


MANAGING EXTREMES

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TAIL ESTIMATION USING DETERMINISTIC METHODS

Maximum Foreseeable Loss (MFL) For
Severe Thunder Storm Tail Loss Estimates



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Outline

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- Commercial probabilistic models
- Deterministic methods for tail loss estimates
- Maximum Foreseeable Loss (MFL) model
- Case study

Commercial Probabilistic Severe Thunder Storm Models

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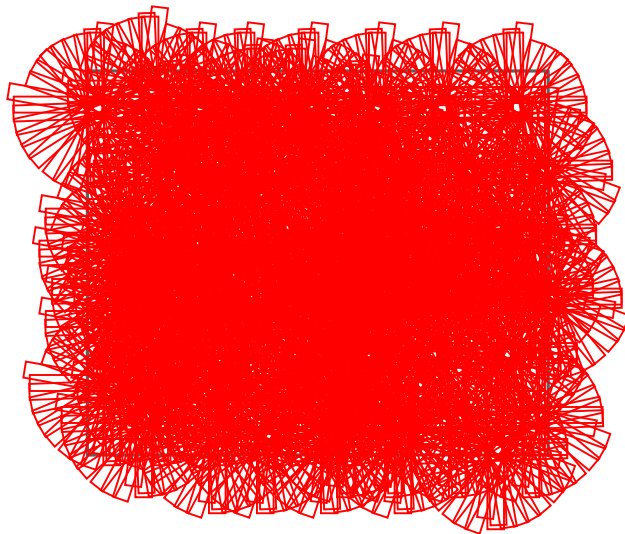
- Typically optimized for industry portfolios
 - Sample storm paths based on industry exposure
 - High probability of model failure for any given company
- Event set size and model resolution are critical for stable model
 - A very large number of events (e.g., 500,000)
 - An insufficient number of events can lead to over or under estimating the tail risk
 - High-resolution definition of tornado paths and other hazard footprints are important

The Importance Of Event Set Size & Resolution

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- It is impractical to achieve loss convergence for all severe thunder storm business applications using a physical, event-based model in today's computing environment



Illustrative Calculations

Average size of a Path	0.5mi width and 5mi length
Average size of a county	50x50mi
<i>Min. Number of Paths Required to fully Cover a County</i>	1,000
Num. of tornado severity scenarios	5
Num. of possible orientations of the path to be modeled	18
Total Num. of Scenarios for a County	90,000
Number of counties in tornado alley	1,500
Total Number of Paths need to be Modeled	135,000,000
Avg. number of paths in a thunderstorm outbreak	20
Total Number of Thunderstorm Outbreaks to be Modeled	6,750,000

Deterministic Methods For Tail Loss Estimates

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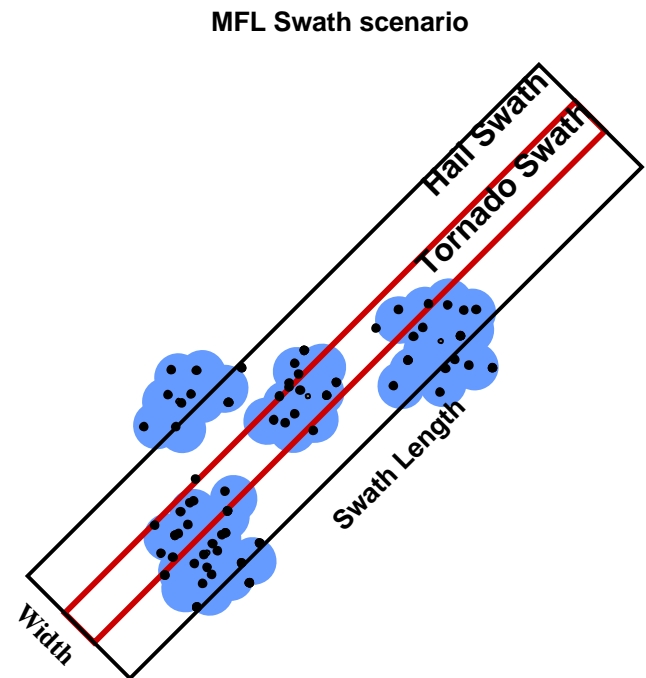
- Probability and possibility
- Large event set with no gaps in coverage
- High-severity events
- “What if” scenarios
- Top loss scenarios are similar to 1:1,000 to 1:10,000 events

