



CIRUN: Climate Information Responding to User Needs

Insurance and Climate Change Workshop

October 30-31, 2008

at the Earth System Science Interdisciplinary Center (ESSIC)

University of Maryland, College Park, Maryland

Co-Sponsored by the Wharton School, University of Pennsylvania, and the

University of Maryland;

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Background:

In an era of intense fluctuation in weather and climate patterns, the cost and availability of insurance are increasingly urgent issues. Between 2000 and 2007, natural disasters caused a loss and destruction worth \$420.6 billion in the United States alone. Catastrophes have caused more devastation over the past 15 years than in the entire history of insurance. In 2004, four hurricanes in Florida (Charley, Frances, Ivan and Jeanne) collectively totaled almost \$33 billion in insured losses. The following year, Hurricane Katrina alone cost the insurance industry \$46 billion.

While the Earth's climate is always changing, scientists are particularly concerned about the effects of upcoming changes. As determined by the Fourth Assessment of the Intergovernmental Panel on Climate Change, scientific data show that the Earth's atmosphere is warming and that ice sheets are melting, causing a rise in sea level that will likely bring increased flooding to coastal regions. In addition, we have witnessed a rise in severe storms and surges, which some scientists attribute to climate change. The recent upsurge in severe hurricanes and the impending rise in sea level, coupled with increasing development in coastal areas of the United States, have exposed us to an increased risk for loss of life and property. Predictive climate information is needed to help us prepare for and adapt to climate changes. Insurers, policymakers and climate scientists must come together to design the climate-prediction tools and subsequent information that will keep insurance available and affordable.

Meeting Agenda:

On October 30-31, 2008, the University of Maryland at College Park and the Wharton School of the University of Pennsylvania co-sponsored the CIRUN Insurance and Climate Change Workshop. Funded by the National Oceanic and Atmospheric Administration (NOAA), the workshop brought together leading climate scientists, public policy experts and insurance industry executives to discuss the impact of climate change on the insurance industry and public policy. Climate fluctuations and extreme weather events have had a highly disruptive, costly impact on our society; predictive climate information is the single most important factor in successful adaptation to climate changes. The purpose of the workshop was to identify the insurance industry's climate-change information needs, to assess the ability of climate scientists to create forecasting tools that will provide the needed information, and to determine the near-term data, processing and analysis requirements to create such tools.

Workshop attendees focused on developing an agenda for the future, rather than describing the accomplishments of the past. Through panel discussions and small work groups, the nearly 40 attendees tackled the crucial questions facing them about insuring weather-related risks during this period of climate change. Clearly, this strategically oriented workshop addressed issues with profound implications for American society.

Outcomes:

Attendees sought 1) to identify the insurance industry's climate-change information needs and to assess the ability of climate scientists to create forecasting tools that will provide the needed information, 2) to determine the near-term data, processing and analysis requirements to create such tools, 3) to recommend the policy issues and solutions that government will need to address in order to respond to the significant changes that will occur in the availability and cost of insurance as a result of climate change. Here are their findings:

1. Insurance Industry's Climate-Information Needs

The insurance industry looks at two major issues: what is insurable and what is the correct price for insurance, depending on the comfort level with the risk. In the past, the insurance industry relied primarily on historical data to determine its risks, but that information alone is insufficient in this era of climate change. In the last 15 years, scientists have made great strides in predicting weather-related

events; however, much work remains. The insurance industry would like to see more advances in the prediction of the following events:

- **Hurricanes.** The main focus here is on landfalls of Category 3 or greater. Underwriters want improved modeling that more accurately predicts possible storm tracks and identifies the factors that determine a hurricane's travel route. How far inland is a hurricane's damage likely to extend, and how closely can its tracks be predicted? Specifically, the industry would like information on three different time periods:
 - *72-hour window prior to a storm.* Underwriters would like better information on imminent storms, including the size and wind speed, potential for flooding, and whether the storm is likely to sustain itself inland. Such information would be used for loss mitigation such as boarding up windows, preparing power sources, protecting other infrastructure and shutting down commercial operations in areas to be affected.
 - *Seasonal window.* The insurance industry would like more accurate predictions of the size, place and quantity of severe storms expected throughout an upcoming season. A key issue is how many of these storms will actually have an asset impact. However, this data would be used mostly to mitigate losses, as insurers are already committed to contracts over this time period.
 - **Longer term/multi-year predictive window.* Underwriters need longer-term information about the distribution, median, and mean of weather events that will impact insured assets. This information will help them determine their comfort level with the risks and set appropriate insurance prices.
- **Sea level rise.** Melting ice sheets and thermal expansion are expected to cause a rise in sea level. Projections differ widely, and the insurance industry would like to better quantify this information. How much will sea level rise over the next half-century in five-year intervals, and what effect will this have on storm surges? Can maps be drawn of coastal vulnerability?
- **Coastal storms.** More research is needed to better understand the characteristics and dynamics of Nor'easters and other coastal storms. Nor'easters usually bring strong northeast winds as they move

north along the East Coast. The strong northeasterly winds that blow in off the ocean cause elevated storm surges that crash onto Atlantic beaches, causing beach erosion and property damage.

