



CAS Seminar on Reinsurance

Meeting the Future Head
On - Responding to Events
in Real Time and Upcoming
Model Updates

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June 4, 2019



Real-Time Event Response

Hazard HQ

Hazard HQ

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OVERVIEW

RECENT EVENTS

CAT INSIGHTS

FAQ

ARCHIVE

2018: A Year in Hazards



2018 Natural Hazard Report

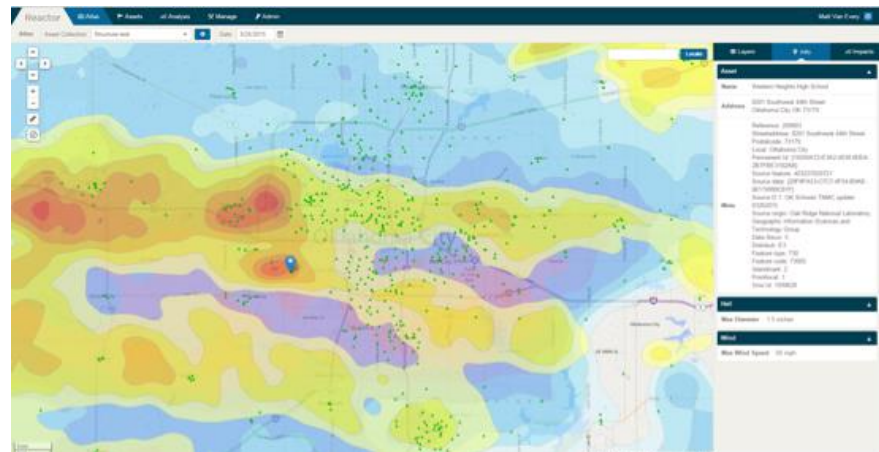
11 events exceeded \$1 billion in losses in 2018. Wildfires scorched the West Coast of the United States; Hurricane Michael and Florence battered the Gulf and East Coast.

In this report, CoreLogic® takes stock of 2018's events to protect homeowners and businesses from the financial devastation that often follows catastrophe. No one can stop a hurricane in its tracks or steady the ground from an earthquake, but with more information and an understanding of the risk, recovery can be accelerated and resiliency can be attained. earthquake in recorded history.

CoreLogic Event Response

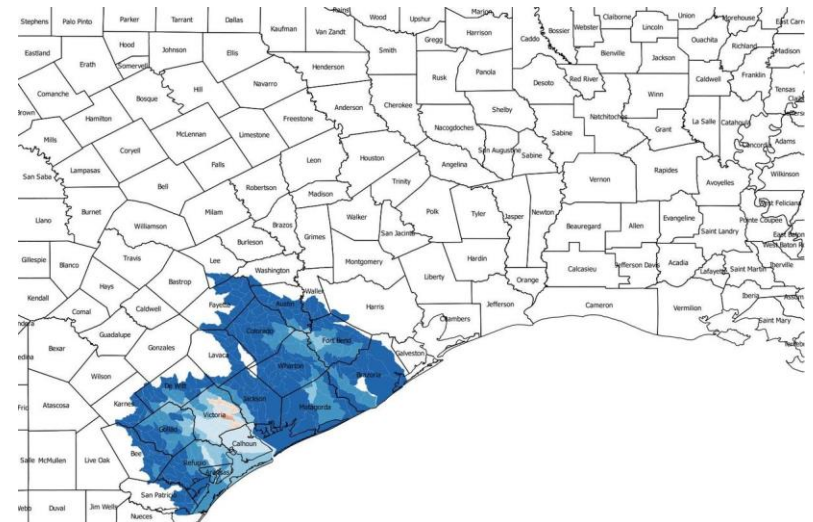
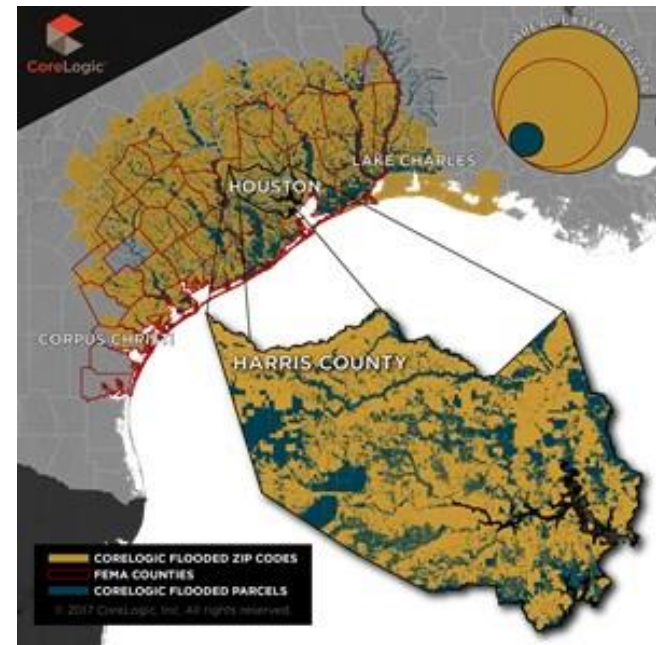
Hazard HQ

- Pre-landfall proxies for major TC events
- Webinars for major events as they unfold
- Proxies post major events to allow clients to estimate portfolio losses
- Event footprints for integration into RQE
- A number of additional services are available for North American events:
 - Reactor, which provides rapid visualization of weather event impacts (hail, wind, flood) on a portfolio
 - Property Valuation (Reconstruction & Market), Open Liens, Equity, Foreclosure, Ownership
 - Property Characteristics



Hurricane Harvey (2017)

- CoreLogic (Aug. 31, 2017) estimates
 - Total residential insured and uninsured flood loss: **\$25 - \$37 billion**
 - NFIP loss: **\$6 - \$9 billion**
- Current modeled NFIP loss (RQE v18) **\$9.1 billion**
- To date, NFIP has paid claims of **\$8.9 billion***
- Approximately 70% of flood damage is uninsured
- More than 50% of properties in Houston at high and moderate risk of flood are not in designated flood zones



