CoreLogic

Parametric Hail Insurance

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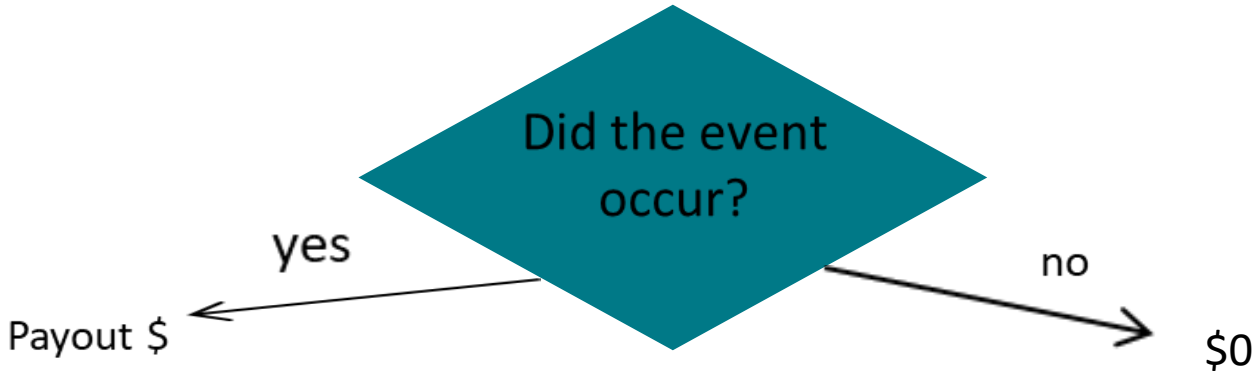
What is Parametric Insurance?

- **Parametric insurance** is a type of insurance that does not indemnify the pure loss, but entity assuming the risk (insurer) agrees to make a payment to the indemnitee (insured) upon the occurrence of a triggering event. The triggering event is often a natural catastrophe event which may ordinarily precipitate a loss or a series of losses.



What is Parametric Insurance?

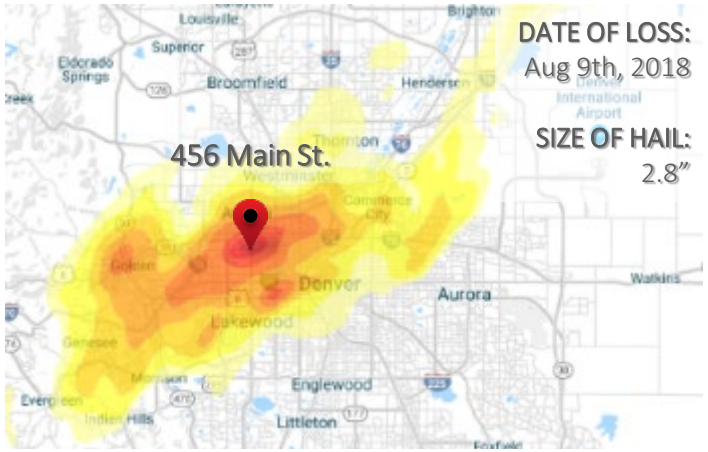
- Benefits from Parametric insurance
  - Simplicity
  - Faster payouts
  - Reduction in Costs

- Drawbacks
  - May not cover full damage that occurs

How is a loss triggered?

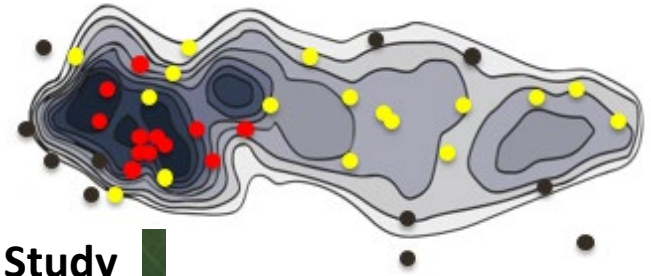
How does the actual Loss trigger work?

- Need a mechanism that can be used to understand if the event has occurred
  - Manual gathering of Hail reports
  - Technology based solution with automated reporting of events
    - Reactor – CoreLogic Hail Verification reports

