

EXTREME EVENTS AND CLIMATE CHANGE

A MULTIDISCIPLINARY APPROACH



EDITED BY

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Table of Contents

[Cover](#)

[Title Page](#)

[Copyright Page](#)

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[Preface](#)

[REFERENCES](#)

[Acknowledgments](#)

[1 Synthesizing Observed Impacts of Extreme Weather Events Across Systems](#)

[1.1. A REASON FOR CONCERN](#)

[1.2. OF TRUTHS AND TRIVIALITIES](#)

[1.3. SYNTHESIZING ACROSS EVERYTHING](#)

[1.4. IMPLICATIONS FOR THE FUTURE](#)

[REFERENCES](#)

[2 The Impact of Heat Waves on Agricultural Labor Productivity and Output](#)

[2.1. CALIFORNIA AGRICULTURE](#)

[2.2. EXTREME EVENTS AND CLIMATE CHANGE: HEAT INDEX](#)

[2.3. HEAT WAVES AND AGRICULTURAL LABOR](#)

[2.4. CONCEPTUAL FRAMEWORK](#)

[2.5. DATA SOURCES AND DESCRIPTION](#)

[2.6. EMPIRICAL ESTIMATION AND RESULTS](#)

[2.7. CONCLUSIONS](#)

[ACKNOWLEDGMENTS](#)

[APPENDIX 2.1](#)

REFERENCES

3 Weather Extremes That Affect Various Agricultural Commodities

3.1. INTRODUCTION

3.2. COMMODITY GROUPINGS

3.3. CONCLUSIONS

ACKNOWLEDGMENTS

REFERENCES

4 Economics of the Impact of Climate Change on Agriculture

4.1. INTRODUCTION

4.2. LAND ALLOCATION BEFORE CLIMATE CHANGE

4.3. CROP MIGRATION AFTER CLIMATE CHANGE

4.4. WELFARE IMPLICATIONS

4.5. CONCLUSION

APPENDIX A

REFERENCES

5 Agricultural Losses in a Telecoupled World

5.1. INTRODUCTION

5.2. BACKGROUND

5.3. MODELING IMPACTS OF BREADBASKET FAILURES

5.4. RESULTS: IMPACTS OF BREADBASKET FAILURE ON GLOBAL LAND USE

5.5. DISCUSSION

5.6. CONCLUSIONS

REFERENCES

6 Perceptions of Extreme Weather Events and Adaptation Decisions

6.1. INTRODUCTION
6.2. METHODOLOGICAL APPROACH
6.3. RESULTS
6.4. CONCLUSIONS AND POLICY-RELATED IMPLICATIONS
ACKNOWLEDGMENTS AND DATA
REFERENCES
APPENDIX

7 Simulation Model Based on Agents for Land Use Change and Cost-Benefit Analysis of Land Management Policies

7.1. INTRODUCTION
7.2. FORMULATION OF SIMBACUS
7.3. DECISIONS OF THE AGENTS (INDIVIDUALS)
7.4. SIMULATION
7.5. RESULTS
7.6. CONCLUSIONS
ACKNOWLEDGMENTS
REFERENCES

8 Climate Extremes, Political Participation, and Migration Intentions of Farmers

8.1. INTRODUCTION
8.2. LITERATURE REVIEW: EXPERIENCE OF CLIMATE EXTREMES, POLITICAL PARTICIPATION, AND MIGRATION INTENTION
8.3. METHODOLOGY
8.4. ANALYSIS: A MODELING APPROACH TO ASSESS THE RELATIONSHIPS AMONG THE EXPERIENCE OF CLIMATE EXTREMES,