* <https://www.fema.gov/significant-flood-events>

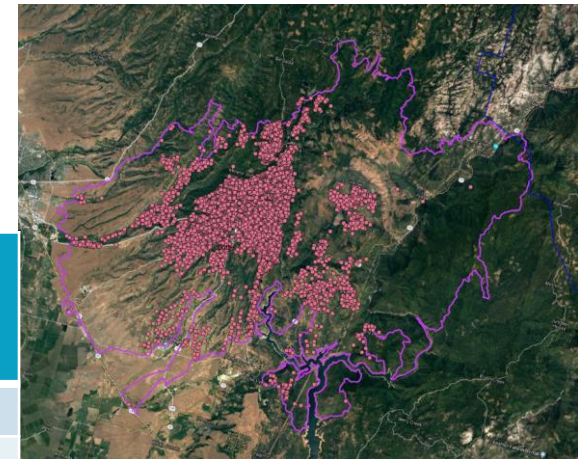
California Wildfires (2018)

Camp Fire Analysis based on the perimeter released on Nov. 15, 2018:

Wildfire Perimeter	Number of Structures at High or Extreme Risk	Reconstruction Cost Value (RCV)
Within the Perimeter	16,344	\$ 3,935,833,947
0 to 0.5 Miles Outside the Perimeter	2,114	\$ 438,626,530
0.5 to 1 Mile Outside the Perimeter	1,359	\$ 287,346,084

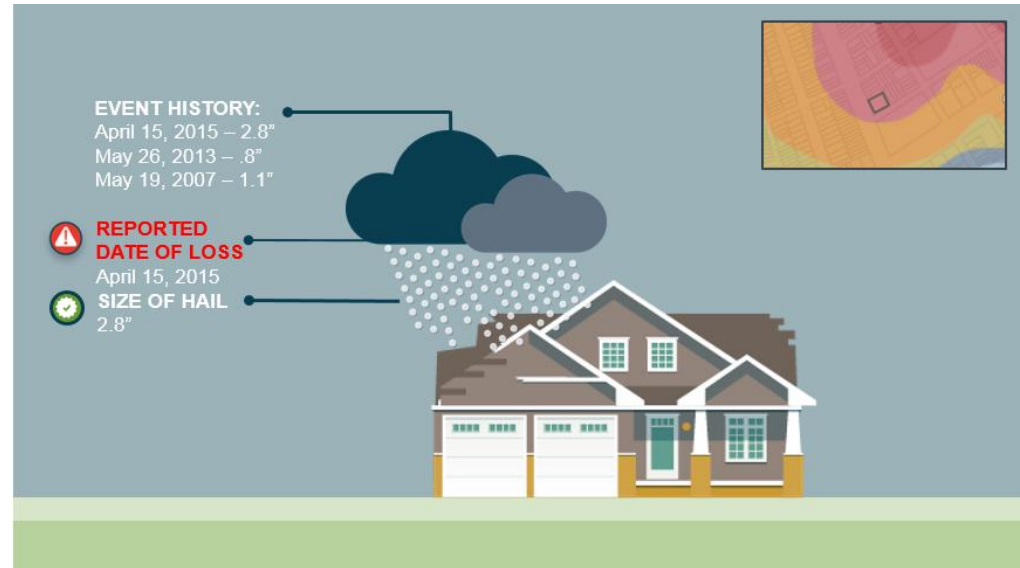
CoreLogic loss estimates (Nov. 27, 2018):

	Residential Loss \$ Billions	Commercial Loss \$ Billions	Total Loss \$ Billions
Camp Fire	\$ 8 - 9	\$ 3 - 4	\$ 11 - 13
Woolsey Fire	\$ 3.5 - 5.5	\$~0.5	\$ 4 - 6
Total	\$ 11.5 - 14.5	\$ 3.5 - 4.5	\$ 15 - 19

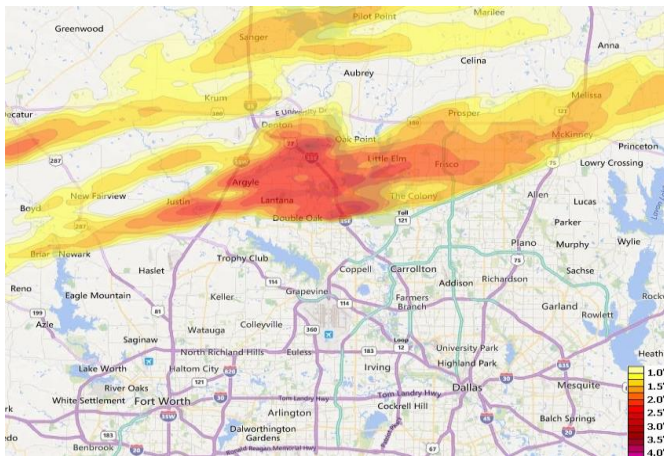


SCS Real-Time Event Management

- Allows users to import real-time SCS event data into RQE to access the **loss impacts for live events**
- High-resolution modeling based on CoreLogic's proprietary radar-based **weather forensic algorithms**



Forensic Hail Verification Model

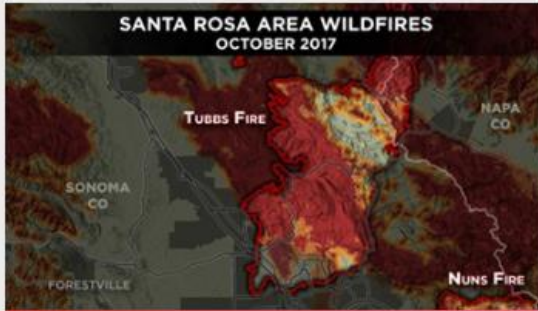


Source: CoreLogic's Reactor Product

◆ What's in it for you?

- Claims management process
- Capital outlays
- Quick access to loss impacts on the business and enable timely reporting to users groups and personas

Webinars



CALIFORNIA WILDFIRES: A WAY FORWARD

In this webinar, CoreLogic hazard experts take a look back at the catastrophic 2017 California wildfires and a look forward along the road to recovery. This was recorded on October 24, 2018.

Contact your Account Executive or email hazardrisk@corelogic.com for the password to view.

[LEARN MORE >](#)

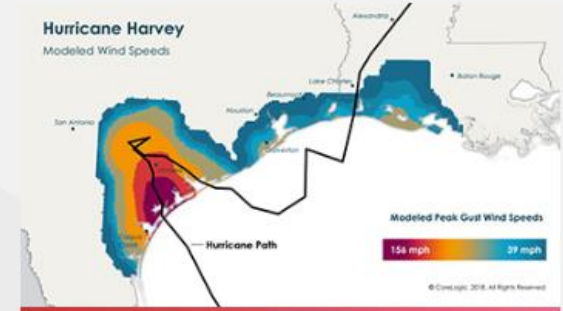


THE VALUE OF THE COST APPROACH

Experts from CoreLogic share insights about the importance of the Cost Approach and how it leads to more accurate valuations. This webinar was recorded on September 18, 2018.

