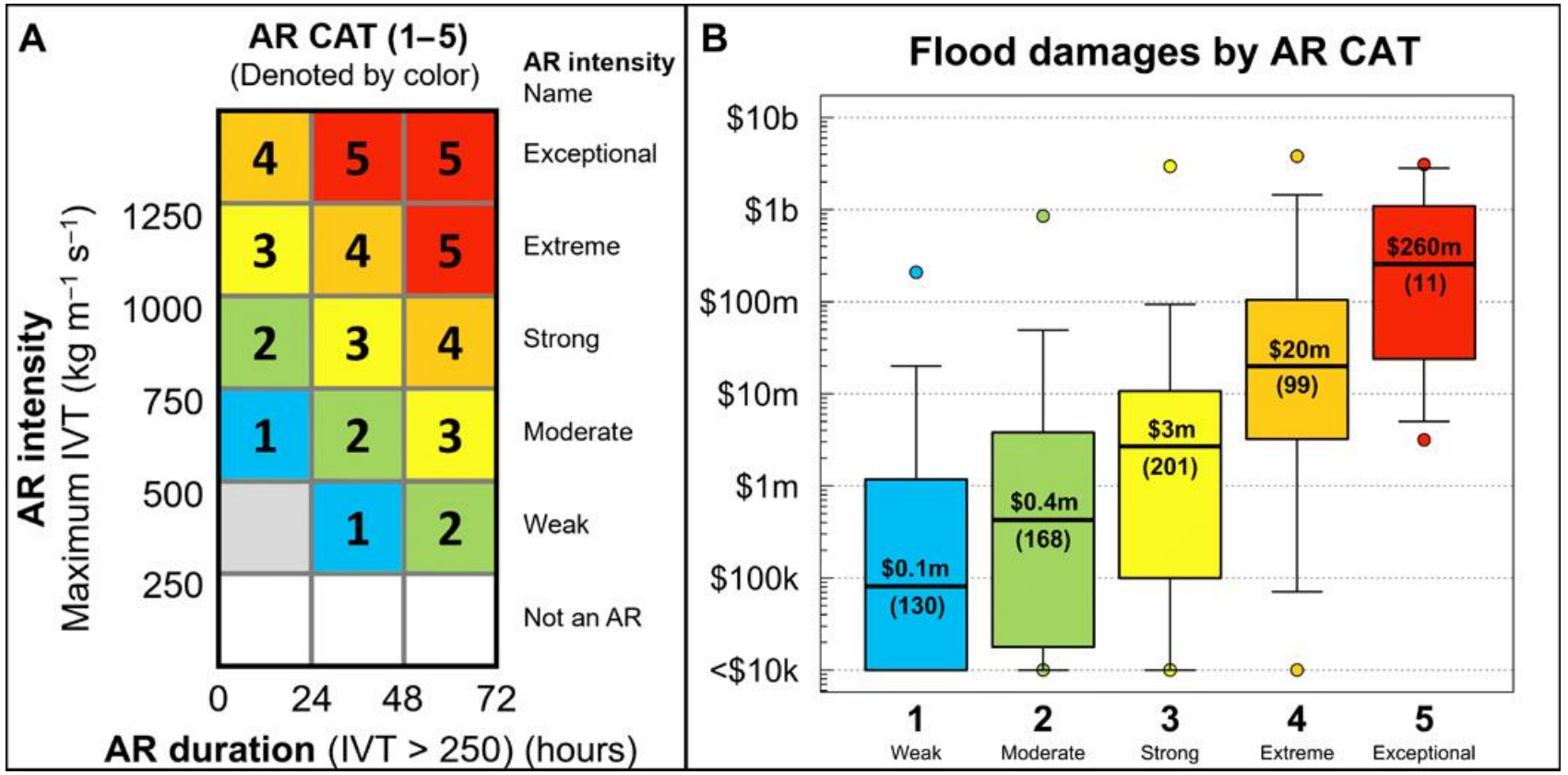
Indiana University, Bloomington [3], Iowa State University [4], Penn State University [5]

The Shifting Scales of Western US Landfalling Atmospheric Rivers Under Climate Change

Atmospheric rivers (ARs) can replenish water reserves and generate million-to-billion-dollar flood damages



"ARs accounted for 84.2% of all insured flood losses in the 11 western states across all season [$51 billion in damages to western states in the last 40 years]"