2. *Near-Term Data, Processing and Analysis Requirements*

To provide the needed climate-change information, scientists have the following near-term data, processing and analysis requirements:

- **Improved data on sea surface temperature (SST)** to help predict hurricanes. Workshop attendees discussed the need to develop decadal SST prediction models.
- **Increased emphasis on El Nino prediction** to determine the remote control on cyclogenesis.
- **High performance computing power.** Additional computing power is needed to resolve basic scientific questions—such as issues in atmospheric physics and cloud behavior—that are impediments to climate and weather forecasting. With more “computational horsepower,” scientists also can run more simulations and create higher resolution models based on different scenarios.
- **More talent.** More “intellectual horsepower” is also needed to further research. The climate science field must work on attracting more students.
- **Catastrophe (CAT) modeling.** Attendees discussed the need for greater openness/transparency with CAT models. In addition to improving the quality of the models, scientists must work on tweaking inputs for better results.
- **Better regional models.** Climate and weather models currently disagree, producing conflicting or inconsistent results. More research is needed to understand why models disagree and which ones are more accurate.
- **Reevaluation of historical regional event data.** Scientists need to reanalyze current models using broader sets of historical information, including paleoclimate data and shipping records.
- **Connect weather-event models to economic/asset base models.** The Global Earth Observing System of Systems—which is being developed by the intergovernmental Group on Earth Observations (GEO)—should help link this information. GEOSS seeks to connect the producers of environmental data and with the end users of these products through an integrated, comprehensive “system of systems” with data from thousands of Earth observation technologies.

- **Better communication among groups.** Climate scientists need to find ways to foster collaboration and communication among themselves. Workshop attendees recommended establishing a NOAA climate information service to help track information from the numerous NOAA agencies. Likewise, climate scientists and the insurance industry must maintain coherent, long-term contact and develop mechanisms for information to be easily accessible and interpretable.

Public Policy Issues:

Attendees recommended addressing the following policy issues related to insurance and climate change.

- **Building codes, coastal development and infrastructure decisions.** Governments need defensible information that will allow them to discourage behavior that is dangerous but politically popular, such as rebuilding in areas that are prone to storm damage. These data should also allow the U.S. Congress and local governments to phase out counterproductive policies, such as issuing flood insurance at prices that are drastically incommensurate with risk, or not hiring third-party inspectors to ensure that building codes on the books are enforced, thus giving people a false sense of security.
- **Increased public awareness.** Workshop attendees recommended that the government develop an information campaign about climate-related risk, explaining the advantages of using loss-prevention methods, such as mitigation, better building codes and retrofitting, as well as the consequences of not acting.
- **Costs vs. benefits of government involvement.** Attendees called for an analysis of the additional research costs needed to gain better predictive information that would reduce government expenditures after natural disasters. They surmised that the necessary sums are modest, compared to the cost of inaction: Insured losses from Hurricane Katrina alone totaled eight times the entire annual budget of the National Science Foundation and 12 times that of NOAA. This does not include the cost of federal and state disaster relief, which could easily exceed \$200 billion in this decade.

Summary:

The CIRUN Insurance and Climate Change Workshop provided a valuable opportunity for leading climate scientists, public policy experts and insurance industry executives to discuss critical issues related to providing insurance in this era of climate change. Attendees quickly established an atmosphere of

cooperation and openness as they worked together to identify the insurance industry's climate- and weather-information needs.

As expected, the insurance industry would like improved hurricane forecasting, particularly of Category 3 or higher hurricanes making landfall. However, the major surprise coming out of the workshop is that the industry at present cannot deal with the high-end uncertainty of future sea level rise and its impact on storm surges. The error bars and potential range of sea level increase are so large that it is affecting reasonable insurance and public policy options. Attendees agreed that more research is needed to fully understand the physics of melting land ice sheets and improve sea-level-rise projections.

While the workshop prompted more questions than answers, it also brought attendees closer to understanding the critical issues related to insuring weather-related risks as our climate changes, and provided guidance on how the scientific community can help tackle this challenge facing society.