Contact your Account Executive or email hazardrisk@corelogic.com for the password to view.

[LEARN MORE >](#)



HURRICANE HARVEY: ONE YEAR LATER

On August 25, 2017, Hurricane Harvey made landfall off the coast of Texas as a Category 4 hurricane. One year later, and CoreLogic will unpack what happened and how we can learn from it. This webinar was recorded on August 30, 2018.

Contact your Account Executive or email hazardrisk@corelogic.com for the password to view.

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Latest U.S. Model Updates

Wildfire

Flood

SCS

Attritional Catastrophe Models

High frequency models require higher granularity

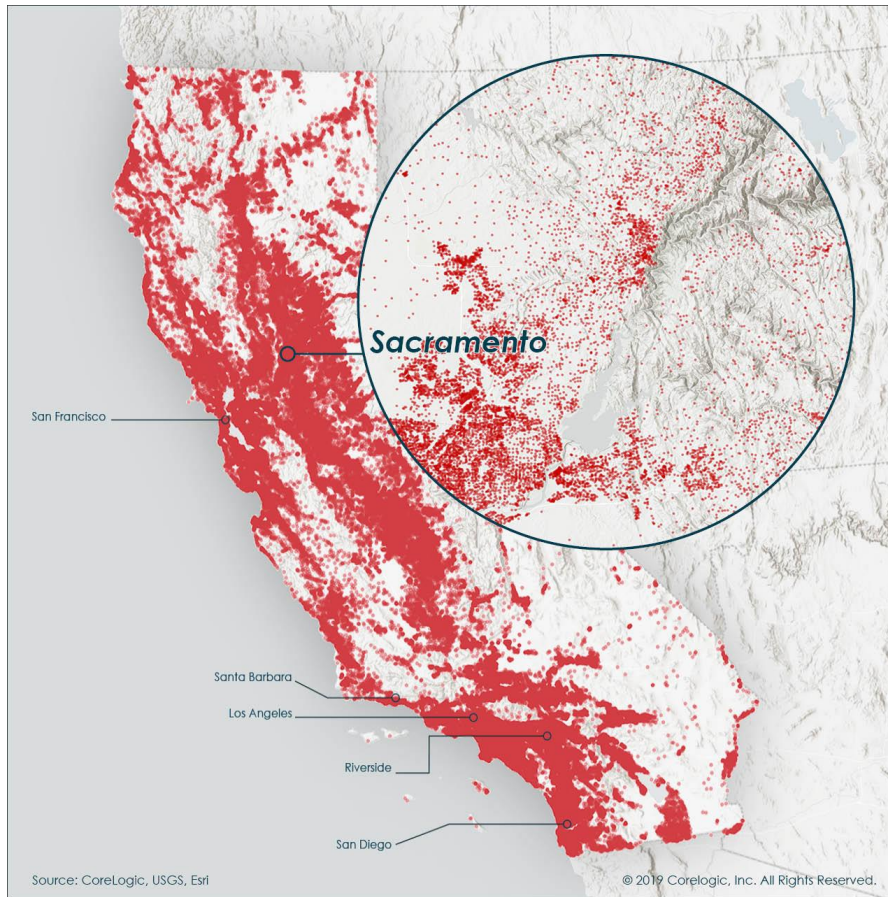
- Hurricanes and earthquakes are big and infrequent
 - Single digit occurrences per year, large affected areas
- Wildfire, floods, and severe convective storms
 - High frequency (hundreds to thousands of events per year)
 - Large areas but high-gradient <granular> hazard
 - Have the potential to cause great regional losses
 - Need to identify “worst-case” for a portfolio requires granular simulation model (high event count)
- Risk management for attritional perils
 - Improved management with better models

Wildfire Risk Management

- Urban Concentrations
 - Urban concentrations outside the Wildland-Urban Interface (WUI) contribute greatly to the observed severity and frequency of loss we have been seeing
- Risk Zones
 - Rational risk accumulation zones can be developed to prioritize and manage regional risk exposure

Using a Model to Estimate Risk

A Granular and Relevant Test Portfolio



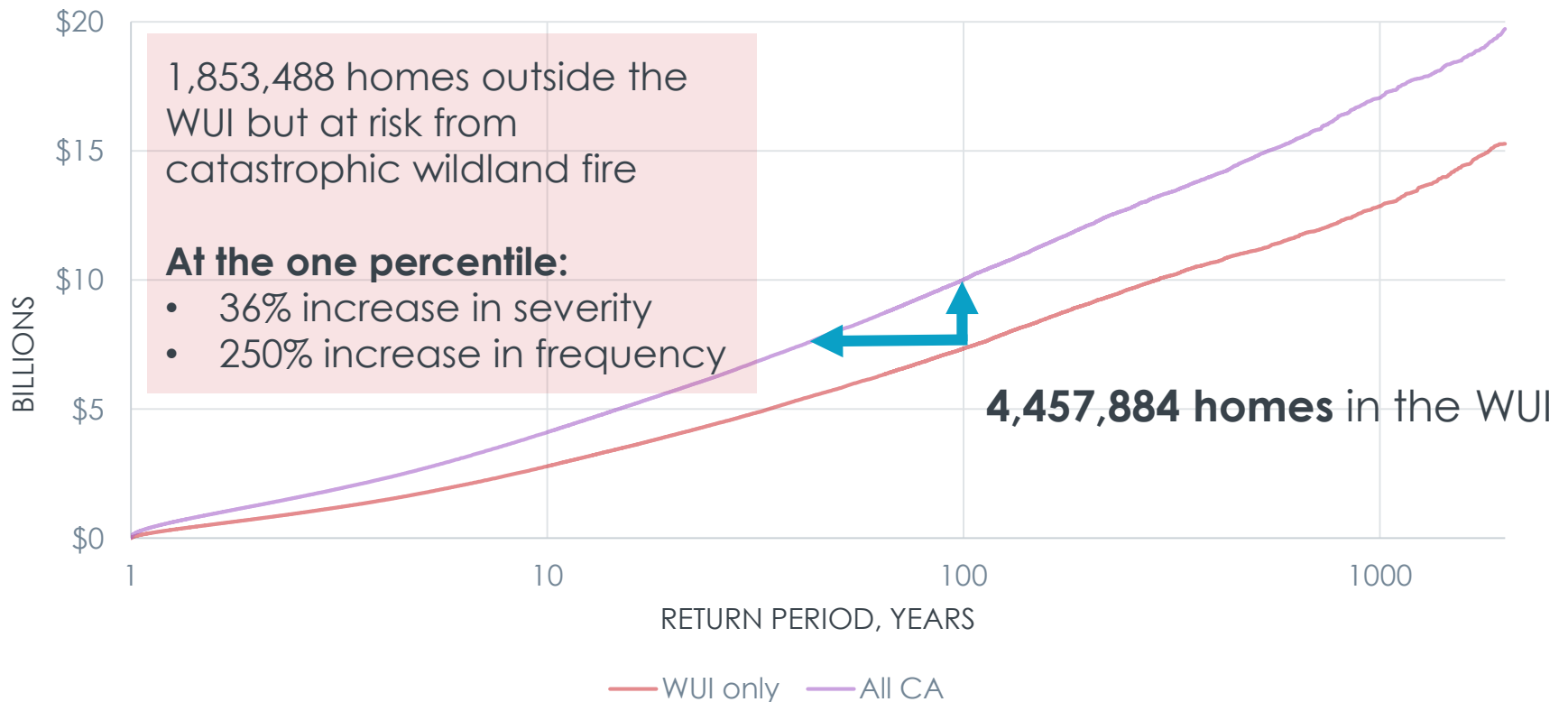
- Large geographic expanse to cover all events
- Granular locations to capture high-gradient of burnt/not burnt footprints
- Test portfolio based on 2010 Census Blocks