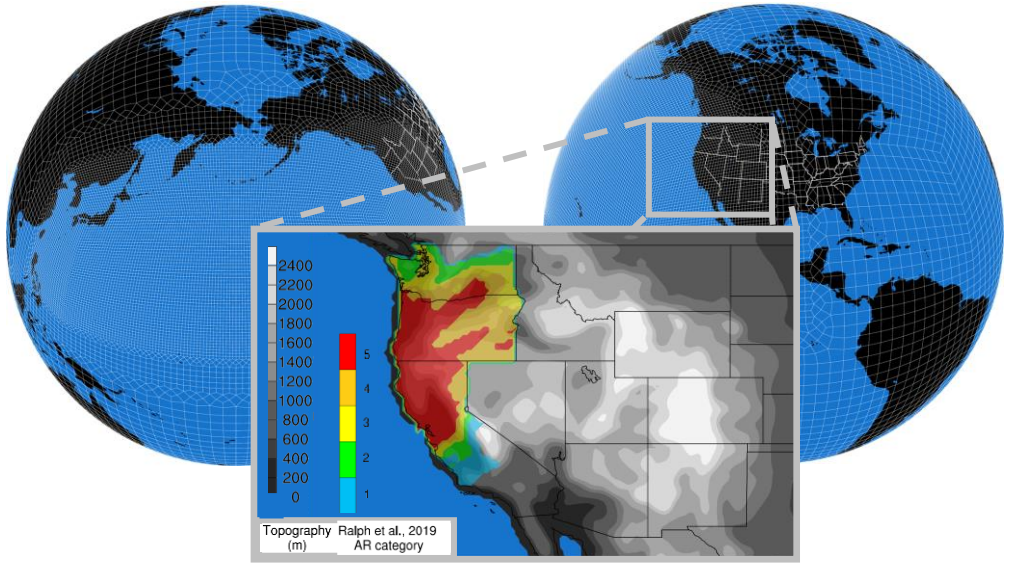
Ralph et al., 2019

Corringham et al., 2019

The Shifting Scales of Western US Landfalling Atmospheric Rivers Under Climate Change

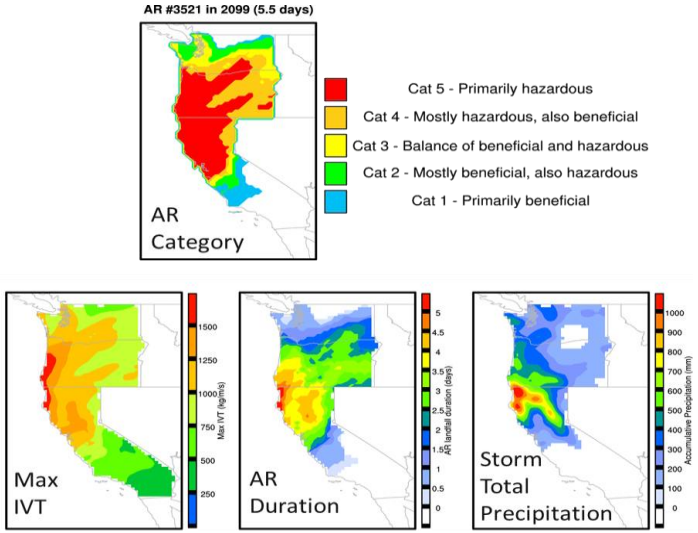
Earth system model projections of changes in AR characteristics

Variable-Resolution enabled Earth system model simulation



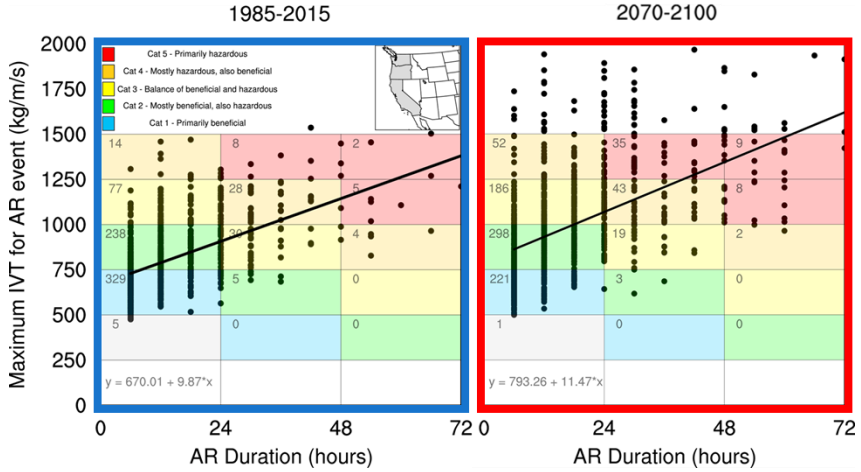
Rhoades et al. 2020a,b

Example of single landfalling AR event tracked using TempestExtremes (and a few extensions)

