



## **Out of the Storm:**

**Confronting America's Catastrophic Risk Crisis**

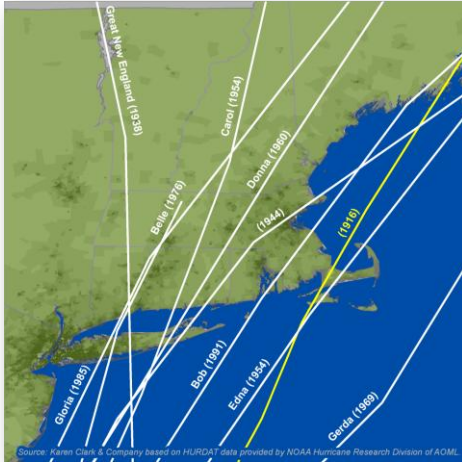
**Modeling Perspectives**

**September 19, 2008**

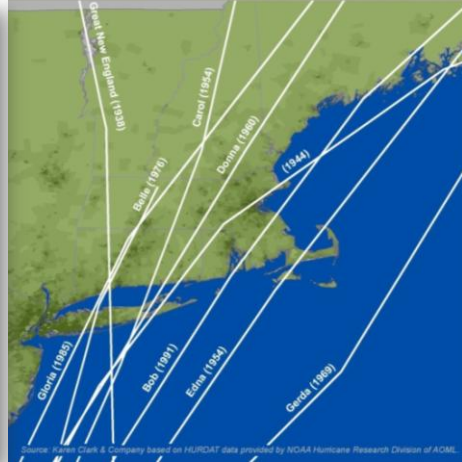
## **Catastrophe Models Provide Uncertain Estimates Not Answers**

- **Catastrophe models are approximations of reality based on many simplifying assumptions**
- **Lack of scientific data and information means there is a high degree of uncertainty around the model assumptions**
- **Model loss estimates are highly sensitive to even small changes in assumptions**
- **Equally valid assumptions can give widely divergent results**

## What is the Frequency of a Northeast Hurricane?



January 2008



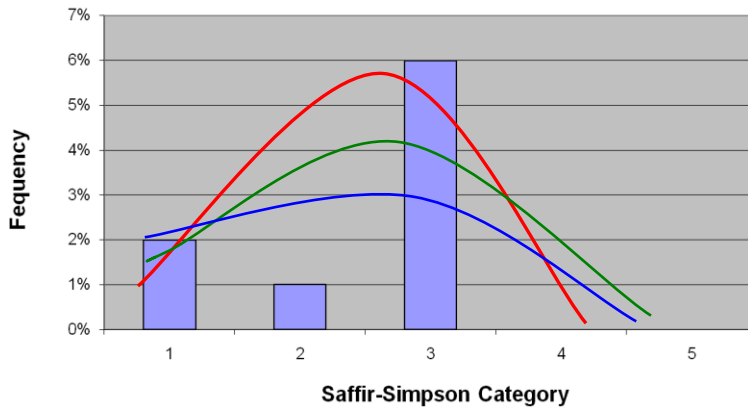
February 2008

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## Modeling the Intensity of Northeast Hurricanes

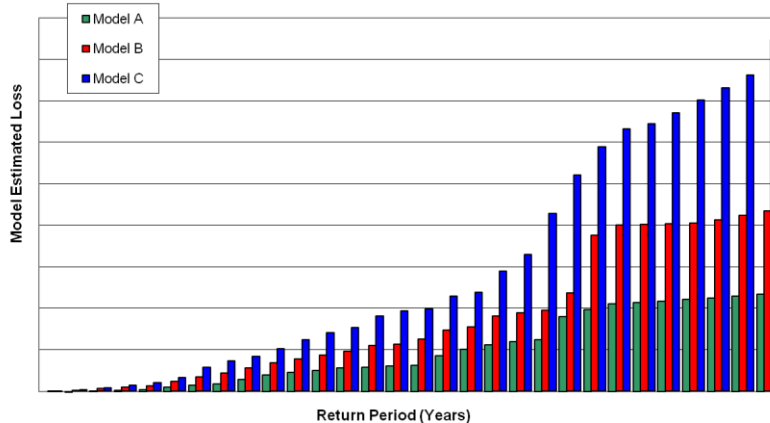


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## Different Assumptions Result in Very Different Loss Estimates



