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A Modeler's Perspective on Loss Normalization and Mitigation

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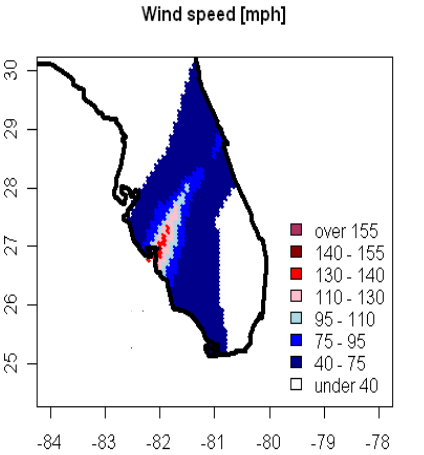
The Study of Historical Cat Events

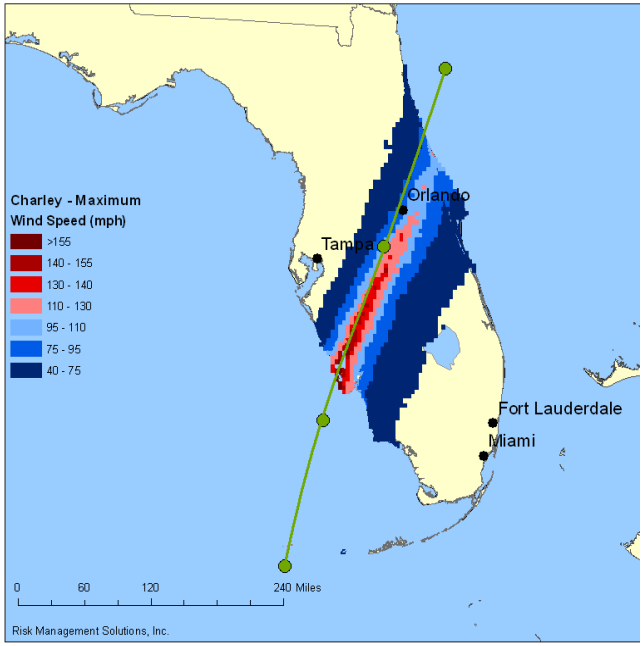
"Human history becomes more and more a race between education and catastrophe." H.G. Wells

Where do normalization methods fit in?

- Normalization is a tool at a modeler's disposal to validate a modeled loss
- Model validation is classified into two broad categories:
  1. Component-level validation (e.g., 2004 HU Charley wind field)



