

Climate Science for the NCA

**NCADAC Climate Change Science
Working Group**

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Urbana, IL

Boulder November 2011

NCA Climate Science Working Group

- **Don Wuebbles (Univ of Illinois) ---- Co-Chair**
- **John Walsh (Univ. Alaska, Fairbanks) ---- Co-Chair**
- **Tom Peterson (NOAA) ---- Observed Changes in Extremes**
- **Harold Brooks (NOAA) ---- Severe Storm**
- **Russ Vose (NOAA) ---- Observed Changes in Extremes**
- **Ken Kunkel (NC State) ---- Climate Outlooks; Observed Changes in Extremes**
- **Susan Cutter (U of SC) ---- Climate Extremes Impacts Date and Trends**
- **Ben Santer (LLNL) ---- Climate Change Detection and Attribution**
- **Rick Katz (NCAR) ---- Statistical analysis of extremes**
- **Jerry Meehl (NCAR) ---- Modeling**
- **Michael Wehner (LBNL) ---- Model Diagnostics**
- **Jim Kossin (NOAA) ---- Hurricanes**
- **Isaac Held (NOAA) ---- Modeling**
- **Katharine Hayhoe (Texas Tech University) ---- Climate Model Downscaling**
- **Randy Dole (NOAA) ---- Climate Diagnostics**
- **Jeff Trapp (Purdue University) ---- Severe local storms**
- **Phil Mote (Washington State University) ---- Regional Climate**
- **Peter Thorne (NC State University) ---- Attribution of Climate Change**

Four Extremes Workshops

- **Climate Science Working Group is convening a series of four workshops on extremes**
 - **Each produces a peer-reviewed article for the Bulletin of the American Meteorological (BAMS).**
 - 1. Trends of Severe local storms including tornadoes and extreme precipitation**
July 26-28 2011, Asheville. Lead: Ken Kunkel
 - 2. Trends and causes of observed changes in heat and cold waves, drought and floods**
November 8-10 2011, Asheville. Lead: Tom Peterson
 - 3. Trends of extreme waves, winds and extra-tropical storms along the coasts**
January 11-13, 2012, Asheville. Lead: Russ Vose
 - 4. Climate Model Inter-comparison (CMIP) Results for IPCC 5**
March 5-9, 2012, Honolulu. Leads: Jerry Meehl, D. Wuebbles