Wildfire Risk: Beyond the WUI

California Housing Unit Portfolio, Structure Only

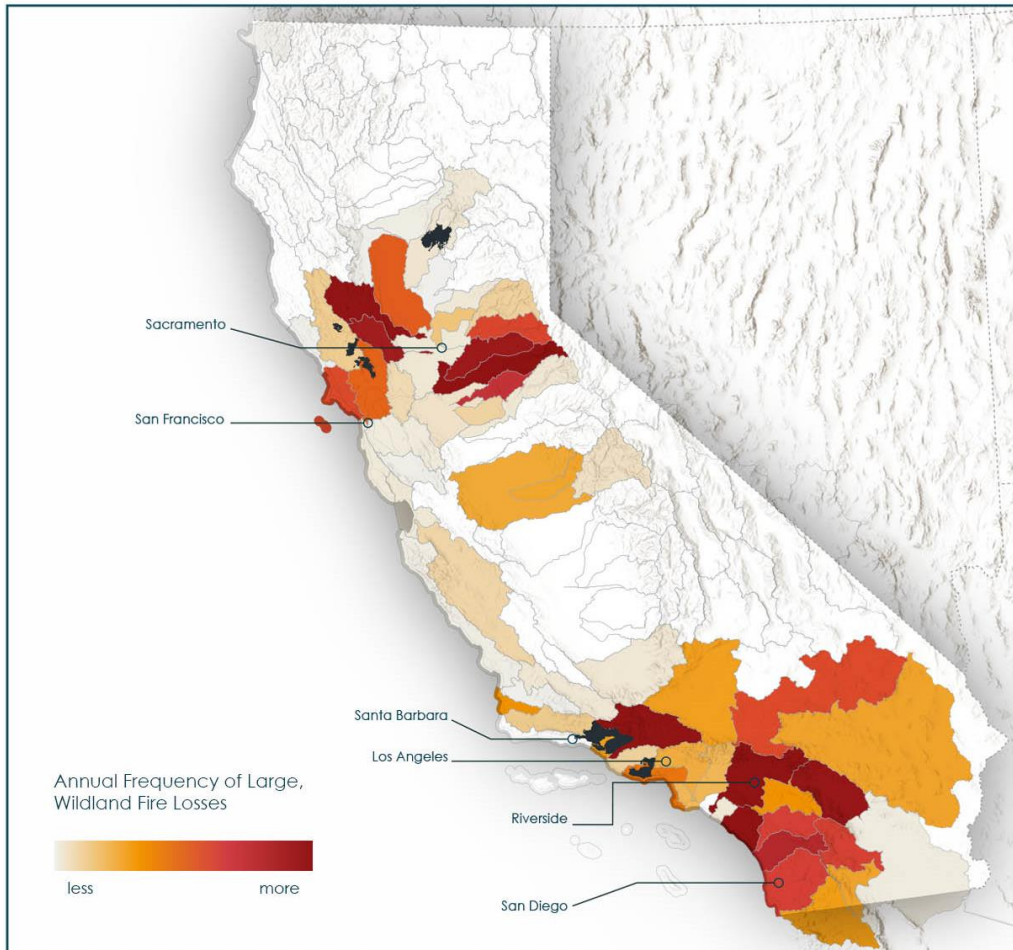
(\$650,000 Per Home)

Annual Aggregate Probability of Non-Exceedance



The Source of the Largest California Fires

Relative **frequency** of large fires in California



Source: CoreLogic, USGS, Esri

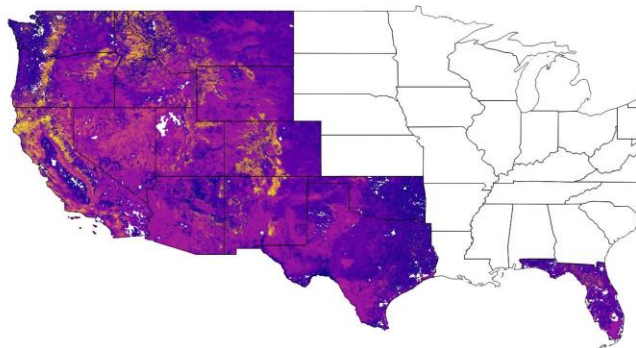
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- Highest frequencies are in areas associated with largest historic losses
- Fires of 2017-2018 are shown in black

U.S. Wildfire Model

2018: Comprehensive update and expansion in coverage

- **30m resolution covering 14 states**
- Explicit **urban burn** module for Wildland-Urban Interface (WUI) Fires e.g. Tubbs
- Distinct, explicit modeling of **smoke** in addition to fire
- **3 risk views** (fuel, moisture): long-term, below normal, and above normal
- Geo-spatial wildfire behavior model integrating **surface and crown fire spread**
- Weather simulation capturing spatio-temporal **variability and extremes**
- Major **historical events** for scenario loss modeling
- **Defensible space and roof class** defined per IBHS recommendation