POLITICAL PARTICIPATION, AND MIGRATION INTENTIONS

8.5. RESULTS

8.6. DISCUSSION

8.7. CONCLUSION

ACKNOWLEDGMENT

REFERENCES

9 Effects of Extreme Weather Events on Internal Migration in Rural Guatemala

9.1. INTRODUCTION

9.2. DATA

9.3. ECONOMETRIC SPECIFICATION

9.4. RESULTS AND DISCUSSION

9.5. CONCLUSIONS

REFERENCES

10 Extreme Heat Exposure and Occupational Health in a Changing Climate

10.1. INTRODUCTION

10.2. METRICS AND MONITORING USED TO ASSESS OCCUPATIONAL HEAT STRESS

10.3. REPORTS ON HEAT EXPOSURE: LOW- AND MIDDLE-INCOME COUNTRIES (LMICS)

10.4. OCCUPATIONAL HEAT STRESS AND RELATED HEALTH CONCERNS

10.5. WORK CAPACITY, PRODUCTIVITY, AND ECONOMIC IMPACT

10.6. STRATEGIES FOR PREVENTION OF HEAT IMPACTS THROUGH MITIGATION AND ADAPTATION TO CLIMATE-RELATED HEAT STRESS IN THE WORKPLACE

10.7. CONCLUSIONS
ACKNOWLEDGMENTS, SAMPLES, AND DATA
REFERENCES

11 Tropical Cyclone Impacts

11.1. INTRODUCTION
11.2. TROPICAL CYCLONE FORECASTING
11.3. TROPICAL CYCLONE PHYSICAL IMPACTS
11.4. SOCIETAL IMPACTS FROM TROPICAL CYCLONES
11.5. CONCLUSIONS
ACKNOWLEDGMENTS
REFERENCES

12 On the Relationship Between Heat Waves and Extreme Precipitation in a Warming Climate

12.1. INTRODUCTION
12.2. DATA
12.3. METHODS
12.4. CASE STUDY RESULTS
12.5. FUTURE CLIMATE PROJECTIONS
12.6. DISCUSSION AND CONCLUSIONS
ACKNOWLEDGMENTS
REFERENCES

13 Evaluating Economic Output at Risk to Climate Change

13.1. INTRODUCTION
13.2. LITERATURE REVIEW
13.3. METHODS
13.4. RESULTS
13.5. CLIMATE CHANGE IMPLICATIONS

13.6. DISCUSSION AND CONCLUSION REFERENCES

[Index](#)

[End User License Agreement](#)

List of Tables

Chapter 2

[Table 2.1 Top Ten Agricultural Commodities in California in 2017 and 2015 Ran...](#)

[Table 2.2 Top 10 Leading Producing Counties in California and Leading Crops/A...](#)

[Table 2.3 Instrumental Variable \(IV\) Estimation, First and Second Stages \(Eqs...](#)

Chapter 3

[Table 3.1 Atmospheric Conditions That Affect Citrus Production.](#)

[Table 3.2 Atmospheric Conditions That Affect Beef and Dairy Production.](#)

[Table 3.3 Atmospheric Conditions That Affect Field Fruits Production.](#)

[Table 3.4 Atmospheric Conditions That Affect Field Vegetables Production.](#)

[Table 3.5 Atmospheric Conditions That Affect Grape Production \(All Types\).](#)

[Table 3.6 Conditions That Affect Maize Production.](#)

[Table 3.7 Atmospheric Conditions That Affect Nursery and Greenhouse Productio...](#)

[Table 3.8 Atmospheric Conditions That Affect Rice Production.](#)

[Table 3.9 Conditions That Affect Soybean Production.](#)

[Table 3.10 Conditions That Affect Tomato Production.](#)

[Table 3.11 Atmospheric Conditions That Affect Stone and Pome Fruit Production...](#)

[Table 3.12 Atmospheric Conditions That Affect Almond, Pistachio, and \(Persian...](#)

[Table 3.13 Conditions That Affect Wheat Production.](#)

[Table 3.14 Impacts from Different Extreme Weather.](#)

Chapter 4

[Table 4.1 Welfare Change in a Region with Rectangular Shape or with More Land...](#)

[Table 4.2 Welfare Change in a Region with More Land in the North.](#)

Chapter 5

[Table 5.1 Proportional Difference in Forest Cover in 2100 Between the Referen...](#)

[Table 5.2 Proportional Difference in Croplands in 2100 Between the Reference ...](#)