1st Workshop: Storms

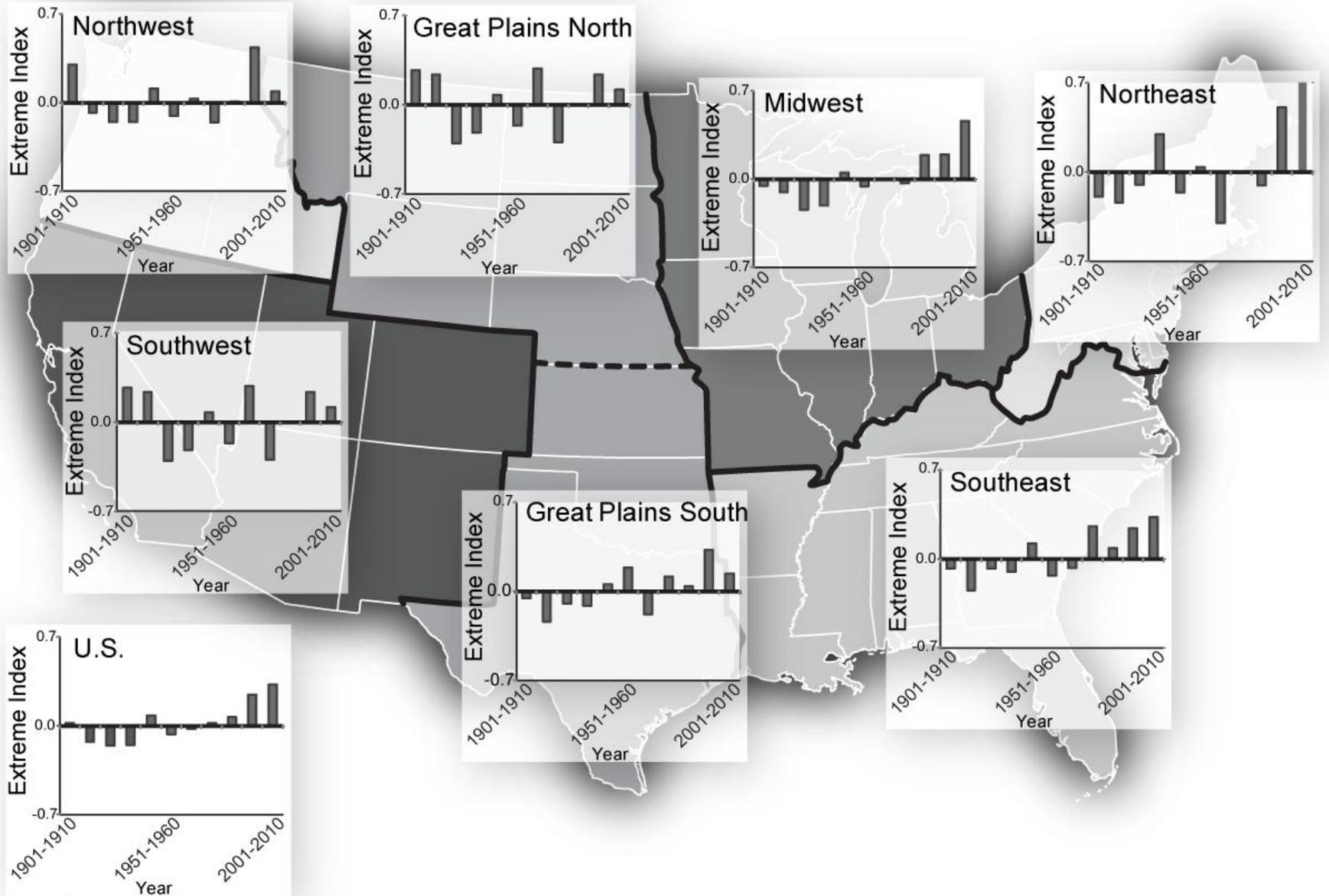
- **The group considered**
 - Severe thunderstorms & tornadoes
 - Extreme precipitation
 - Hurricanes
 - Snowstorms and ice storms
 - Impacts of these kinds of storms