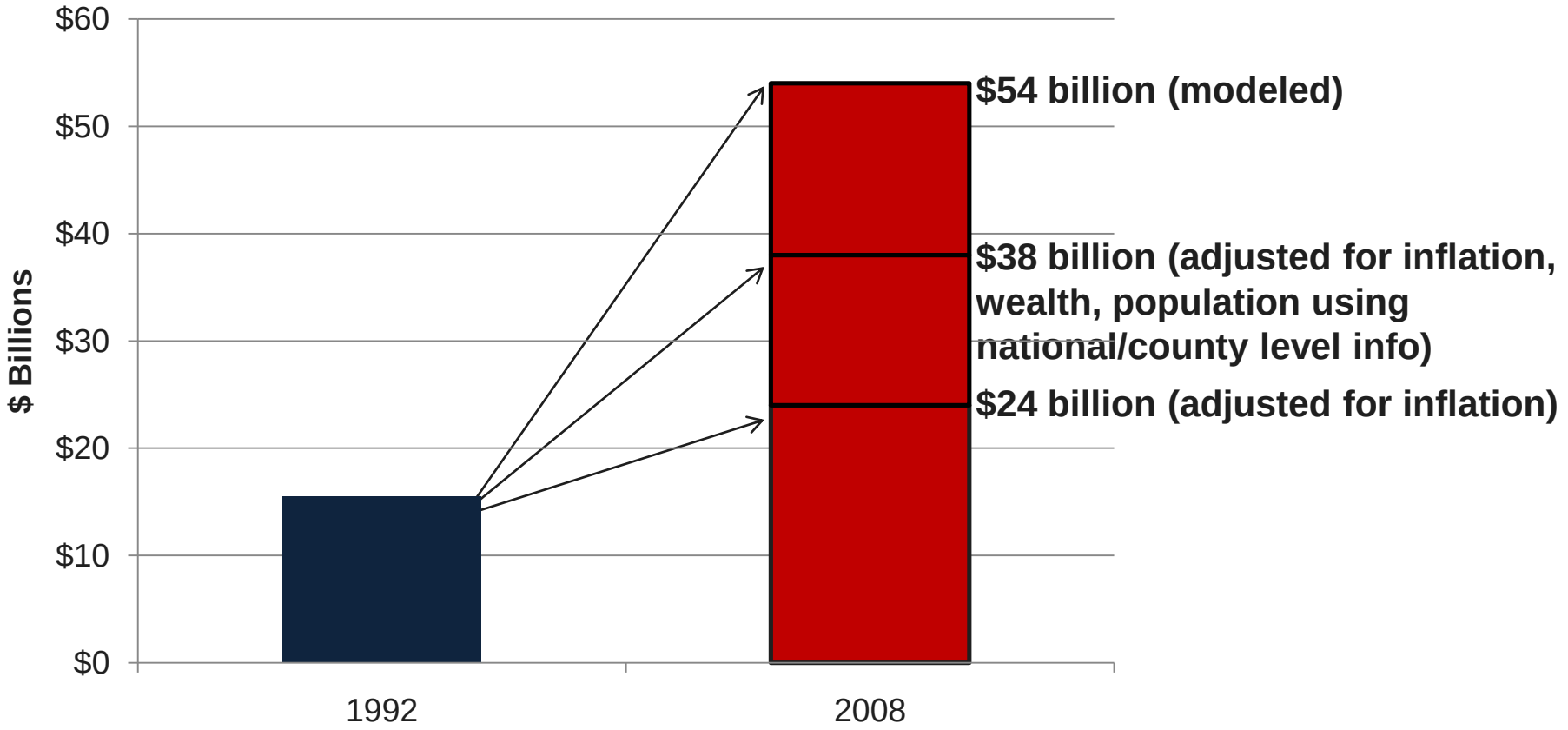
http://www.aoml.noaa.gov/hrd/Storm_pages/charley2004/



  2. Loss (or results) validation
     - Company portfolio
     - ➢ **Industry-wide**

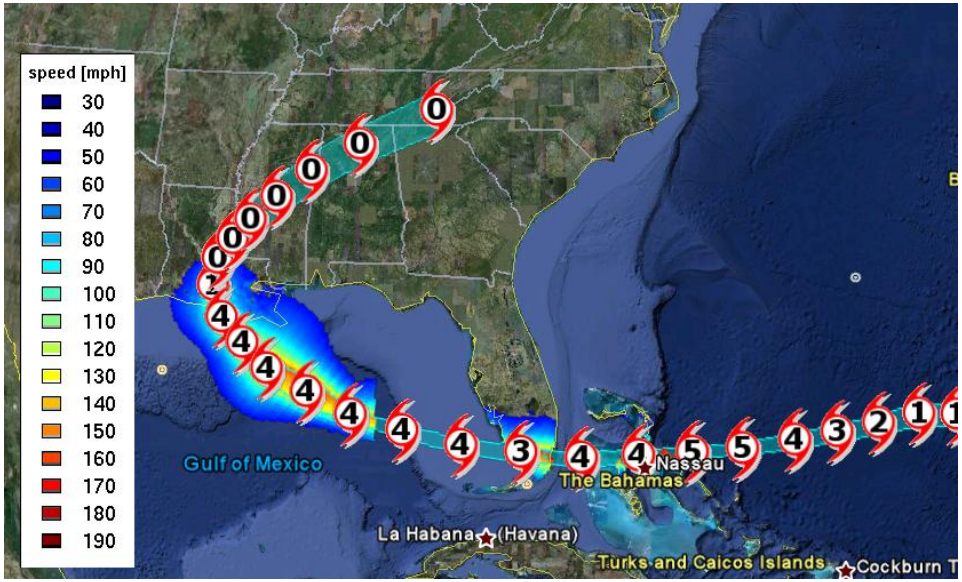
The Example of Hurricane Andrew

In 1992, Hurricane Andrew caused $15.5 billion in insured losses (according to PCS)



Loss in Translation

- Must ensure observed and modeled losses compared across the same exposure and time basis
- Using best estimate of footprint, either:
  - Go backward in time (adjust vulnerability/ exposure/ insurance coverages to time of event)
  - Bring forward in time (convert to equivalent losses for today's environment and exposure)



