# EXTREME EVENTS AND CLIMATE CHANGE

## A MULTIDISCIPLINARY APPROACH

EDITED BY

FEDERICO CASTILLO • MICHAEL WEHNER • DÁITHÍ A. STONE

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# PREFACE

Climate change has continued unabated since the second assessment report of the Intergovernmental Panel on Climate Change concluded in 1995 that “the balance of evidence suggests a discernible human influence on global climate” (Houghton et al., 1996, p. 4). Since then, confidence in the attribution of the human cause of global warming has increased to the point that by 2018 the Fourth United States National Climate Assessment report found that there is “no convincing evidence that natural variability can account for the amount of global warming observed over the industrial era” and that at best estimate, human changes to the composition of the atmosphere, mainly through the consumption of fossil fuels, accounted for all of that warming (Wuebbles et al., 2017). Because significant climate change is certain to continue into the future, attention to its impacts has become critically important (Field et al., 2014; Jay et al., 2018). As noted in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change:

> Global, regional, and local socioeconomic, environmental, and governance trends indicate that vulnerability and exposure of communities or social-ecological systems to climate hazards related to extreme events are dynamic and thus vary across temporal and spatial scales (high confidence). Effective risk reduction and adaptation strategies consider these dynamics and the inter-linkages between socioeconomic development pathways and the vulnerability and exposure of people.
>
> (Oppenheimer et al., 2014)

Effective risk reduction therefore depends on multidisciplinary research that explores how past, current, and future extreme weather occurrence interacts with risk perceptions, adaptation efforts, and resilience mechanisms. For example, heat wave analysis has emphasized the impacts on health and on health care systems (Guirguis et al., 2014; Ostro et al., 2009; Stoecklin-Marois et al., 2013) whereas the impact of floods, hurricanes, and drought on migration patterns has been mostly undertaken from a social science perspective (Hugo, 2011; Landry et al., 2007; Piguet et al., 2011). The need to approach the impacts of extreme events from a multidisciplinary approach provided the editors with the spark to organize the 2016 AGU Fall Meeting session, “Multidisciplinary Methods to Estimate the Impact of Climate-Related Extreme Events,” which is the genesis of this book.

This book presents a selection of contributions concerning the impacts of climate change. The authors are international experts in their fields, and their work represents the state of the art in attribution and socioeconomic impact analysis of extreme events. The work presented in this book is indicative of the multidisciplinary approaches that are needed to have a full assessment of the impact of extreme weather on society.

Chapter 1 by Stone begins our discussion by outlining a detection and attribution approach to the general question of synthesizing the impacts of extreme weather in a changing climate. Using Arctic coast erosion as an example, Stone demonstrates the causal chain that must be developed to attribute individual impacts on anthropogenic climate change. The book then focuses on specific agricultural impacts for five chapters. In Chapter 2 Castillo et al. analyze the impact of heat waves on outdoor labor, particularly on agricultural labor in California. Using a Cobb-Douglas production function approach and drawing