- **Paper sent to BAMS**

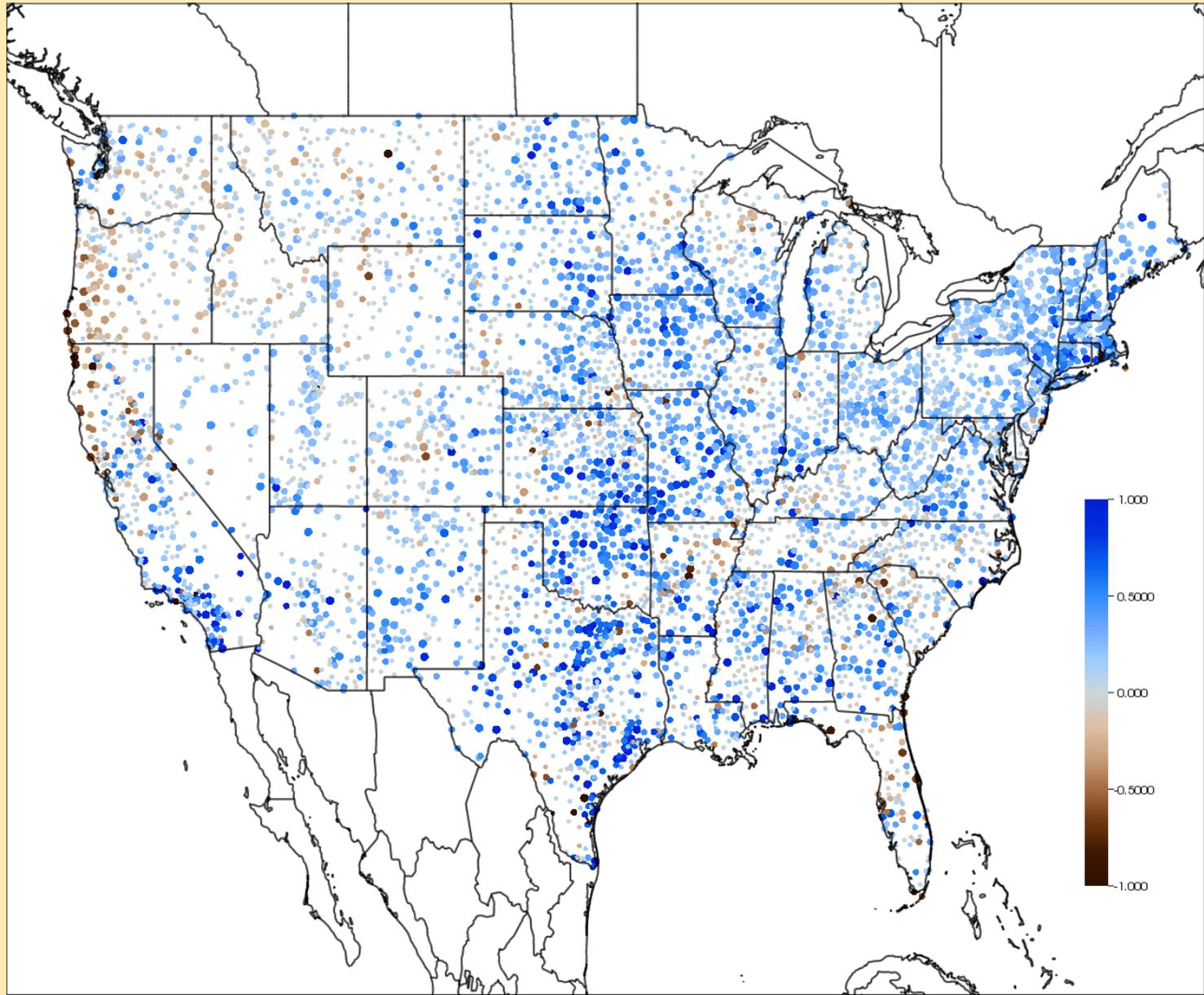
“Monitoring and Understanding Changes in Extreme Storm Statistics: State of Knowledge”

Kenneth E. Kunkel, Thomas R. Karl, Harold Brooks, James Kossin, Jay Lawrimore, Derek Arndt, Lance Bosart, David Changnon, Susan Cutter, Nolan Doesken, Kerry Emanuel, Pavel Ya. Groisman, Richard W. Katz, Thomas Knutson, James O’Brien, Chris Paciorek, Thomas Peterson, Kelly Redmond, David Robinson, Jeff Trapp, Russell Vose, Scott Weaver, Michael Wehner, Klaus Wolter, Donald Wuebbles