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## After 10 Years, Hurricane Andrew Gains Strength

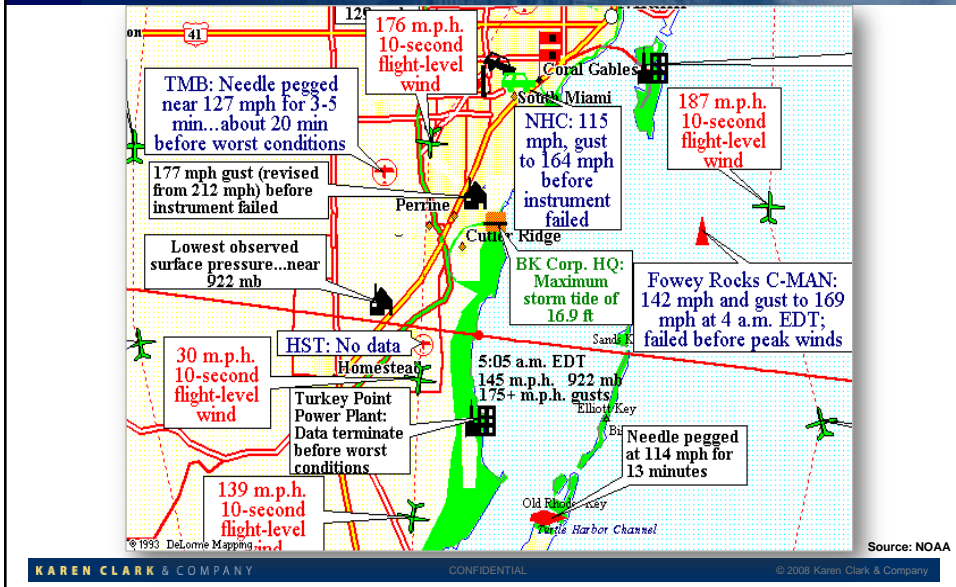
- August 21, 2002 — NOAA scientists announced Hurricane Andrew was even stronger than originally believed when it made landfall in south Florida 10 years ago. Based on new research, scientists upgraded the storm from a Category 4 to a Category 5, the highest on the Saffir-Simpson Hurricane Scale
- In their re-analysis of Hurricane Andrew's maximum sustained surface-wind speeds, the NOAA/National Hurricane Center Best Track Committee, a team of hurricane experts, concluded winds were 165 mph — 20 mph faster than earlier estimated
- One NOAA scientist issued a statement disagreeing with the decision, documenting his belief that Andrew's wind speeds never exceeded Category 4 levels when over land. He also noted the high uncertainty in Andrew's wind speed estimates (+/- 30 mph).

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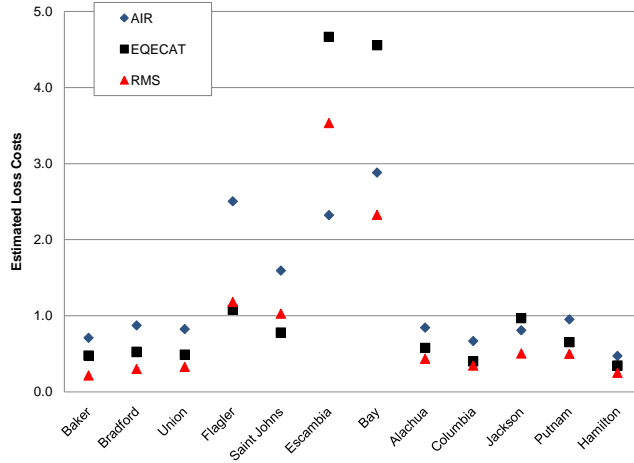
## Actual Observations for Hurricane Andrew in Miami-Dade County



