

## Theme: Extreme Weather - Climate and the Built Environment: New perspectives, opportunities, and tools

President-Elect: J. Marshall Shepherd, University of Georgia

Program Co-Chairs: Eileen Shea, NOAA, and Philip Ardanuy, Raytheon

### Background:

In 2011, the United States experienced twelve \$1 billion dollar weather and climate disasters. Globally, weather and climate disasters (Figure 1) contributed to more than one-third of a trillion dollars in damage<sup>i</sup>. The scientific literature and the Intergovernmental Panel on Climate Change (IPCC) have independently suggested that intensity and frequency of extreme weather events will increase due to climate change. However, there is some debate about whether contemporary extreme weather events and climate change are related. Regardless of attribution, extreme weather and climate events represent a significant intersection point that combines scientific inquiry, technological advances, societal implications, and public awareness.



**Figure 1**-2011 world natural disasters (source: USA Today and Munich Re)

Whether the severe tornado outbreak in Joplin, Missouri or the massive flooding in Thailand was caused by a synoptic weather pattern, ENSO forcing, or climate change, their impacts on society and the infrastructure is not debatable, and the public generally takes notice. Our society is a “built environment”<sup>ii</sup> increasingly connected by cyber, energy, water, transportation, health, social, and other infrastructures—one that interacts with the natural environment through ecosystem functions supplied by wetlands, barrier islands, etc. The sustainability of this built environment and

stewardship of our natural ecosystems are clearly related to quality of life. Yet, the destruction of a hospital (Figure 2) by a tornado; disruption of major transportation corridors by a tropical storm, or the massive public health outcomes of a sustained heat wave illustrate how sensitive the built environment is to weather and climate.



Figure 2- Damage to a Joplin, Mo. hospital from the May 2011 tornado. Photo by Meagan Jean Wooley (courtesy of W. Thomas, photo by Meagan Jean Wooley, from <http://www.earthzine.org/2011/06/28/code-grey-protecting-hospitals-from-severe-weather/>)

### **Theme Concept:**

The theme is designed to explore the aforementioned “focal point” combining scientific inquiry, technological advances, societal implications, and public awareness through the lens of past, current, and future extreme weather and climate events. Herein, we broadly define weather and climate extreme events to include, but not be limited to, severe storms, tornados, tropical cyclones, floods, winter storms, drought, temperature extremes, derechos, aircraft turbulence, wildfires, extreme solar activity, and ocean-land responses (e.g. storm surges, landslides, debris flows). Under the auspices of the proposed theme, traditional topics related to advances in observations, modeling, and applications can be explored. Additionally, the theme also allows for exploration of an array of topics including effective strategies for communication, social and policy theory, adaptation, mitigation, intervention, emergency response, and public behavior or perceptions. Further, the timelines of the topic and its broad accessibility to the scientific, stakeholder, and public communities should make it particularly appealing to many segments of our traditional AMS community as well as non-traditional communities. The theme is most relevant to the NOAA goal and the National Weather Service vision for “A Weather-Ready Nation – a society that is prepared for and responds to weather related events.” This ongoing “national conversation” on a Weather Ready Nation was motivated by the brutality of the weather disasters that hit the US in 2011, and is bringing social and physical scientists together as never before. A leading

action from the Norman Symposium (held to improve the nation's resiliency against severe weather) is to integrate social and physical sciences – from research to operations. The intent of the national conversation is to evaluate opportunities for improving:

- User-driven impact-based forecasts/warnings,
- Integration of social and natural sciences into services,
- Service delivery across the weather enterprise, and
- Community planning and impacts mitigation.

### **Organizing Concept for the 2014 AMS Annual Meeting:**

The 2014 AMS annual meeting will occur during an era when society and the science community is casting an inquisitive yet wary eye at the sheer magnitude, frequency, and diversity of extreme events in recent years. It will also likely be the first AMS annual meeting after the next IPCC Assessment and National Climate Assessment Reports are released. It will also occur in Atlanta, Georgia, a city that has experienced, within the last five years, devastating drought, a tornado in the central business district, and a 200- to-500 year flood event.

At the major connecting hub of the southeastern United States, the AMS has the opportunity to bring together an interdisciplinary group of scholars, technologists, communicators, educators, and stakeholders that have more than a vested interest in extreme weather and climate. In fact, a major goal is that we can and will push the envelope on new ideas, perspectives, and tools that can advance the field scientifically and technically, but also serve as a vital feedback circuit to the built environment with its increasingly interconnected energy, transportation, communications, water, food, safety, health, and economic infrastructure. It would be exciting to see: (1) an NCAR scientist discussing new capabilities in cooling systems during heat waves with an energy stakeholder over a chili dog at the Varsity, (2) a private sector aerospace engineer talking with a communications professional about mitigation strategies during an extreme solar event, or (3) a social psychologist discussing with a CNN or Weather Channel meteorologist about how different racial or gender groups respond to hurricane warnings. It is clear that our traditional annual meeting structure will hold to form, but we also hope that the various joint sessions, one-day symposia, panels, exhibits area, and special sessions will reflect this integrative perspective also.

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<sup>i</sup> Source: global reinsurance company Munich Re

<sup>ii</sup> The Macmillan Online dictionary defines the “built environment” as “all the structures people have built when considered as separate from the natural environment,  
<http://www.macmillandictionary.com/dictionary/british/the-built-environment.”>