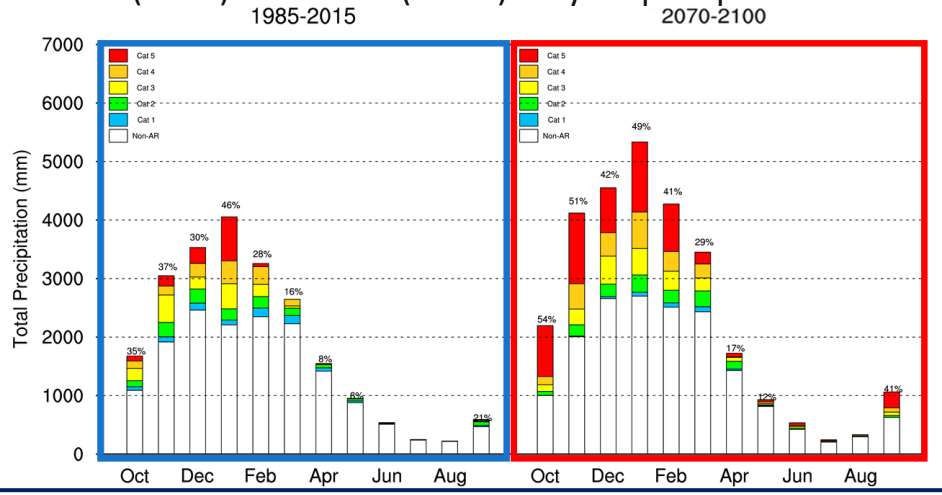


All coastal western US landfalling AR events tracked over two 30-year simulations (historical and RCP8.5)

Max AR Cat reached by an individual AR (dots)



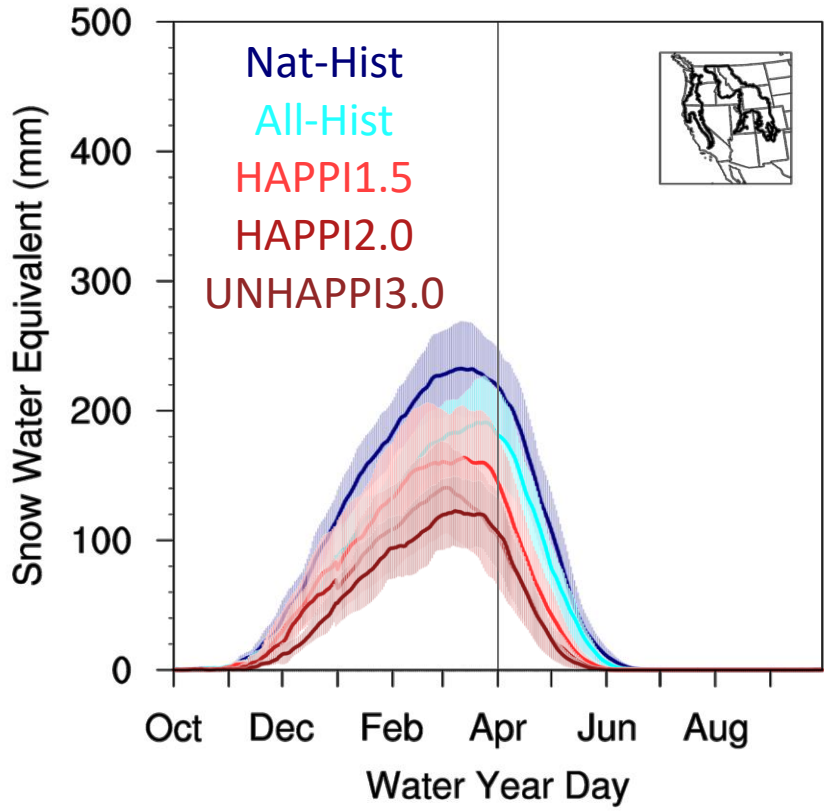
AR (color) vs non-AR (white) 30-year precipitation totals



A few closing thoughts for the Extremes and Impacts white paper

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

Relative role of antecedent conditions (e.g., snowpack and soil moisture) prior to extreme AR events



Water management issues (e.g., reservoir operation and urban flood-risk) that emerge due to shifts in character and frequency of extreme ARs with warming

Economic costs of flood damages associated with shifts in AR characteristics with warming