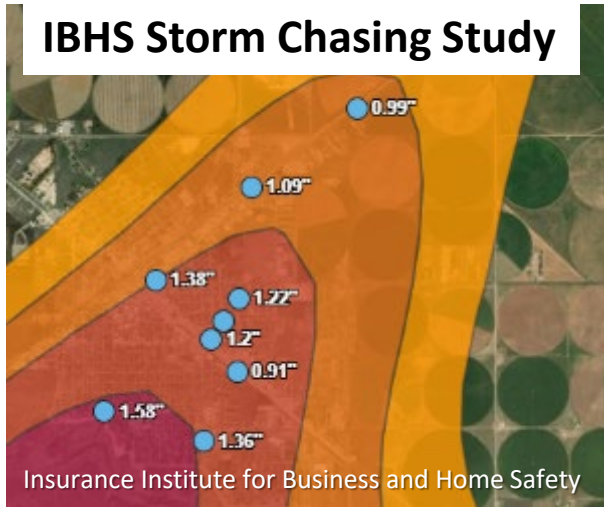


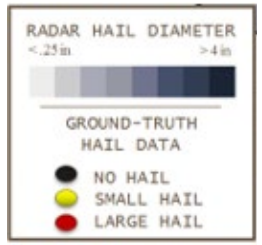
Hail Event Triggering:
CoreLogic's Hail Verification Technology

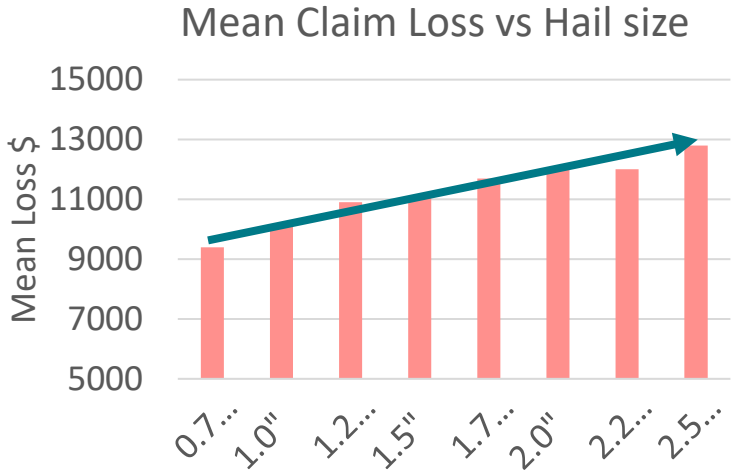
- Realistic, high-resolution hail footprints derived from proprietary radar-based weather forensic algorithm from CoreLogic (lower image)
- Every footprint is analyzed and quality controlled by our team of expert meteorologists
- Collaborated with IBHS field projects to independently validate the hail model
- Large study of claims data found a high correlation between increasing hail size and mean claim losses



