11A.1 CCSP 3.3: WHY WEATHER AND CLIMATE EXTREMES MATTER

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1. INTRODUCTION

In 2008 the U.S. Climate Change Science Program (CCSP) released its Synthesis and Assessment (SAP) number 3.3 on *Weather and Climate Extremes in a Changing Climate* with Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. SAP 3.3 has 4 chapters. The introductory chapter (Peterson et al., 2008) describes Why Weather and Climate Extremes Matter. Chapter 2 examined how extremes have been changing followed by Chapter 3's discussion of attribution of the causes of extremes and projections for their future. The report ended with Chapter 4's discussion of measures to improve understanding of weather and climate extremes.

The authorship of Chapter 1 encompassed a wide range of backgrounds and included David M. Anderson, NOAA; Stewart J. Cohen, Environment Canada and Univ. of British Columbia; Miguel Cortez-Vázquez, National Meteorological Service of Mexico; Richard J. Murnane, Bermuda Inst. of Ocean Sciences; Camille Parmesan, Univ. of Tex. at Austin; David Phillips, Environment Canada; Roger S. Pulwarty, NOAA; and John M.R. Stone, Carleton Univ.

2. KEY FINDINGS

The key findings of this chapter were:

- Climate extremes expose existing human and natural system vulnerabilities.
- Changes in extreme events are one of the most significant ways socioeconomic and natural systems are likely to experience climate change.
  - Systems have adapted to their historical range of extreme events.
  - The impacts of extremes in the future, some of which are expected to be outside the historical range of experience, will depend on both climate change and future vulnerability. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, the sensitivity of the system, and its adaptive capacity. The adaptive capacity of socioeconomic systems is determined largely by such factors as poverty and resource availability.
- Changes in extreme events are already observed to be having impacts on socioeconomic and natural systems.
  - Two or more extreme events that occur over a short period reduce the time available for recovery.
  - The cumulative effect of back-to-back extremes has been found to be greater than if the same events are spread over a longer period.
- Extremes can have positive or negative effects. However, on balance, because systems have adapted to their historical range of extremes, the majority of the impacts of events outside this range are expected to be negative.
- Actions that lessen the risk from small or moderate events in the short-term, such as construction of levees, can lead to increases in vulnerability to larger extremes in the long-term, because perceived safety induces increased development.

3. MORE INFORMATION

For more information, the entire CCSP SAP 3.3 on *Weather and Climate Extremes in a Changing Climate* can be downloaded free of charge from: http://www.climatescience.gov/Library/sap/sap3-3/final-report/default.htm

4. REFERENCES

Peterson, Thomas C., David Anderson, Stewart J. Cohen, Miguel Cortez, Richard Murname, Camille Parmesan, David Phillips, Roger Pulwarty and John Stone, 2008: Chapter 1: Why weather and climate extremes matter, in *Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands*. T.R. Karl, G.A. Meehl, C.D. Miller, S.J. Hassol, A.M. Waple, and W.L. Murray (eds.). A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC., 11-33

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