CGD SEMINAR

NCAR

DATE: Tuesday, 23 October 2018

TIME: 11 a.m.

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: A glimpse of mid-century megadrought risk in low-warming scenarios from large ensemble, multi-model, observational, and paleoclimate perspectives

SPEAKER: Toby Ault, Cornell University

ABSTRACT:

Megadroughts are prolonged periods of aridity that are as dry as on average as the decade-scale droughts of the 20th century, but much longer lasting. Because these events have been infrequent, even when considered over the past millennium, characterizing their risk in the future requires data from paleoclimate sources, statistical analysis of the historical record, and large ensembles of climate change projections. Previous work has suggested that under the most severe climate change trajectories, megadrought likelihoods are primarily governed by the regional response to forcing. Here, we evaluate the risk of multi-decadal megadrought across western North America using: (1) a statistical emulator of western North American hydroclimate, (2) regional paleoclimate reconstructions as benchmarks, and (3) climate change projections from several large ensembles. In terms of the most widely used reconstructed hydroclimate index -- the Palmer Drought Severity Index (PDSI) -- we find that state-of-the-art climate model simulations tend to underestimate the natural occurrence rate of 35-year and longer megadrought events. Accordingly, risk estimates of megadroughts in climate model ensembles alone are lower than they would be if these models exhibited decadal-to-centennial scale climate variations comparable in magnitude to paleoclimate reconstructions. The primary source of disagreement originates from the highly energetic variations in precipitation from tropical Pacific teleconnections in the models, causing large interannual swings in simulated regional hydroclimate. Ongoing experiments using idealized SSTs to force an atmosphere-only model may help reconcile paleoclimate and large ensemble perspectives on megadrought risk under the low levels of warming expected by mid-century, which is a time horizon highly relevant for water resource managers making strategic decisions today.

Live webcast: http://ucarconnect.ucar.edu/live

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