Trends in occurrences of 2-day, 1-in-5yr storms

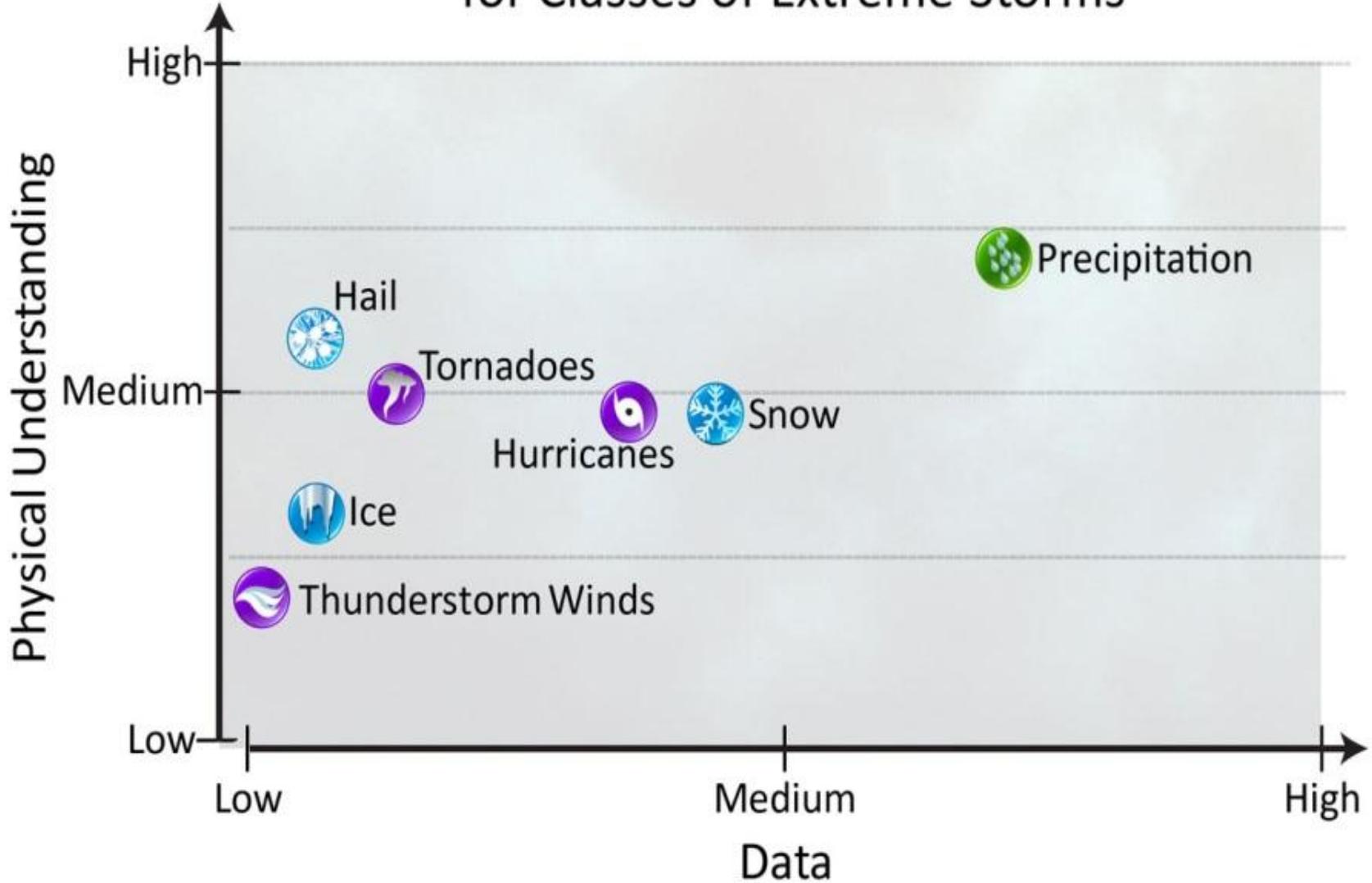


Trend in threshold for 1-in-20yr daily precipitation extreme



Authors Assessment

Adequacy for Detection and Attribution of Changes for Classes of Extreme Storms