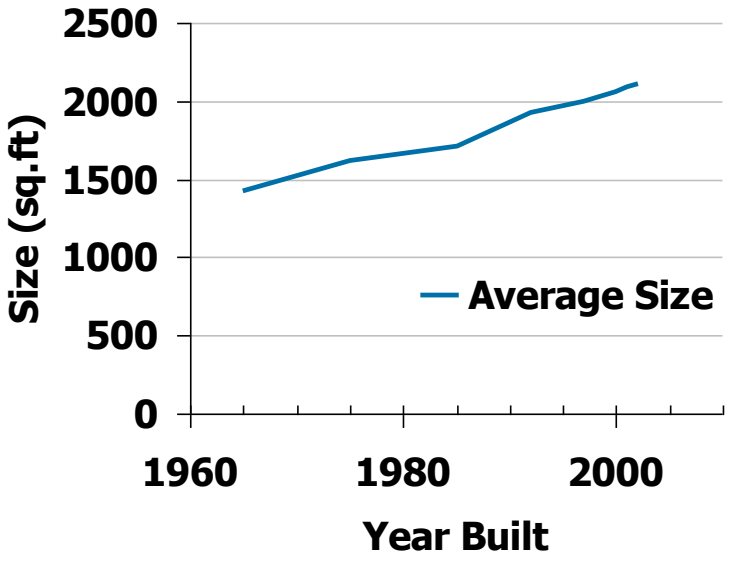
Track and wind field of Hurricane Andrew

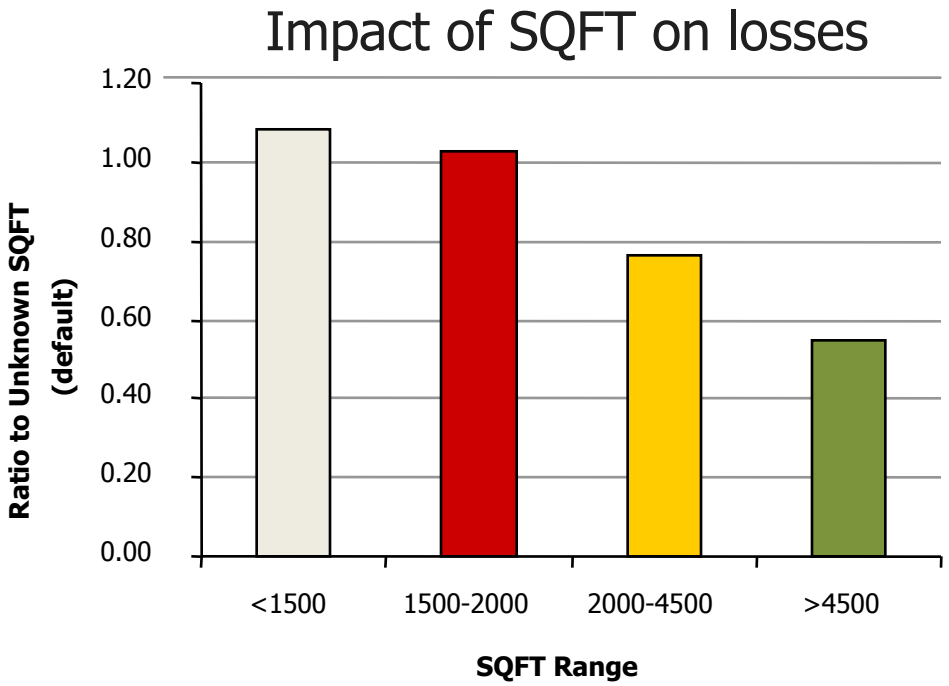
Limitations of Normalization Methods

- Granularity of data to develop factors (county vs. state vs. national)
- Changes in vulnerability of building stock
  - Not homogeneous across regions
  - As a result of building codes and practices over time
- Other changes triggered by a catastrophe
  - Modifications in insurance industry practices either due to litigation (wind vs. water) or regulations
  - New resilience or continued degradation of infrastructure