NOAA Hail Verification Project



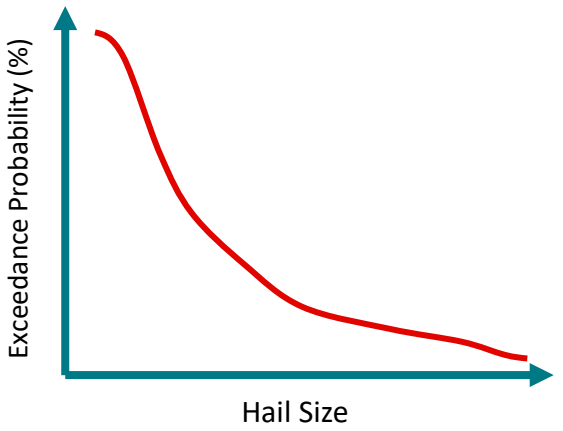


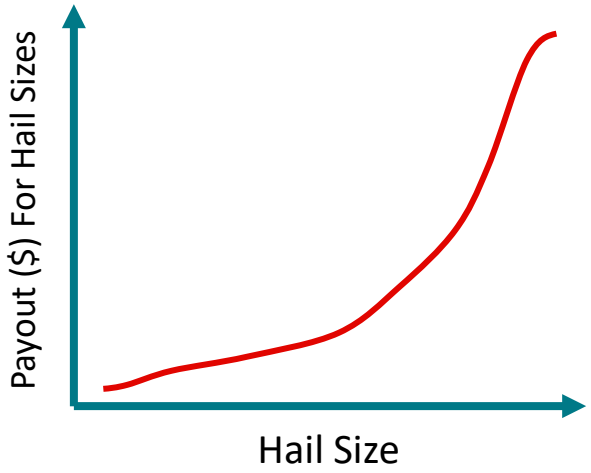


Parametric Hail Insurance: Pricing and EP Curve design

Part 2: Estimate losses and rates

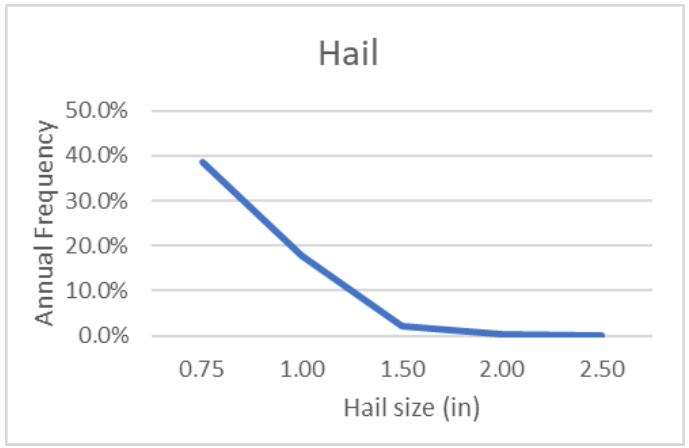
- Calculation of expected loss
  - Need for a solution that estimates the EP curve by hail size
    - i.e. annual frequency of 1” hail or greater (and/or larger sizes)
- Single Limit vs Multiple Limit Payout
  - Selection of limit (Loss at X”, or average excess loss)
  - Or Payout increases at hail size increases
    - Somewhat more complicated to implement
- Freq x Limit = estimated losses -> premiums

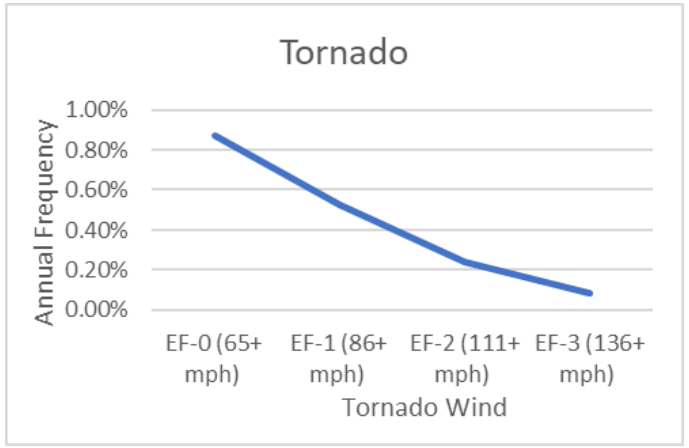


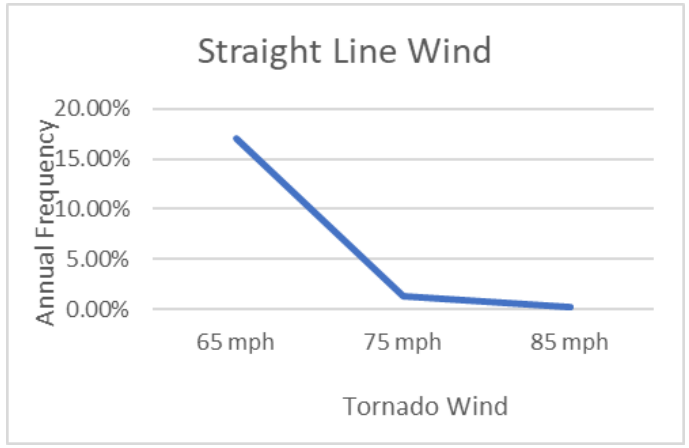


EP curve examples

lat	33.00000						
lon	-97.00000						
North Texas							
	Hail		Tornado	Tornado		Straight Line	SLW
Hail size	annual freq		Wind	annual freq		Wind	annual freq
0.75	38.5%		EF-0 (65+ mph)	0.87%		65 mph	17.01%
1.00	17.8%		EF-1 (86+ mph)	0.52%		75 mph	1.26%
1.50	2.3%		EF-2 (111+ mph)	0.24%		85 mph	0.20%
2.00	0.3%		EF-3 (136+ mph)	0.08%			
2.50	0.1%						