Chapter 6

[Table 6.1 Characteristics of the Landscapes in the Case Study.](#)

[Table 6.2 A Comparison of Factors Included in the Different Models of Farmer ...](#)

[Table 6.3 Description of Sociodemographic and Farm Characteristics of Smallholders](#)

[Table 6.4 Perceptions of Exposure to Extreme Weather Events \(Hurricanes, Droughts, and Floods\)](#)

[Table 6.5 Marginal Effects from Logit and Complementary Log-Log Estimations of the Probability of Having a POET](#)

[Table 6.6 Perception of Effectiveness of Adaptation Measures Implemented to Reduce the Impact of Extreme Weather Events](#)

[Table 6.7 Mean and Proportion Tests for the Differences in Household Characteristics](#)

[Table A.1: Logit and Complementary Log-Log Estimation of the Probability of Having a POET](#)

Chapter 7

[Table 7.1 Impacts of Having a POET](#)

[Table 7.2 Comparison Using Different Population Growth Rates \(Scenario 2 and 3\)](#)

Chapter 8

[Table 8.1 Definitions, Means, and Standard Deviations \(SD\) of Dependent and Independent Variables](#)

[Table 8.2 Probit Regression Results: Goal Intention Model](#)

[Table 8.3 Predicted Marginal Effects of Factors Influencing Migration Intentions](#)

[Table 8.4 Multinomial Logit Regression Results: Target Destination Model \(1\):...](#)

[Table 8.5 Predicted Marginal Effects of Factors Influencing Choice of Target Destination](#)

[Table 8.6 Multinomial Logit Regression Results: Target Destination Model \(2\):...](#)

[Table 8.7 Predicted Marginal Effects of Factors Influencing Choice of Target ...](#)

Chapter 9

[Table 9.1 Descriptive Statistics of Rural Municipalities.](#)

[Table 9.2 Descriptive Statistics of Control Variables for Rural Municipalities...](#)

[Table 9.3 Effects of Extreme Climatic Events of Dry and Rainy Days on Migration...](#)

[Table 9.4 Marginal Effects of Extreme Climatic Events of Dry and Rainy Days on Migration...](#)

Chapter 10

[Table 10.1 Examples of Direct, Empirical, and Rational Heat Indices Commonly Used...](#)

[Table 10.2 Type of Adaptation/Solutions That Can Be Employed to Various Degrees...](#)

[Table 10.3 Mitigation Techniques Put Forth to Decrease and Reverse Climate Change...](#)

Chapter 11

[Table 11.1 Saffir-Simpson Scale Wind Speeds.](#)

[Table 11.2 Recurrence Intervals and Probabilities of Occurrences \(NASA, 2017\)...](#)

Chapter 13

[Table 13.1 Summary Statistics for Earnings by Industry \(\\$ thousand 2011\).](#)

[Table 13.2 Population-Weighted Regression Coefficients for All Industries and...](#)

List of Illustrations

Chapter 1

[Figure 1.1 Annual variations in fatality and injury impacts from tornadoes i...](#)

[Figure 1.2 Synthesis assessments from the IPCC AR5 concerning the attributio...](#)

[Figure 1.3 Confidence in attribution of observed trends in impacts related t...](#)

Chapter 2

[Figure 2.1 Scatterplot of temperature and relative humidity at the Fresno, C...](#)

[Figure 2.2 California counties included in this study.](#)

Chapter 3

[Figure 3.1 Average annual yields in the US for three major commodities: maize...](#)

[Figure 3.2 THI values for \(a\) combinations of air temperature and dew point ...](#)

Chapter 4

[Figure 4.1 The land allocation.](#)

[Figure 4.2 Northward crop switching.](#)

[Figure 4.3 Southward crop switching.](#)

[Figure 4.4 The importance of the shape of the region.](#)

[Figure 4.5 The price effect flips the direction of crop switching.](#)

[Figure 4.6 The effect of the transition cost on crop switching.](#)

[Figure 4.7 The effect of the transition cost on land development.](#)

