Case Study of Hurricane Katrina
About the Author

Mike Smith's fascination with weather began at the age of five when he witnessed a tornado with F5 damage tear through his home town of Kansas City. The tornado was one of the most damaging in history and Mike recalls thinking “If a tornado could do such damage, it must be interesting.” He’s been hooked on weather ever since.

After achieving a Bachelor of Science Degree in meteorology, with additional studies in engineering and mathematics, from the University of Oklahoma, Mike began his professional career in broadcasting. He worked for television stations in Oklahoma City, St. Louis and Wichita.

In 1981, Mike founded WeatherData, a company dedicated to the highest standards of customer service and meteorological science. Mike is a board certified consulting meteorologist and Fellow of the American Meteorological Society. He served as Chairman of the Commercial Weather Services Association, a Charter Member of the National Weather Association and served on the American Meteorological Society’s Forecasting and Aviation Meteorology Committees.

In 1992, Mike won the American Meteorological Society’s Award for Outstanding Contribution to Applied Meteorology and shared in WeatherData’s 2000 Award for Outstanding Service to Meteorology by a Corporation. He is a recipient of seven United States patents, with other U.S. and foreign patents pending, and is a published author and photographer in the field of meteorology.
Hurricane Katrina, in economic terms, is the worst natural disaster in the history of the United States. With direct and indirect economic loss exceeding $200 billion, more than 1,200 fatalities and evacuees in all 50 states, the sheer magnitude of Katrina is often difficult to grasp.

The purpose of this White Paper is to review the information available prior to landfall in the context of its value for decision-making.
In the predawn hours on Saturday morning, August 27, a team of WeatherData meteorologists were tracking and forecasting Hurricane Katrina. Their 2 a.m. Katrina Risk Assessment forecast called for Katrina to pass just east of New Orleans at Category 4 intensity. Our forecast of the path of the eye of the storm was either over New Orleans or just to the east from this point in time until landfall – remarkable consistency.

WeatherData takes great pride in getting the meteorology (wind speed, storm's path, etc.) right and in going the extra step to provide insight as to the storm's effects. Keeping in mind that Katrina crossed the Louisiana coast around 7 a.m. on Monday, August 29, the following statements made in our forecast products were of amazing accuracy. They are edited to eliminate redundancy, none of the editing changes their meaning.

Sunday, August 28, 2005

- **2 a.m.**: “Katrina’s Cat 4 or 5 strength ensures a giant storm surge of 10 to 20 feet above normal… Regarding the Gulf Coast, extensive to catastrophic structural damage, power outages and flooding are inevitable with the population centers of New Orleans and Biloxi hard hit.”
- **8:30 a.m.**: “Look for winds to 160 mph…very dangerous situation setting up for New Orleans and Mobile…storm surge heights of 15-20 ft. above normal are likely. Surge heights of this magnitude could inundate a large section of eastern New Orleans…winds of 70 to 80 mph will occur inland to Jackson and Montgomery…”
- **11 a.m.**: “Catastrophic damage now appears likely from New Orleans east through the Mississippi coast…complete destruction of most beachside structures with extensive damage inland, as well…surge heights of 18-25 ft….”
- **2:30 p.m.**: “swelling water in Lake Pontchartrain will eclipse the levee system and fill into the northern and eastern sections of New Orleans…”
- **5:30 p.m.**: Special Forecast of the Economic and Sociological Effects of Hurricane Katrina. “Due to the large size of the hurricane, sustained 100 mph wind speeds will likely occur as far north as Interstate 20 from Jackson to where it crosses the Alabama border to near Pensacola…Serious damage will occur in these areas including widespread power failures and flooding…Loss of life in Katrina will be much higher than in Andrew and may be higher, perhaps significantly so, than in Camille. Major loss of life is possible if the eye goes over New Orleans, due to the below sea level elevation…On this path and at this intensity, total damage may well exceed $50 billion…the Port of New Orleans will be affected by this storm, including the ports through which much of the United State's imported oil flows...The Port of Mobile will also experience damage due to wind and surge.”

In addition, WeatherData’s meteorologists developed many special, customized products for our clients and participated in conference calls with a number of them.

Meteorologists are often reluctant to make these types of forecasts for fear of looking foolish if the forecast does not pan out. However, we believe our clients pay us to make the “tough calls” and provide our best professional opinions.
The Hurricane Katrina Economic and Sociological Effects Forecast was sent to WeatherData clients on August 28, 2005, to help them ascertain the impact of Hurricane Katrina. This tool proved valuable in helping clients such as insurance companies and railways plan for not only the areas that were going to be directly affected, but also the chain reactions of this catastrophic event that affected nearly every business and enterprise.
Case Study Regarding the National Weather Service’s Performance During Hurricane Katrina

Our colleagues at the National Weather Service’s National Hurricane Center (NHC) did a fine job with the meteorology of Katrina. However, we have some concerns about the ways in which they communicated that information.

