



MMM SEMINAR SERIES

Quantifying the influence of historical global warming on the probability of unprecedented extreme climate events

Noah S. Diffenbaugh

Associate Professor, School of Earth, Energy and Environmental Sciences

Senior Fellow, Woods Institute for the Environment

Stanford University

Stanford, California

Effective climate risk management requires robust quantification of the probability of different kinds of hazards, such as heat waves, droughts, floods, and severe storms. As a result, there has been increasing interest in the extent to which historical global warming has influenced the occurrence and severity of individual extreme climate events. However, although trends in the extremes of the seasonal- and daily-scale distributions of climate records have been analyzed for many years, quantifying the contribution of observed global warming to individual events that are unprecedented in the observed record presents a particular scientific challenge. I will describe a modified method for leveraging observations and large climate model ensembles to quantify the influence of observed global warming on the probability of unprecedented extreme events. This approach is grounded on three tenets: (1) *Focus on understanding the physical causes of the individual event*; (2) *Use formal uncertainty quantification to test the probability of those physical conditions occurring in the current climate*; and (3) *Use formal hypothesis testing to compare the probability of those physical conditions occurring in the current climate and a climate without human influence*. My group has applied our analysis to a number of different climate variables from a number of individual events, including temperature, precipitation, soil moisture, and atmospheric circulation patterns. Together, this work has shown that global warming can influence the risk of extreme events that are unprecedented in historical experience, particularly by altering the probability of the physical conditions that are responsible for the event. In addition to providing an overview of the scientific challenge and the details of our method and results, I will also summarize our ongoing efforts to develop and release a generalized analysis code that will enable the public to transparently apply our method to any extreme event for which there is long-term observational data, and for which climate models are able to accurately simulate the underlying physical causes.

This seminar will be webcast live at:

<http://www.fin.ucar.edu/it/mms/fl-live.htm>

Recorded seminar link can be viewed here:

<https://www.mmm.ucar.edu/events/seminars>

Thursday, 25 August 2016, 3:30 PM

Refreshments 3:15 PM

NCAR-Foothills Laboratory

3450 Mitchell Lane, Bldg. 2, Main Auditorium, Room 1022