Chapter 5

[Figure 5.1 Geopolitical \(top left\), land \(top right\), water basin \(bottom le...](#)

[Figure 5.2 Global land use for the reference and RCP 4.5 scenarios.](#)

[Figure 5.3 Gains and losses in global land uses between 2010 and 2100 for al...](#)

[Figure 5.4 Gains and losses in global land uses between 2010 and 2100 for al...](#)

[Figure 5.5 Changes in forest area for selected regions.](#)

[Figure 5.6 Changes in crop area for selected regions.](#)

[Figure 5.7 Changes in land use change emissions for selected regions.](#)

Chapter 6

[Figure 6.1 Past impacts caused by the most harmful extreme weather event exp...](#)

[Figure 6.2 Future \(expected\) impacts of extreme weather event reported by sm...](#)

Chapter 7

[Figure 7.1 Elements of the simulation model.](#)

[Figure 7.2 Baseline versus Scenario 1 with a POET.](#)

[Figure 7.3 Urban sprawl using different population growth rates.](#)

Chapter 8

[Figure 8.1 Conceptual framework: Experience of climate extremes, political p...](#)

[Figure 8.2 Location of Minqin county in northwest China and surveyed townshi...](#)

Chapter 9

[Figure 9.1 Migration and immigration rates 1997-2002.](#)

[Figure 9.2 Temporal distribution the number extreme climatic events of dry d...](#)

[Figure 9.3 Spatial distribution the number extreme climatic events of dry da...](#)

[Figure 9.4 Spatial distribution the number extreme climatic events of rainy ...](#)

[Figure 9.5 Average precipitation and temperature by months. Note: In the cli...](#)

Chapter 10

[Figure 10.1 Example of rational heat balance modeling with the predicted hea...](#)

[Figure 10.2 Average of daily maximum shaded WBGT \(afternoon values\) during t...](#)

[Figure 10.3 Maps of work loss in percentage of the available afternoon worki...](#)

[Figure 10.4 Changes in core body temperature in an agricultural worker throu...](#)

[Figure 10.5 Pathway of heat exposure and acute kidney injury.](#)

[Figure 10.6 Risk of heat hazards in an occupational setting as affected by s...](#)

Chapter 11

[Figure 11.1 Official track errors for Atlantic basin tropical storms and hur...](#)

[Figure 11.2 Annual average official intensity errors for Atlantic basin trop...](#)

[Figure 11.3 Atlantic basin annual ACE and three-year moving average \(1950-20...](#)

[Figure 11.4 Rainfall from Hurricane Harvey \(2017\).](#)

[Figure 11.5 Before and after images of flooded areas near Houston, Texas, af...](#)

[Figure 11.6 Global hurricane frequency.](#)

[Figure 11.7 Hurricane Irma's Advisories.](#)

Chapter 12

[Figure 12.1 Continental surface temperature trends. \(a\) Global and \(b\) CONUS...](#)

[Figure 12.2 500-hPa pattern for the Central-South sector heavy precipitation...](#)

[Figure 12.3 Instability and wind shear for the Central-South sector heavy pr...](#)

[Figure 12.4 Moisture and mean sea-level pressure \(MSLP\) for the Central-Sout...](#)

[Figure 12.5 Moisture transport and convergence for the Central-South heavy p...](#)

[Figure 12.6 500-hPa geopotential height pattern for the Central-South sector...](#)

[Figure 12.7 Instability and wind shear for the Central-South sector light pr...](#)

[Figure 12.8 Moisture and MSLP for the Central-South sector light precipitati...](#)

[Figure 12.9 Moisture transport and convergence for the Central-South sector ...](#)

[Figure 12.10 Heavy precipitation event in the current and future climate. Fo...](#)

[Figure 12.11 Light precipitation event in the current and future climate. As...](#)

[Figure 12.12 Frequency and duration of JJA heat waves. Scatterplot showing t...](#)

[Figure 12.13 Temperature anomalies on heat wave days. \(a\) Differential tempe...](#)

[Figure 12.14 Distribution of future summer precipitation events. Boxplot sho...](#)