The Commercial Weather Services’ Association (an industry group, WeatherData is a member) has assembled a timeline that raises a number of important questions about NWS performance:

- **Friday, August 26, 5 p.m.:** National Weather Service local forecast for New Orleans Monday called for “decreasing clouds. Isolated thunderstorms. Very windy. Highs in the lower 90’s. Chance of thunderstorms 20 percent.” At the same time, NHC’s forecast graphic shows the path of Katrina to be about 60 miles east of New Orleans. Why the huge discrepancy between NHC and the local office?

- **Friday evening, 10 p.m.:** The local New Orleans forecast (as people were turning in for the night) was unchanged even as NHC moved their forecast path closer to New Orleans.

- **Saturday, August 27, 10 a.m.:** The first hurricane watch (not warning) is issued for southeast Louisiana, but does not include Mississippi or Alabama. While there has been criticism of local officials about the voluntary (as opposed to mandatory) evacuation at this time, the fact is there was no NWS hurricane warning in effect.

- **Saturday, August 27, 4 p.m.:** The National Weather Service’s “Probabilities for Guidance in Hurricane Protection Planning by Government and Disaster Officials” product (more commonly called “strike probabilities”) was only predicting a 21% chance of the eye coming within 65 miles of New Orleans. This was inconsistent with the NHC track forecast and the 21% value was lower than the values for 2004’s Hurricane Ivan, which missed New Orleans and struck eastern Alabama and western Florida. There was an evacuation for New Orleans because of Ivan. While there has been justified criticism of local officials, it must be stressed that strike probabilities for Katrina that were lower than a recent hurricane that missed New Orleans hardly reinforced the urgency of the situation.

- **According to multiple press reports, “around dinner time” NHC director Max Mayfield “made a round of phone calls to top state and local officials” including the Mayor of New Orleans. He wanted to impress on them the severity of what was about the happen – and to “be able to go to sleep that night knowing that he’d done everything in his power to save lives.” He is quoted as telling New Orleans Mayor Nagin “this was the worst hurricane he had ever seen and that public officials should do everything in their power to get people out of the way.” **

While the intent of Mr. Mayfield is commendable, why didn’t NHC’s products for the public reflect this urgency? There were still no hurricane warnings. The “strike probability” for New Orleans was still 21% – hardly a number that reinforced that a catastrophe was about to occur. In fact, at the same point in the life of Hurricane Ivan (which missed New Orleans) the strike probability was higher, 23%.

The National Weather Service has had, for most of its existence, an unfortunate culture where certain entities are given preferential treatment. Phone calls to selected people and entities seem to be part of that culture.
WeatherData’s stance: If the National Weather Service believes a dangerous situation exists, their products (all, not just some) should reflect that danger. Telephoning certain selected individuals is counterproductive when people are in (literally) mortal danger and need information to protect their lives, as well as property.

• **Saturday, August 28, 10 p.m.:** The first NWS hurricane warnings are issued… well after dark, and after some have retired for the night.

We also have very serious concerns about a new National Weather Service policy regarding the deliberate issuance of false tornado warnings during hurricanes.

In 2004, Hurricane Charley brought 100+ mph winds to Orlando, killing four and causing extensive damage. The local National Weather Service issued a tornado warning for the hurricane-force winds, even though there was no tornado predicted to occur. This practice received the blessing of the National Weather Service hierarchy and was the subject of a favorable article in the *Bulletin of the American Meteorological Society, July, 2005, Page 1049.*

As Katrina progressed toward the coast, the National Weather Service issued literally hundreds of warnings and other products…so many, it was often difficult to keep up with all of them.

Small tornadoes often occur with hurricanes. These can be detected by radar and warned of in the conventional way. Yet, under the new policy, as Katrina moved toward Louisiana and Mississippi, the local National Weather Service issued multiple tornado warnings even though no specific tornado threat existed. Two of these warnings have been reproduced. (see sidebars)

Note that neither of these are being issued for a tornado, rather the hurricane’s eyewall winds, which are not the same thing. Only this time, in contrast to Orlando, which is inland, there was a 30 ft. storm surge – a giant wall of water, moving toward the tornado warning area. “Seek shelter on the lowest floor of the building…” is a formula for disaster when a wall of water is approaching! How many people heeded this advice and were swept up by the storm surge? The answer can never be known and perhaps the number is zero. But the idea of knowingly issuing false tornado warnings is an extremely bad one in our opinion. Meteorology has enough credibility problems without this.
The National Weather Service justifies this policy to “cut through the clutter” of the barrage of messages they issue during hurricanes. Of course, the obvious solution is to 1) Cut out unnecessary messages, and 2) Create an urgent "Inland Hurricane Wind Warning" or "Inland Hurricane Eyewall Wind Warning." We urge the National Weather Service to make this change in policy as quickly as possible.