- Covers **attritional** and **catastrophe** wildfires
- Suitable for **risk pricing/underwriting** and **aggregation**

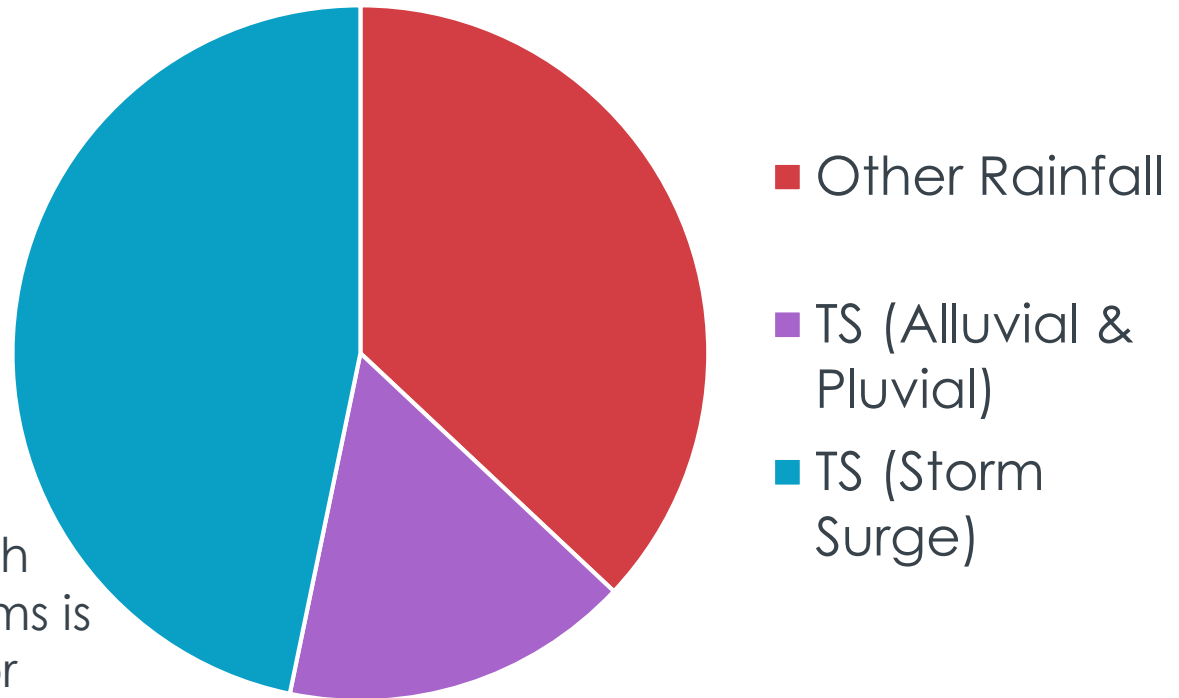


Flood Risk Management

- Correlation with hurricane
 - A large portion of flood losses (storm surge and precipitation driven) is driven by hurricane
 - Correlation of flood losses (storm surge and precipitation driven) with hurricane wind losses is important for many risk managers
- Complete modeling of flood risk
 - Areas outside of SFHAs are important
 - A large percentage of flood losses being uninsured is typical

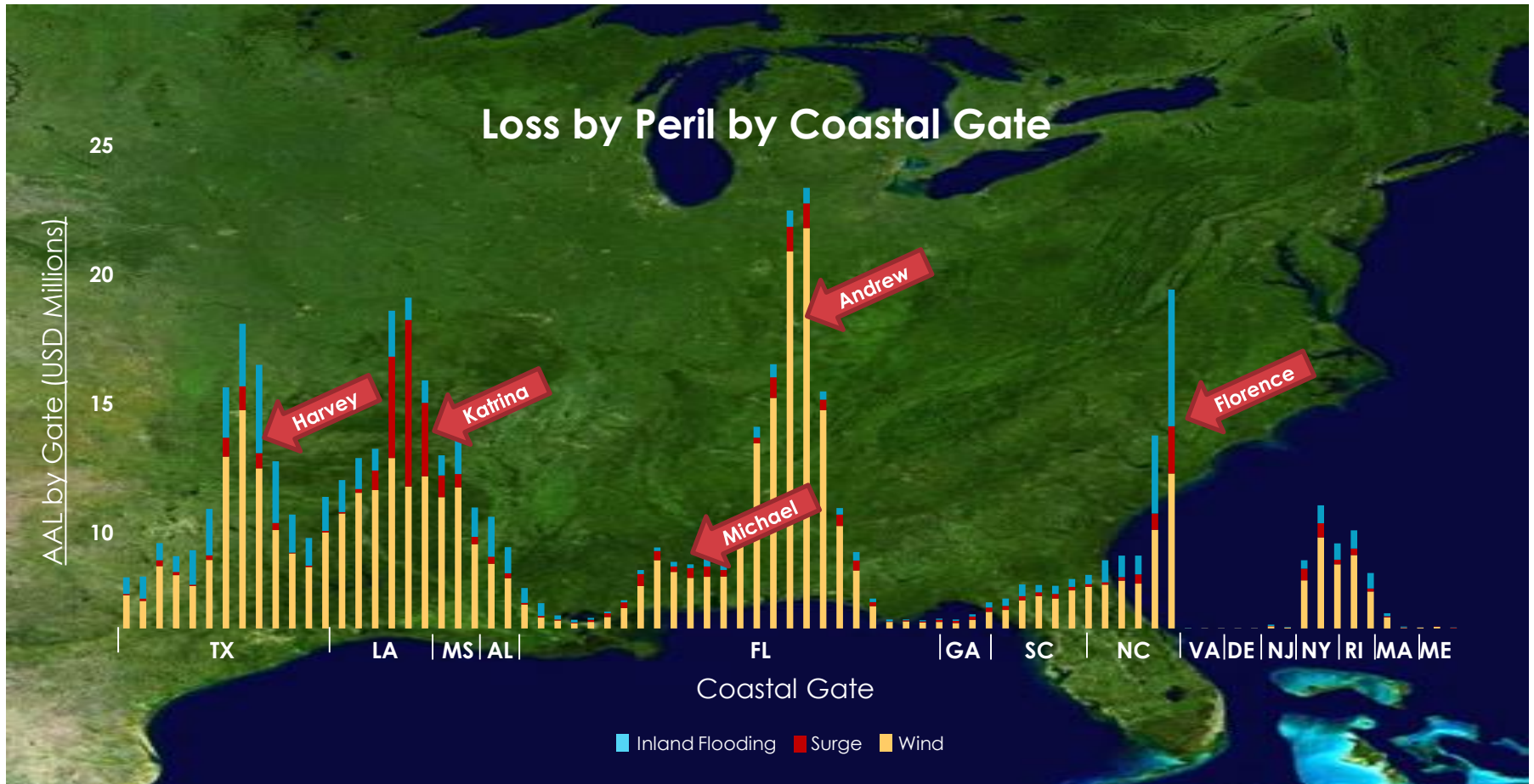
Drivers of Flood Loss to the NFIP Portfolio

