

**THE NATIONAL ACADEMIES OF
SCIENCES, ENGINEERING, AND MEDICINE
DIVISION ON EARTH AND LIFE STUDIES
BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE
500 5th Street, NW, Room Keck 604
Washington, DC 20001**

DE-SC0014256

Title: Extreme Weather Events and Climate Change Attribution

Final

Period of Performance: 8/1/2015 to 3/31/2016

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Extreme Weather Events and Climate Change Attribution

Final Report
8/1/2015 to 3/31/2016

Part I. Project Identification Information

Sponsor Award Number: DE-SC0014256
Project Name: Extreme Weather Events and Climate Change Attribution
Responsible Staff Officer: Katie Thomas
Award Dates: 8/1/2015 to 3/31/2016
Type of Report: Final
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Part II. Project Status Information

A. Primary Objectives and Scope

For this study, an *ad hoc* NRC committee will conduct a fast-track examination of the science of attribution of extreme weather events to human-caused climate change and natural variability. The committee will actively engage the community of scientists who are developing new approaches in event attribution, including by convening a workshop and conducting additional information gathering via publicly available virtual briefings. It will assess current scientific understanding and capabilities, provide guidance about the robustness of different approaches, and identify future research priorities.

The Committee's Statement of Task and membership is provided below.

B. Description of Study Activities

July 2015: Nominations for potential committee members were solicited through July; in this month staff were actively gathering information on nominees and talking with potential members.

August 2015: The committee slate was submitted and approved by the National Academies' leadership in early August. The staff began working with the committee to identify key participants for the study workshop and review current literature on the topic.

September 2015: The committee held two meetings via WebEx in September: the first (September 11th) was a closed session meeting of the committee that included an orientation, the conflict of interest and bias discussion, and a discussion of the committee's task. The second (September 22nd) was an open meeting with sponsor representatives to discuss their goals for the study. The committee and staff continued to plan the workshop: inviting participants and honing the agenda. They also began discussing the committee's report and writing preliminary background.

October 2015: In October, the committee held another closed session meeting (October 1st) discuss the scope of the study and continue planning the workshop. Additionally, the committee held two open session WebEx meetings (October 12th and 14th) to receive input from key individuals previously identified who would be unable to attend the workshop in person.

October 21-23, 2015: The committee brought together 60+ experts, both domestically and internationally, at its 2-day public workshop on October 21-22, 2015 in Washington, DC. Speakers and participants discussed and met for an additional third day in closed session.

November 30-December 1, 2015: The committee held one more in-person, closed session meeting on November 30 – December 1 in which they continued to work on the draft report.

December 2015: Staff worked with the committee and internal Report Review Committee (RRC) to select a slate of external reviewers for the report and prepared the draft for review.

January 2016: The report was sent to reviewers in January 2016.

February 2016: The committee and staff worked together to address every comment from external review and worked to prepare the draft for public release.

March 2016: The report received final sign-off from the institution and was briefed to sponsors on March 10, 2016 and released to the public on March 11, 2016.

C. Final Report

Report Description:

As climate has warmed over recent years, a new pattern of more frequent and more intense weather events has unfolded across the globe. Climate models simulate such changes in extreme events, and some of the reasons for the changes are well understood. Warming increases the likelihood of extremely hot days and nights, favors increased atmospheric moisture that may result in more frequent heavy rainfall and snowfall, and leads to evaporation that can exacerbate droughts.

Even with evidence of these broad trends, scientists cautioned in the past that individual weather events couldn't be attributed to climate change. Now, with advances in understanding the climate science behind extreme events and the science of extreme event attribution, such blanket

statements may not be accurate. The relatively young science of extreme event attribution seeks to tease out the influence of human-cause climate change from other factors, such as natural sources of variability like El Niño, as contributors to individual extreme events.

Event attribution can answer questions about how much climate change influenced the probability or intensity of a specific type of weather event. As event attribution capabilities improve, they could help inform choices about assessing and managing risk, and in guiding climate adaptation strategies. This report examines the current state of science of extreme weather attribution, and identifies ways to move the science forward to improve attribution capabilities.

Outreach and Dissemination:

Over 600 people participated in the public release event on March 11, 2016 (in-person and online). Since the release of the prepublication, there have been 73 news stories about the report from 42 news outlets. An additional public discussion was held at the Koshland Museum on April 7, 2016, moderated by Heidi Cullen from Climate Central. Other briefings of the report include: House Committee on Science, Space and Technology; Senate Committee on Environment and Public Works; White House Office of Science and Technology Policy (OSTP); Environmental Protection Agency; and OSTP Subcommittee on Disaster Reduction. The report is available for free pdf download from the National Academies Press at <http://www.nap.edu/catalog/21852/attribution-of-extreme-weather-events-in-the-context-of-climate-change>. To date, the report has been downloaded over 9,000 times.

EXTREME WEATHER EVENTS AND CLIMATE CHANGE ATTRIBUTION

BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE

Statement of Task:

An *ad hoc* NRC committee will examine the science of attribution of specific extreme weather events to human-caused climate change and natural variability. Specifically, the committee will:

- Provide an assessment of current scientific understanding and capabilities for attribution of specific extreme weather events to climate change.
- Provide guidance about the robustness of extreme event attribution science. The guidance should discriminate among different attribution approaches and different classes of extreme events, and it should consider various characteristics of the analysis (e.g., data coverage and quality, model performance, etc.).
- Identify research priorities for further development of the approaches.

Committee Membership

David W. Titley, Chair

Pennsylvania State

Gabriele Hegerl

University of Edinburgh

Katharine L. Jacobs

University of Arizona

Philip W. Mote

Oregon State University

Christopher J. Paciorek

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