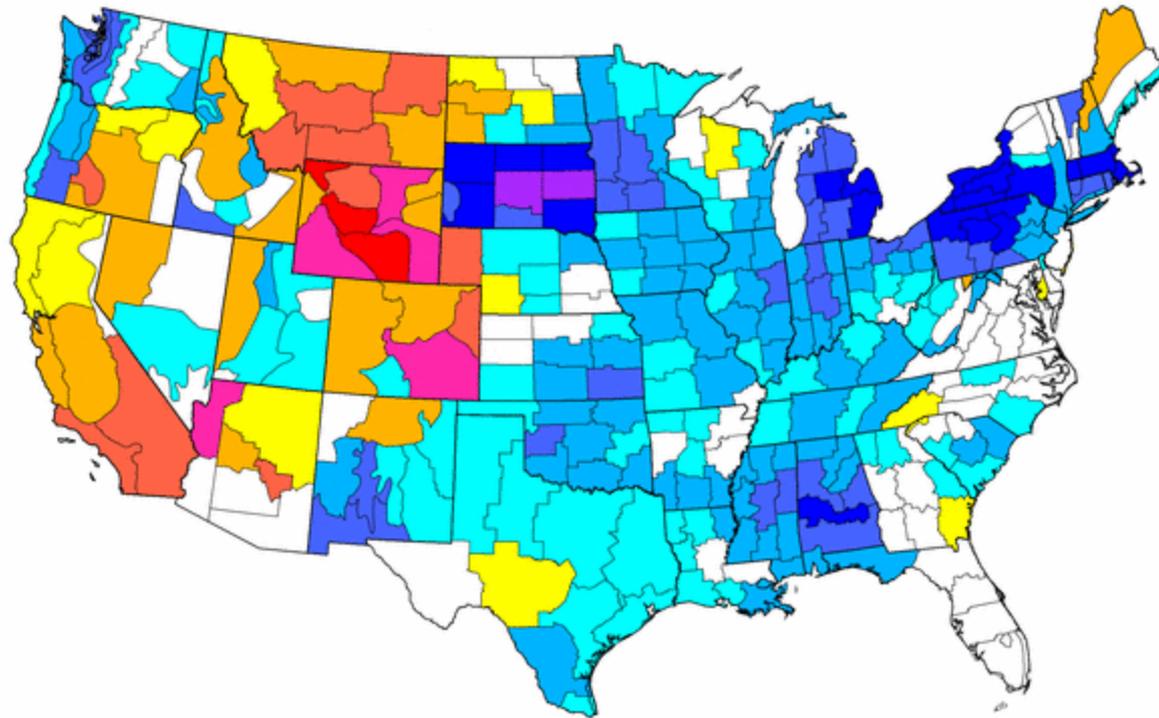


2nd Workshop: Other Events

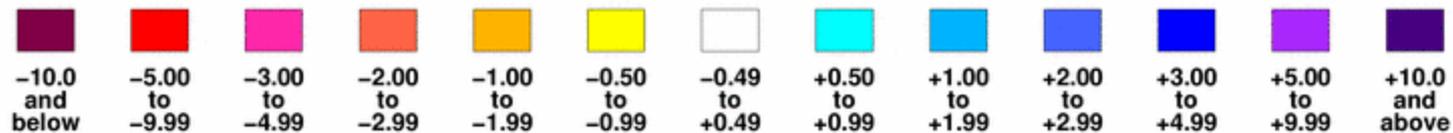
- **This workshop focused on:**
 - Heat Waves
 - Cold waves
 - Droughts
 - Floods
- **Paper for BAMS is in preparation**