Size does matter…

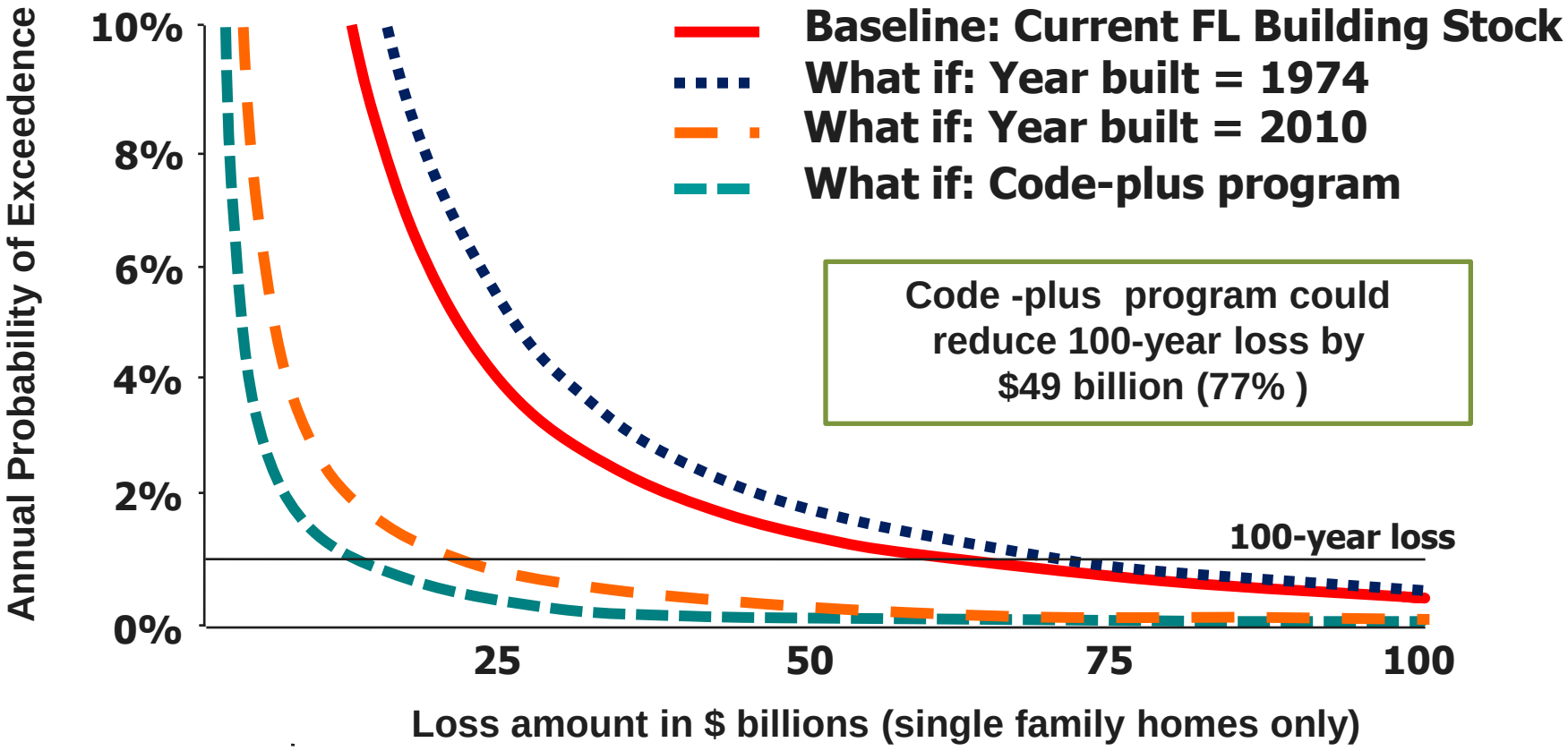
- RMS analyses have shown that larger homes tend to be less vulnerable to damage than smaller homes
- Size of homes (in square feet – SQFT) has been changing over the last 40 years; these exposure changes, coupled with changes in vulnerability, can lead to errors in normalization.





How Much can Mitigation Help?

- 60% of the current residential Florida building stock built between 1940 and 1994 (i.e., building code changes following HU Andrew)



Reconstruction versus Normalization

- Uncertainty in loss estimates (both modeled or normalized) increases the further back in time one goes (mainly tied to lack of data)
- Inaccuracies in normalized loss estimates will increase as one moves forward in time – if one does not take into consideration changes in vulnerability
- One should expect the difference between a normalized loss and a modeled loss to be at its minimum where the building stock is not changing (or changing slowly) over time
- Overall, reconstruction of cat losses is more reliable than the normalization of catastrophe losses (though admittedly more difficult)