NFIP Portfolio Average Annual Loss by Driver



Flooding associated with hurricanes/tropical storms is modeled to account for more than 60% of annual flood loss exposure

Wind and Flood: Peril Correlation



4%



Fraction of U.S.
Housing with NFIP
Flood Insurance^{1,2}

70%



Fraction of flood
damage that is
uninsured³

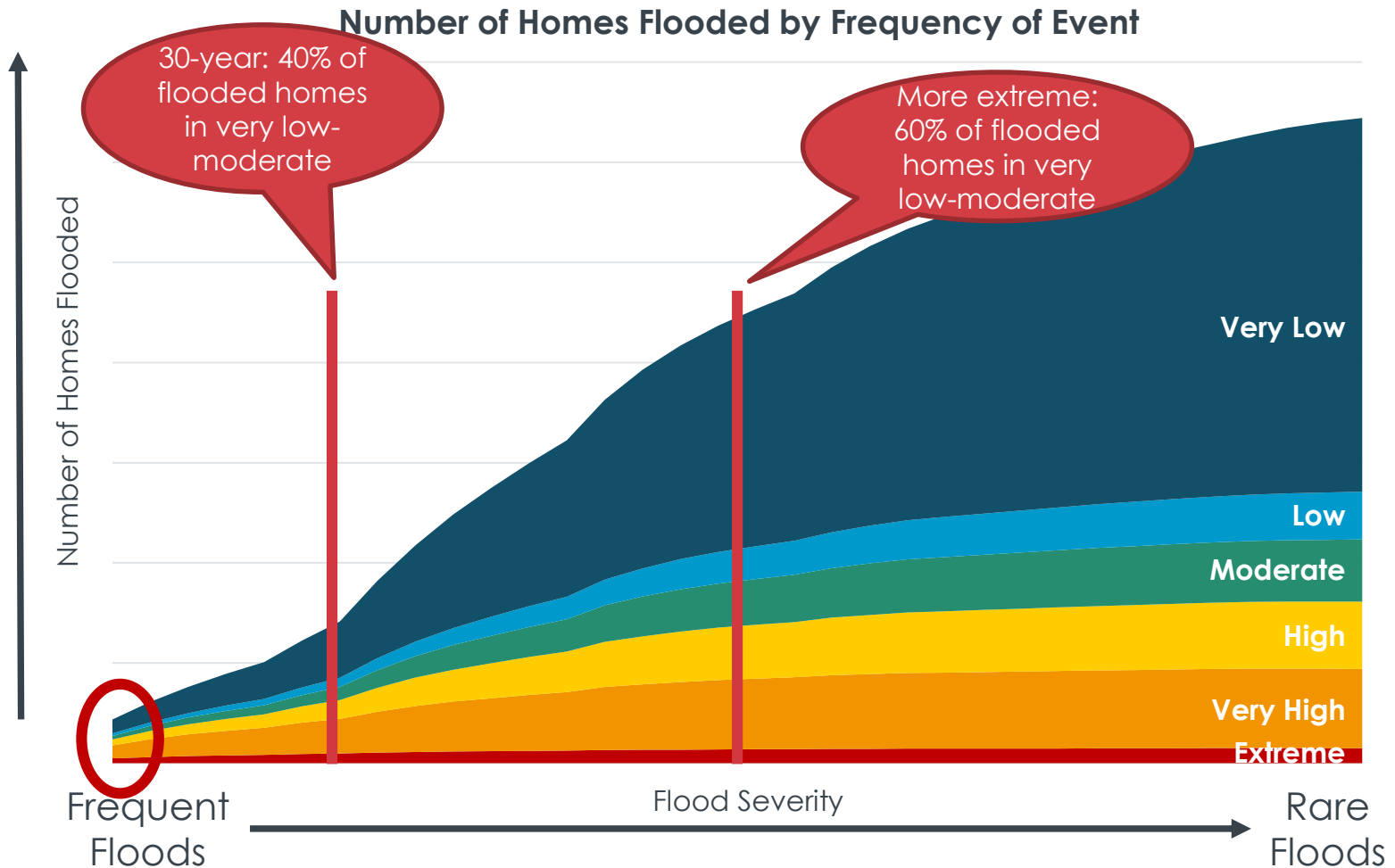
1-NFIP Policy count (5,079,881) as of November 2018 (<https://www.fema.gov/policies-force-month>)

2-US Census Housing count (137,403,460) as of July 1, 2017 (<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>)

3-Source: CoreLogic (<https://www.corelogic.com/news/media-advisory-corelogic-analysis-estimates-total-residential-insured-and-uninsured-flood-loss-for-hurricane-harvey-between-25.aspx>)