[Figure 12.15 Potential future heat wave and related precipitation event chan...](#)

Chapter 13

[Figure 13.1 Effect of daily temperature on log total earnings x 100. Standar...](#)

[Figure 13.2 Effect of daily temperature on log earnings by industry sector x...](#)

[Figure 13.3 Effects of daily temperature on log earnings x 100 in four tempe...](#)

[Figure 13.4 Distribution of estimated annual earnings growth rate over time ...](#)

[Figure 13.5 Map of estimated annual earnings growth rate for S&P 500 manuf...](#)

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

tornadoes

 tropical cyclones, [171](#)-172

 in United States of America

 common currency, [5](#)-6

 detection and attribution, [3](#)-5

 transition cost effect, [50](#), [57](#)-58

 transportation and warehousing sector, [207](#)-208, [210](#)-212

tropical cyclones

 conclusions, [178](#)

 development of, [167](#)

 forecasting of

 intensity, [169](#)

 tracks, [167](#)-169

 wind radii, [169](#)

 physical impacts of

 100- and 1,000-year floods, [172](#)-173

 rainfall flooding, [172](#)-173

 storm surge flooding, [171](#)

 tornadoes, [171](#)-172

 in warmer world, [174](#)-175

 winds, [170](#)-171

 societal impacts from

 evacuation decisions, [175](#)-177

 hazards and monetary losses, [177](#)-178

tropical depression, [170](#)

tropical disturbances, [170](#)
tropical storm, [170](#)
Trump administration, immigration policies of, [12](#)
Typhoon Haiyan, [171](#)
UKMET. *See* [United Kingdom Met Office model](#)
uncertainty, synthesis assessments, [7](#)
UNFCCC. *See* [United Nations Framework Convention on Climate Change](#)
United Kingdom Met Office model (UKMET), [168](#)
United Nations Framework Convention on Climate Change (UNFCCC)
extreme weather, [1](#)–2
synthesis assessments for, [1](#)–2
United States of America
breadbasket failure in
 agricultural shocks, [74](#)–82
 GCAM, [70](#)–72
 scenario structure for, [72](#)–73
detection and attribution of tornadoes in, [3](#)–6
Universal Thermal Climate Index (UTCI), [149](#), [151](#)
utilities sector, [207](#)–208, [210](#)–212
Ventura county, agricultural production, [12](#)
vertical synthesis, [6](#)–7
vulnerability, [95](#)
walnuts, weather extremes and, [21](#), [36](#)–39

WBGT. *See [wet bulb globe temperature](#)*

weather. *See also [cold weather](#); [extreme weather](#); [hot weather](#); [wet weather](#)*

economic sensitivity to

climate change implications, [213–215](#)

discussion and conclusion, [215–216](#)

introduction, [205–207](#)

literature review for, [207](#)

methods for, [207–208](#)

results, [208–213](#)

natural hazards and, [2–3](#)

phenology and, [21–22](#)

weather extremes. *See [agricultural commodities, weather extremes and](#); [extreme weather](#)*

Weather Research and Forecasting (WRF) model, [168](#), [186](#)

welfare implications

consumer surplus, [60–61](#)

producer surplus, [61](#)

redistribution of, [61–62](#)

social surplus, [59–60](#)

wet bulb globe temperature (WBGT), [148–150](#)

geographic distribution of, [152](#)

wet weather, annual yields and, [23](#)

wheat

annual yields of, [23](#)

weather extremes and, [39–40](#)

wholesale trade sector, [207](#)–208, [210](#)–211

wildfires, climate system and, [3](#)

wind

crop impacts, [41](#)–42

grapes, [28](#)–29

nursery and greenhouse, [30](#)–31

rice, [31](#)–32

strawberries, [27](#)

tropical cyclones, [170](#)–171

wine grapes, [28](#)

work capacity, heat exposure and, [152](#)–154, [158](#)–159

WRF model. *See* Weather Research and Forecasting model

yield. *See* [agricultural yield](#)

Yolo county, agricultural production

data for, [15](#)–16

empirical estimation and results, [16](#)–18