## Meteorologists Don't Know the Maximum Wind Speeds for Most Hurricanes — Particularly Over Land

- Wind measuring equipment is not uniformly installed along the coast
- Anemometers often fail before peak winds are measured due to power outages and other problems
- Available wind measurements are subject to significant error and frequently must be translated to a common basis—averaging time and terrain characteristics
- Peak winds are frequently inferred from other information, introducing more uncertainty
- "There is always some uncertainty in determining the maximum winds in a hurricane," said Max Mayfield, former director of the National Hurricane Center

# Long Term Hurricane Model Loss Costs for Florida



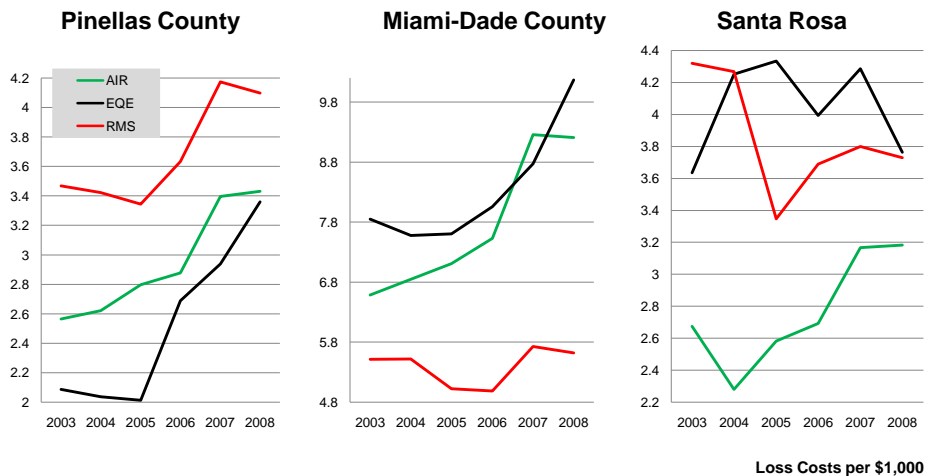
Source: Florida Commission on Hurricane Loss Projection Methodology – 2007 Model Submissions

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# Year to Year Changes in Hurricane Model Loss Costs



Source: Florida Commission on Hurricane Loss Projection Methodology – 2003 to 2008 Model Submissions

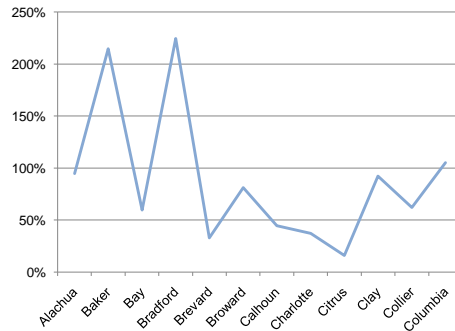
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## Comparison for Florida Hurricane Model ZIP Code Results

- Differences between lowest ZIP code loss cost in a county can exceed 200%
- Typical difference in excess of 50%
- Outside of Florida these differences are magnified



Source: Florida Commission on Hurricane Loss Projection Methodology – 2008 Model Submissions

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## Facts About Catastrophe Risk

- There is limited scientific data on catastrophes
- What scientists don't know is at least as much as they do know
- This scientific "unknowledge" means the models are based on many assumptions characterized by a high degree of uncertainty
- More detail does not necessarily mean more accuracy
- Portfolio optimization the way it is currently being implemented at many companies leads to portfolios optimized to the model biases

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According to George Box (of Box-Jenkins fame)

**“Essentially, all models are wrong,  
but some are useful.”**

## Standards and Best Practices for Effective and Efficient Catastrophe Risk Management

- Catastrophe models are one component of the risk assessment and management process
- Senior management develops an independent, a priori view of catastrophe loss potential based on other information
- Catastrophe model results are dissected, fully vetted and tested for credibility
- Catastrophe model results are combined with other independent information, actuarial and underwriting analyses
- Reliable, robust risk management decisions are made

## Karen Clark & Company

- **Developing consistent standards around the use of catastrophe models and techniques for holistic risk management**
- **Working with leading companies to implement best practices and robust risk management strategies**
- **Delivering tools and consulting services that enhance catastrophe risk transparency and risk management**