Flood Risk Management

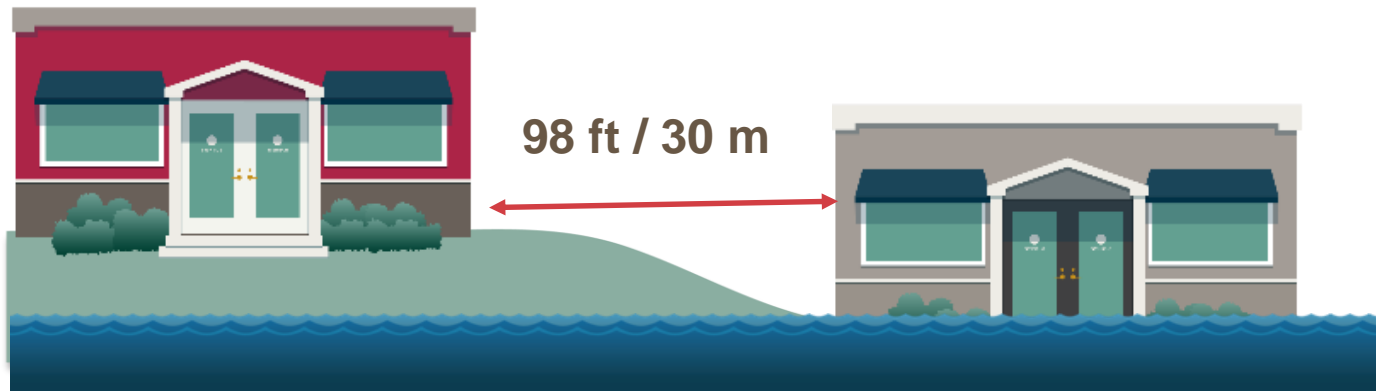
What Can We Expect In Future Disasters?



U.S. Inland Flood Model

High resolution modeling suitable for both single site and portfolio analyses

Increased Granularity = Accuracy and confidence in results



- **10m or finer** resolution digital elevation models, high resolution hazard down to < 1m
- PxPoint **structure and parcel-based** geocoding
- Vulnerability model incorporates detailed property characteristics, with **smart defaults** based on year of construction, local date of incorporation into FIRM, and other elements
- **300,000-year** simulation – critical for excess flood policies
- **Same hurricane event set to model wind, storm surge, inland flooding**

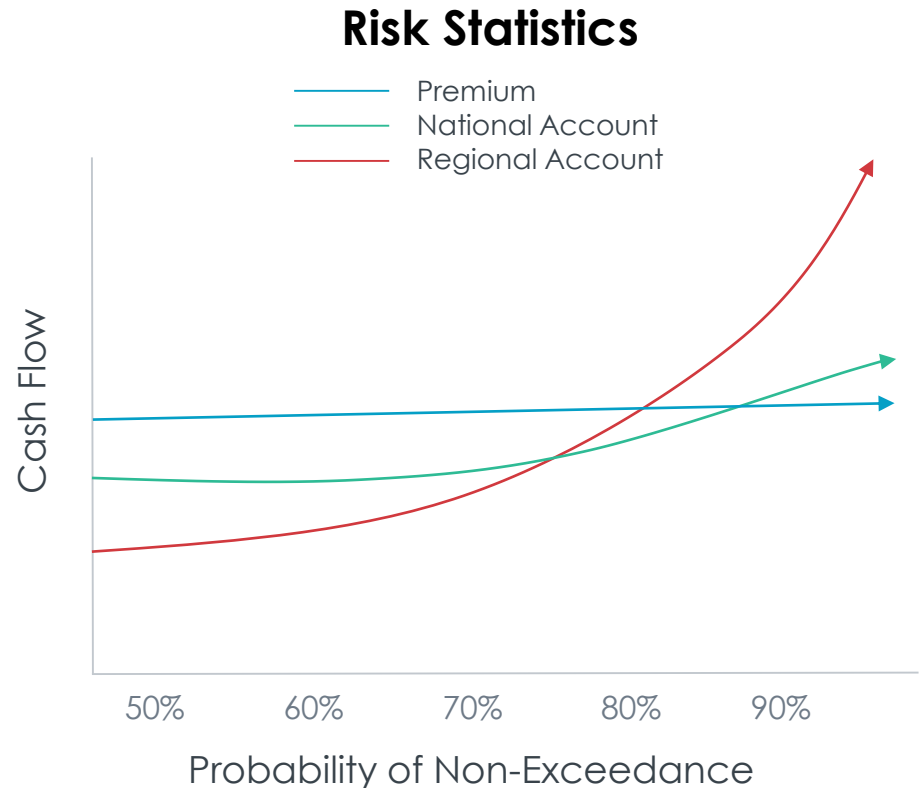
Severe Convective Storm Modeling

- Early version severe convective storm (SCS) models disappointed users
 - Failure to reasonably align with historic loss data
 - Failure to provide confident risk curves
- NextGen SCS models address these challenges
 - Granular footprints deliver reliable output
 - High-definition modeling delivers reliable EP curves

Modeling Severe Convective Storm

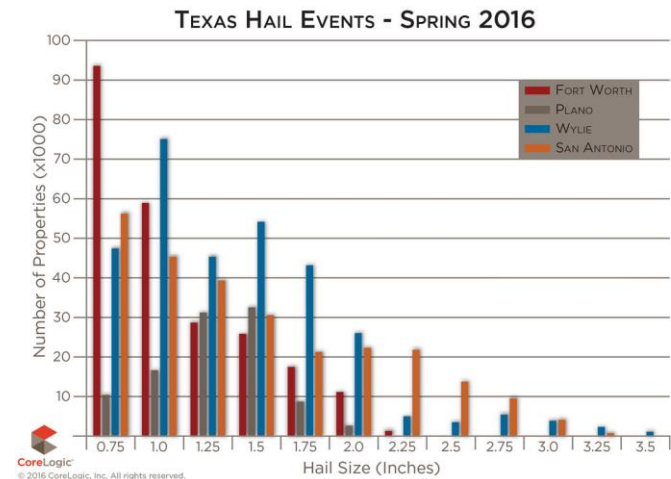
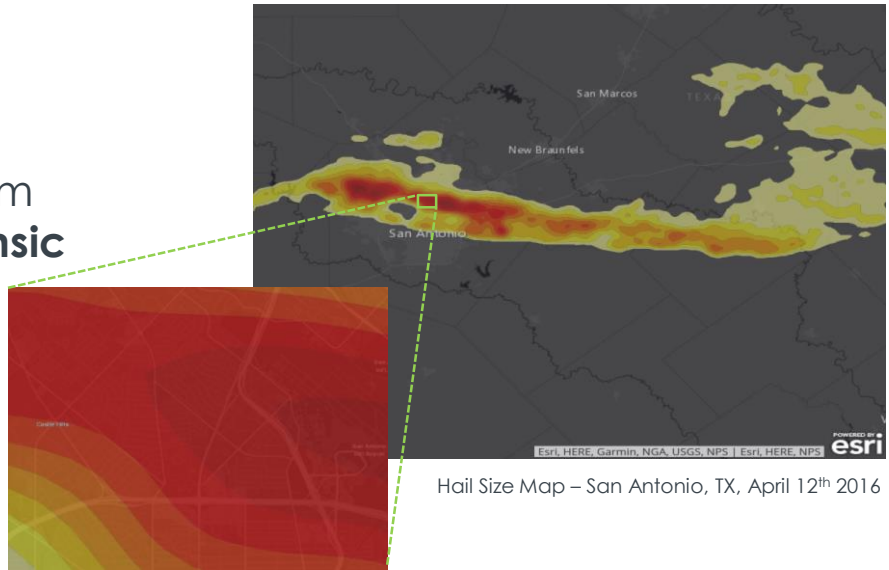
- Nation-wide statistics demonstrate that SCS is a high-frequency loss peril
- For smaller companies, SCS presents a larger challenge
 - The Joplin Tornadoes (2011) saw 3 small companies go insolvent
 - Recent convective years have stressed financials of smaller companies