Monthly Linear Trends in PHDI, 1900-2010

Palmer Hydrological Drought Index
1900–2010 linear regression trend, Annual

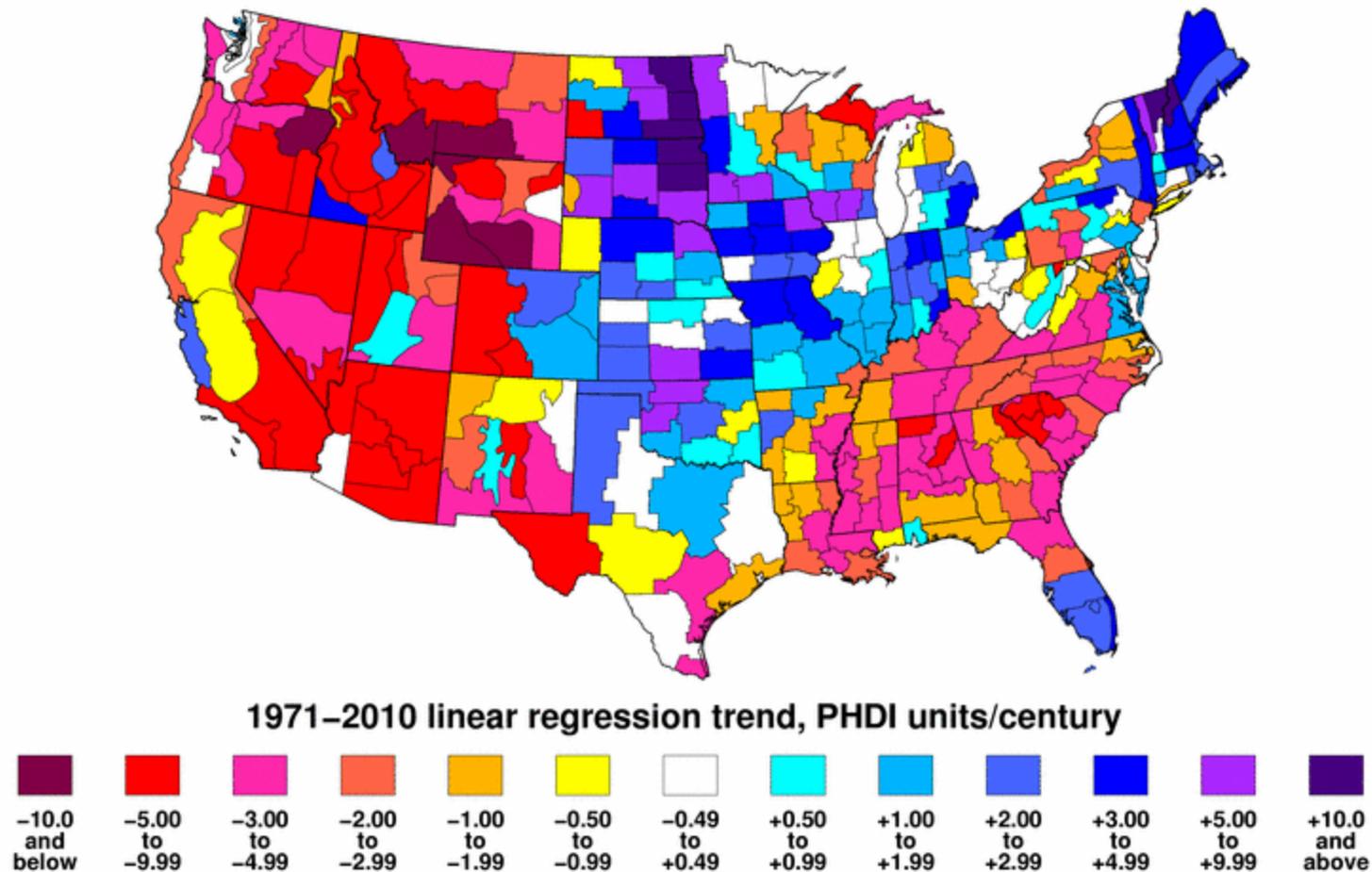


1900–2010 linear regression trend, PHDI units/century

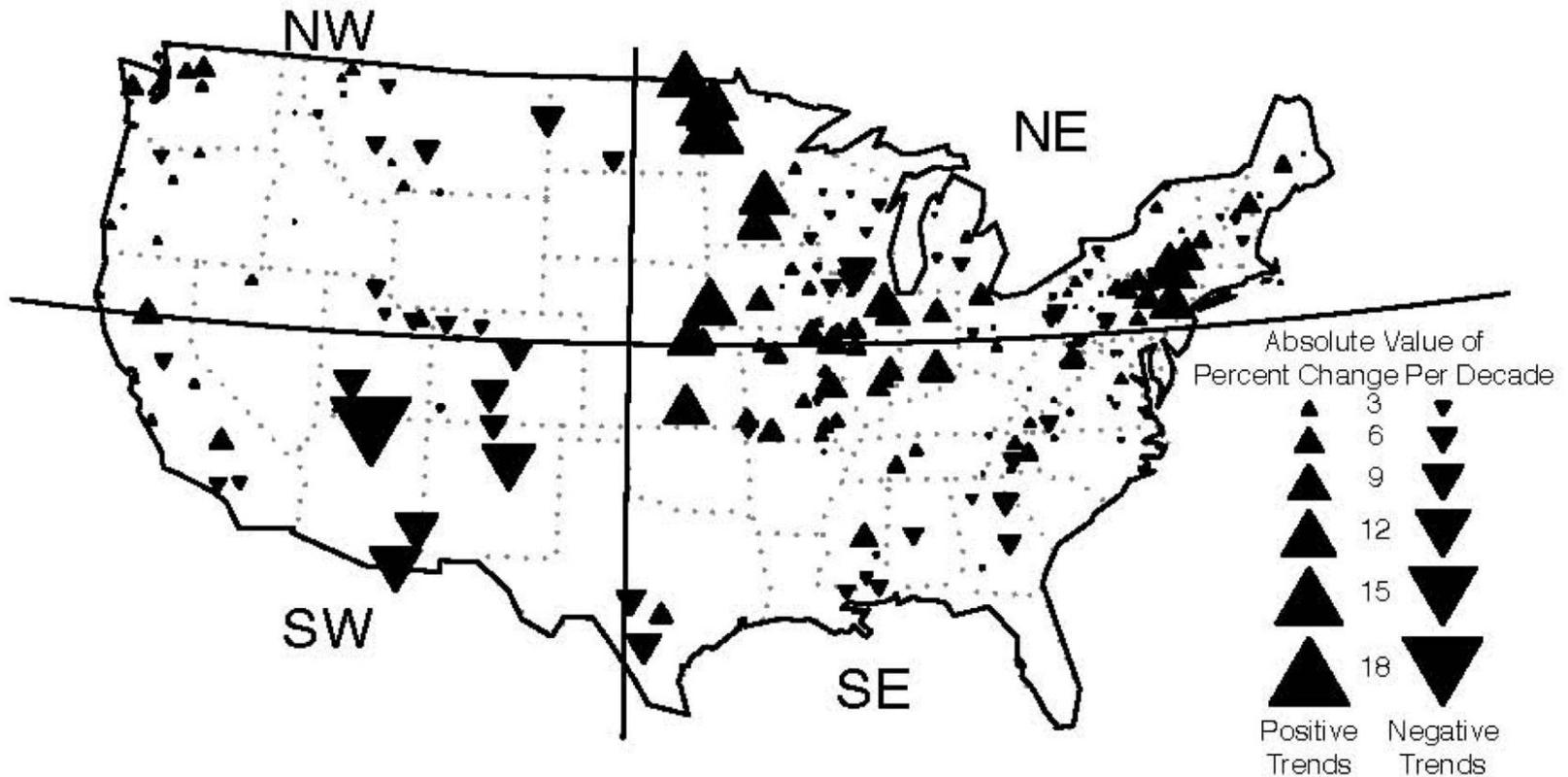


Monthly Linear Trends in PHDI, 1971-2010

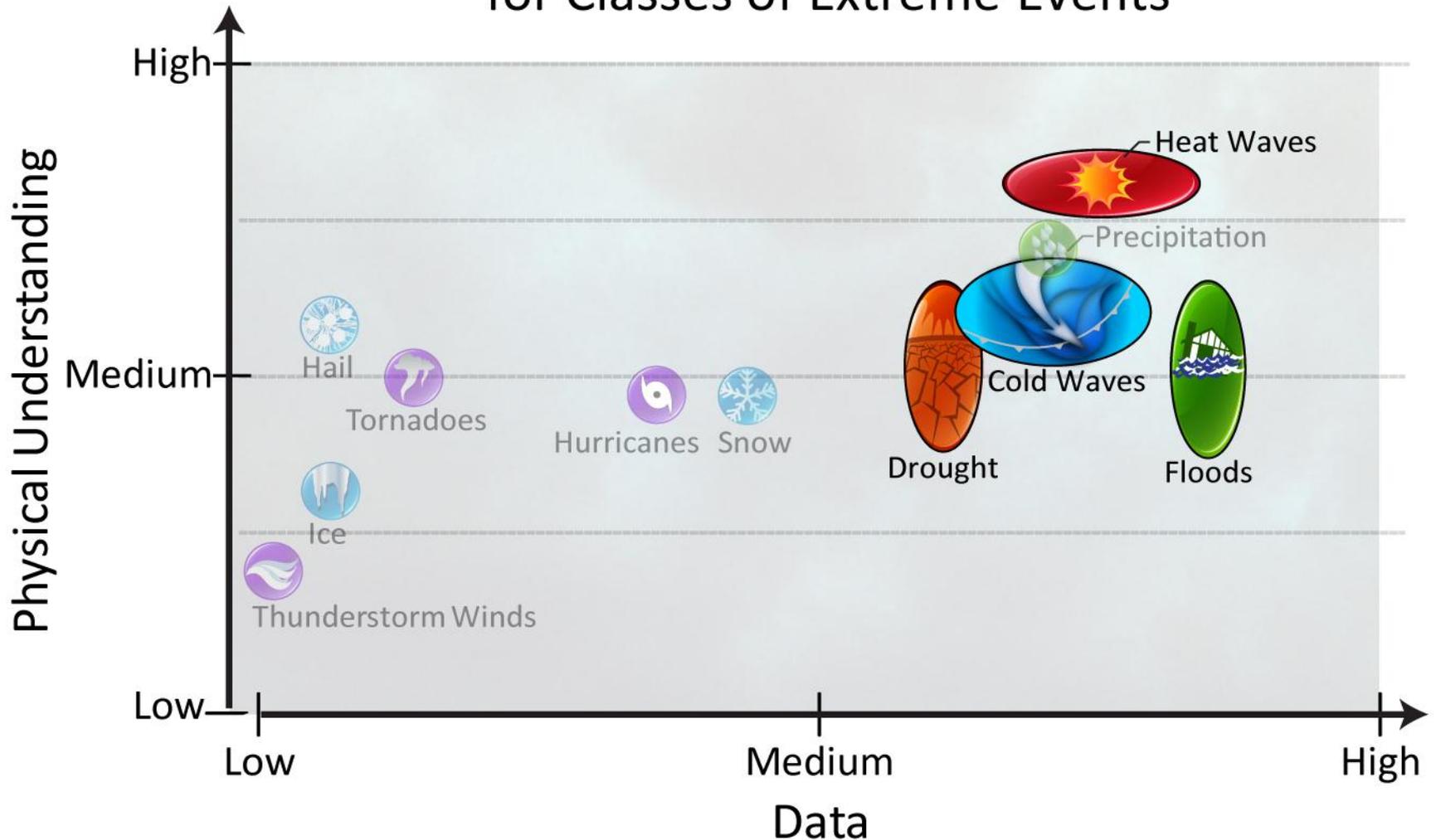
Palmer Hydrological Drought Index
1971-2010 linear regression trend, Annual



Observed trends in floods (from USGS 2011)



Adequacy for Detection and Attribution of Changes for Classes of Extreme Events



Climate Science Lead Authors

Don Wuebbles (Univ. of Illinois) ---- Convening Lead Author (CLA)

John Walsh (Univ. of Alaska, Fairbanks) ---- Convening Lead Author (CLA)

Identification of lead authors is underway.

May add a few more for help with the Frequently Asked Questions report

For NCADAC approval:

- **Climate science frequently asked questions document to be published online.**

Summary: Climate Science Activities

- **Two climate extremes workshops have been held**
- **Papers written from Workshops are a major input to the Climate Assessment in important topical areas**
- **CLAs and LAs determined for the NCA Chapter and Appendix**
- **Planning begun:**
 - **Outlining the chapter on climate science**
 - **Outlining the appendix on climate science**
 - **Coordination with other chapters**
 - **Defining a special report on Frequently Asked Questions**