Maximum Foreseeable Loss (MFL) Model

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- Exhaustive set of high-severity events, centered specifically on a portfolio
 - ~1 million events can be built specifically for a company's portfolio (no coverage gaps)
 - Street-level property address information is critical
 - Tornado, hail, or wind swaths independently or together
 - Damage curves for appropriate lines of business



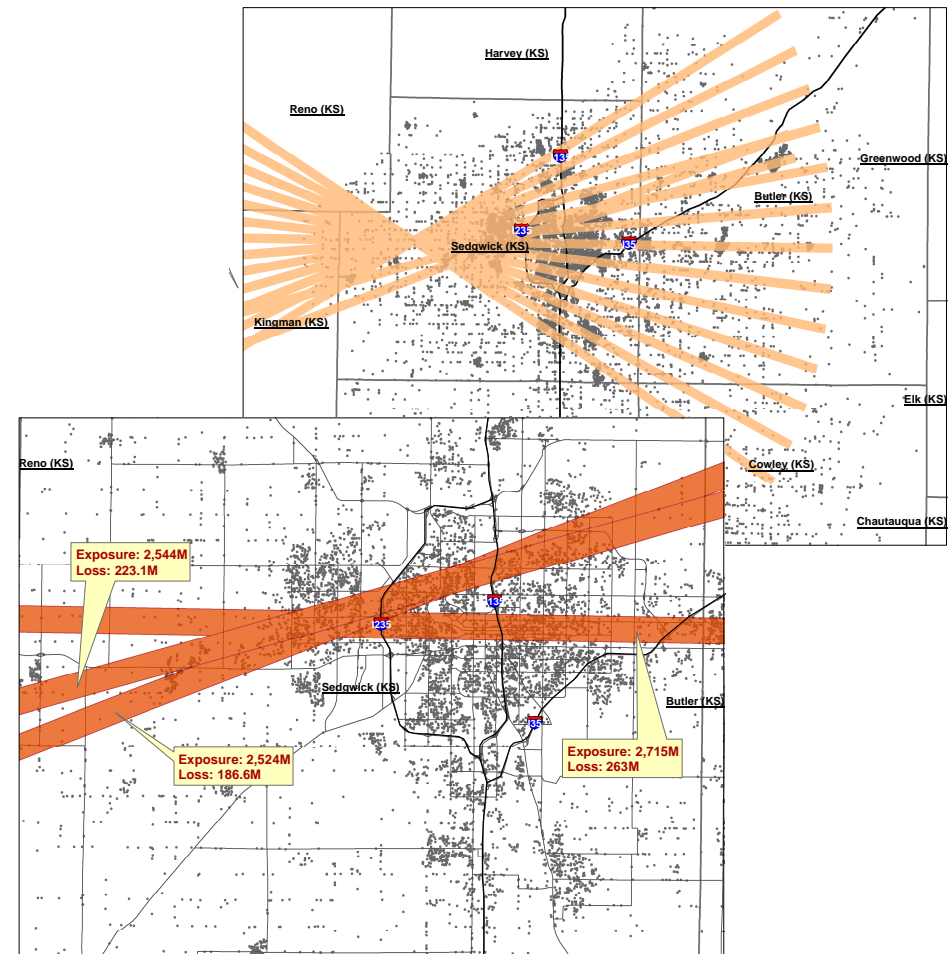
Case Study- F4 Tornado Scenario

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- A storm producing a single “mile-wide” F4 tornado and severe hail – Not the Worst Case
- Winds and damage within the track based on detailed tornado research
- 61,000 high-end severe thunderstorm tracks
- Top loss scenarios are similar to 1:1,000 to 1:10,000 events

Examples of deterministic MFL tracks



Case Study Results

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- F4 storm scenarios are 15% to 35% higher than the model 1:10,000 year loss

Probabilistic model results for study region/exposure

Study region loss results		
Return Period	Loss in million USD	
	AEP	OEP
10,000	\$ 145	\$ 139
1,000	\$ 104	\$ 97
250	\$ 63	\$ 56
100	\$ 43	\$ 39

F4 Scenario Summary Statistics (% of total)

- 21,000 scenarios >\$65m (34%)
- 7,100 scenarios >\$100m (12%)
- 2,500 scenarios > \$145m (4%)

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