Challenge: Developing an SCS model that shares these characteristics



Modeling Severe Convective Storm

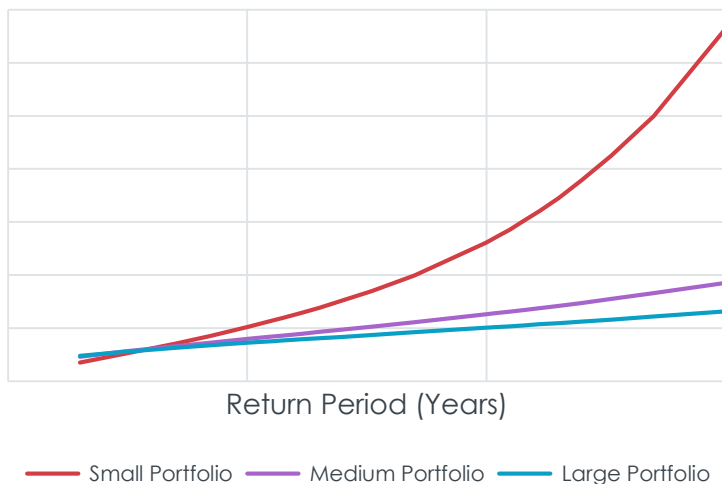
- Granular Risk Model
 - Realistic, high-resolution hail and wind footprints and climatology derived from proprietary radar-based **weather forensic algorithms** from CoreLogic
 - High-resolution **tornado footprint modeling**
- Broad Simulation Model
 - **Comprehensive** stochastic event set for tornado, hail, and straight-line wind
 - Perils modeled individually, but as **spatially coupled events**, according to climatology and insurers' event definition practices
 - **300,000-year simulation** provides robust and spatially smooth results



Reliable risk curves from SCS

Small companies versus big companies

AEP Normalized to AAL



- As size of portfolio (diversity) increases, the risk curve flattens
 - This is intuitive; a large portfolio is exposed to higher frequency
- What does this imply for modeling?
 - The risk curve for the diverse portfolio is dominated by market-share losses on big events at all levels
 - The risk curve for the concentrated portfolio will have more zero losses; and more big losses from events that don't impact the greater market
- What are the attributes of a model that we should see?
 - Focusing only on the high-frequency data points
 - More volatility in smaller portfolio

U.S. Severe Convective Storm Model

2018: Comprehensive update leveraging CLGX weather forensic science

- **Hazard Model**

- Brand new, **comprehensive**, stochastic event set for tornado, hail, and straight-line wind
- High-resolution modeling based on proprietary **radar-based weather forensic algorithms** from CoreLogic®
- **Environment-Conforming Smoothing**
- ~50 scenario events

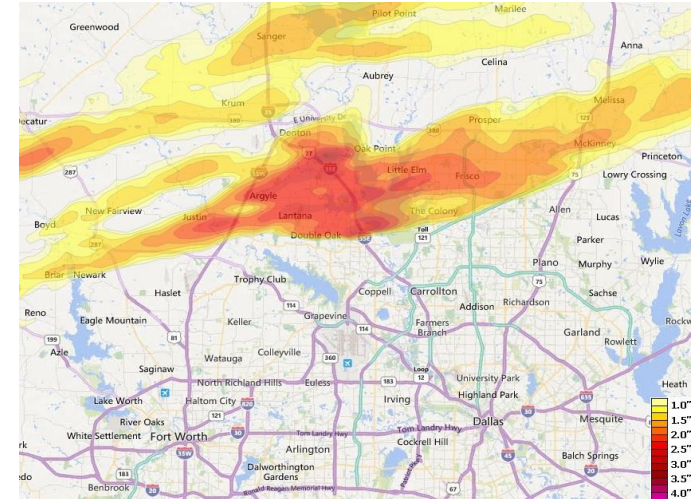
- **Additional ENSO Risk Perspectives**

- **Real-time Event Management**

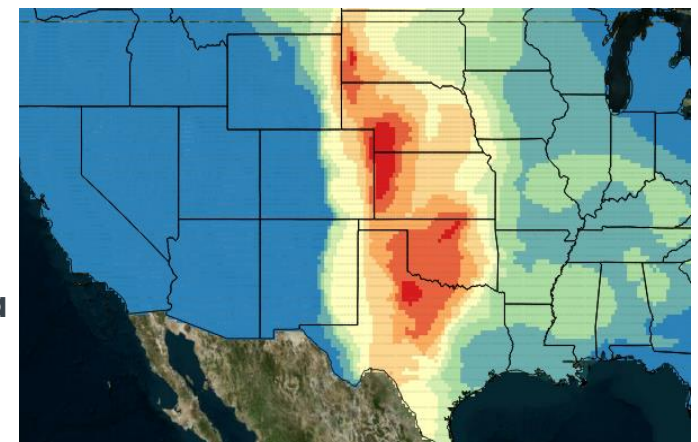
- Allows users to import **real-time event data** into the scenario storm set to access the loss impacts for actual events

- **Vulnerability Model**

- **Component-based** vulnerability, validated with comprehensive claims and exposure data
- Incorporation of CoreLogic **property characteristic data and reconstruction cost algorithms**
- Handling of **ACV vs RV** policy considerations



Hail Size Map – Dallas, TX 3/26/17 (Core Logic's Reactor Product)





CoreLogic®

Get the Whole Story.®

Questions?

For more information call 866.774.3282
email hazardrisk@corelogic.com
or visit <http://www.hazardhq.com>