We believe this highlights one of the most important services we offer to our clients: Pertinent, concise information without generating “information overload.” We never issue information we know to be false. WeatherData works for its clients and produces information tailored to their business requirements. This has proven far more effective than having to try to “play meteorologist” and attempt to interpret NWS products (intended for the public-at-large) into their business context.

Lessons Learned

Business Continuity – From The Wall Street Journal September 9:

Before the storm hit, Oreck had transferred its computer systems and call-center operations to backup locations in Colorado. If New Orleans got hit, Mr. Oreck’s plan was to move the corporate offices to Long Beach, MS. If Long Beach got hit, production, distribution and the call center operations would go to New Orleans. He never thought both sites would get hammered.

Based on subsequent press reports, Oreck is doing relatively well compared to most coastal businesses in the path of Katrina. When choosing a backup site, it is important to choose locations that are strategically situated so they are not knocked out in the same storm. Preferably, they should be in climatologically different parts of the Nation (i.e., do not locate all sites in the earthquake zone of southern California: locate them far enough apart so the same blizzard does not shut them down, etc.). In other words, put your eggs in different climatological baskets. At WeatherData, we can assist you with the climatological component of site selection.

WeatherData helps establish customized solutions for weather risk needs to ensure that weather hazards will have minimal effects on a company and its’ facilities.

Global Warming

Although there have been innumerable reports tying Katrina and Rita to “global warming”, the data compiled shows there is no correlation between
world temperatures and intense hurricanes striking the United States. The extreme damage we are experiencing with recent hurricanes is directly tied to the explosion of population in coastal counties along the Atlantic and Gulf Coasts. If you put people, houses and businesses more in the path of a destructive storm, more damage will result.

The accompanying table charts the frequency of both hurricanes and intense hurricanes (Category 3 or higher):

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Average Per Decade: 7.1 4.7 4.6 1.2 0.2 17.7 8.0
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* Only the highest Saffir-Simpson Category to affect the U.S. has been used.

Meteorologists have known for decades (long before the term “global warming” was coined) there is a 25 to 40 year cycle of hurricanes in the Atlantic Basin (Atlantic Ocean, Caribbean Sea and Gulf of Mexico). As the table indicates, hurricanes have been less frequent as global temperatures have risen in the 80’s and 90’s. In the 1980’s, Dr. Bill Gray of Colorado State University, one of the nations leading hurricane researchers, forecast higher numbers and intensities of hurricanes in the 90’s and first decade of the 2000’s.

Whether a correlation between global weather and hurricanes exists or not is the “wrong question” for business continuity. Our opinion is that far too much time is being spent worrying about the effects/consequences of global warming and far too little is spent planning for extreme weather, regardless of the cause.
Effective, pro-active planning is the only course of action that businesses can follow to minimize the effects of extreme weather.

In Conclusion

When you are responsible for contingency planning, consider the following analogies: You would not go to court without an expert attorney. You would not attempt do-it-yourself cancer surgery after consulting WebMD®. When serious natural hazards threaten your enterprise, you need expert advice and consultation. Regardless of whether it is a hurricane, blizzard, ice storm or tornado, WeatherData can assist with the planning and information needed to make critical decisions for specific operations at specific sites. We take the guesswork out of decision-making as it applies to the risks related to extreme weather.

About WeatherData, Incorporated

Since 1981, WeatherData has partnered with Fortune 500 companies in proactively managing the risks and opportunities associated with high-impact weather and natural hazards. Through an innovative blend of research, communication services and technology, WeatherData provides User-Centric™ services—information tailored to the specific requirements of an organization combined with unique geographic precision.
Last year during Hurricane Charley, nearly 1,400 miles were warned. Miles struck: 197.

In all, hundreds of thousands of people fled their homes, shuttered their businesses and prepared for the worst.

But the alerts were false alarms.

For years, forecasters at the [NOAA National Weather Service’s] Hurricane Center have posted widespread warnings to cover their uncertainties, triggering multimillion-dollar evacuations and the mass closings of schools, companies and governments.

In nearly half of the 29 hurricanes that struck the United States since Hurricane Andrew in 1992, The Herald found, three-quarters of the warning areas per storm were ultimately left untouched by hurricane winds.

...at private companies, meteorologists say they carefully weigh the probability of a storm striking in the warning area against the costs of closing businesses.

As Hurricane Charley bore down on Florida in 2004, Blue Cross and Blue Shield’s Risk Management Director John Phelps had to decide whether to recommend closing the company’s Jacksonville offices, which would have cost $180,000 in lost labor -- every hour. At the same time, the safety of roughly 6,500 employees was at stake.

The private weather service WeatherData, in Wichita, Kan., told Phelps that Hurricane Charley’s strongest winds would not strike Jacksonville, even though the Hurricane Center had put Northeast Florida under a warning.

"Had we not had the WeatherData forecast," Phelps said, "we would have closed."

Excerpts from the Miami Herald
Tuesday, October 11, 2005