Developing Hail Risk: Base Data Layers

- **Hail Report Based**

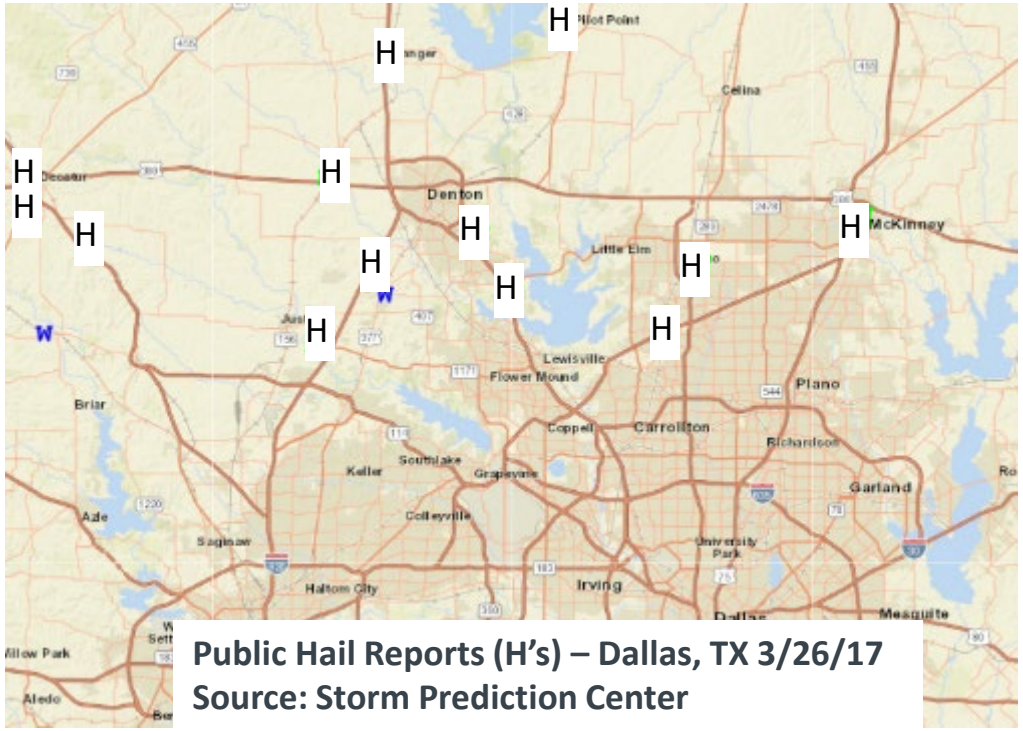
  Deliverable: Frequency of hail events in County or Zip Code

  - Can estimate the frequency of an event but not the hail size breakdown within the event (A 1.5” hail event occurs in Dallas County every 1.5 years)

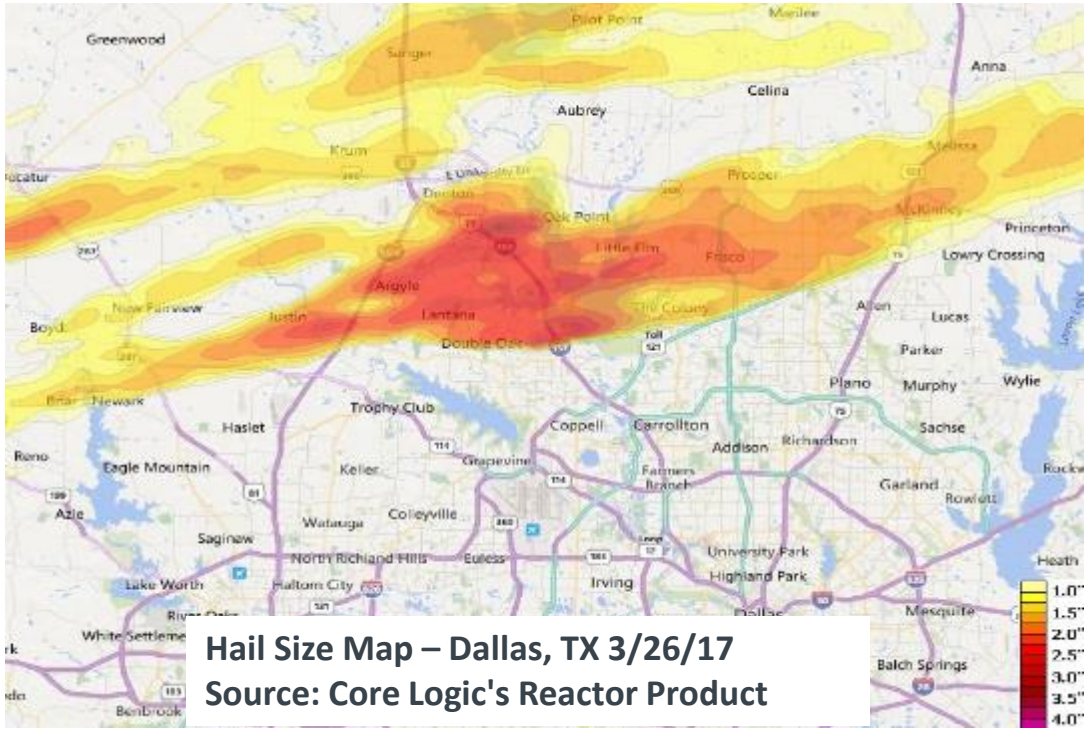
- **Hail Footprint Based**

  Deliverable: Frequency of observed hail size at property

  - Can estimate the hail-size specific frequency of hail events (This property is expected to be hit by *at least* 1.5” hail every 15)



Public Hail Reports (H’s) – Dallas, TX 3/26/17
Source: Storm Prediction Center



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

Developing Hail Risk: Hail Footprint Granularity

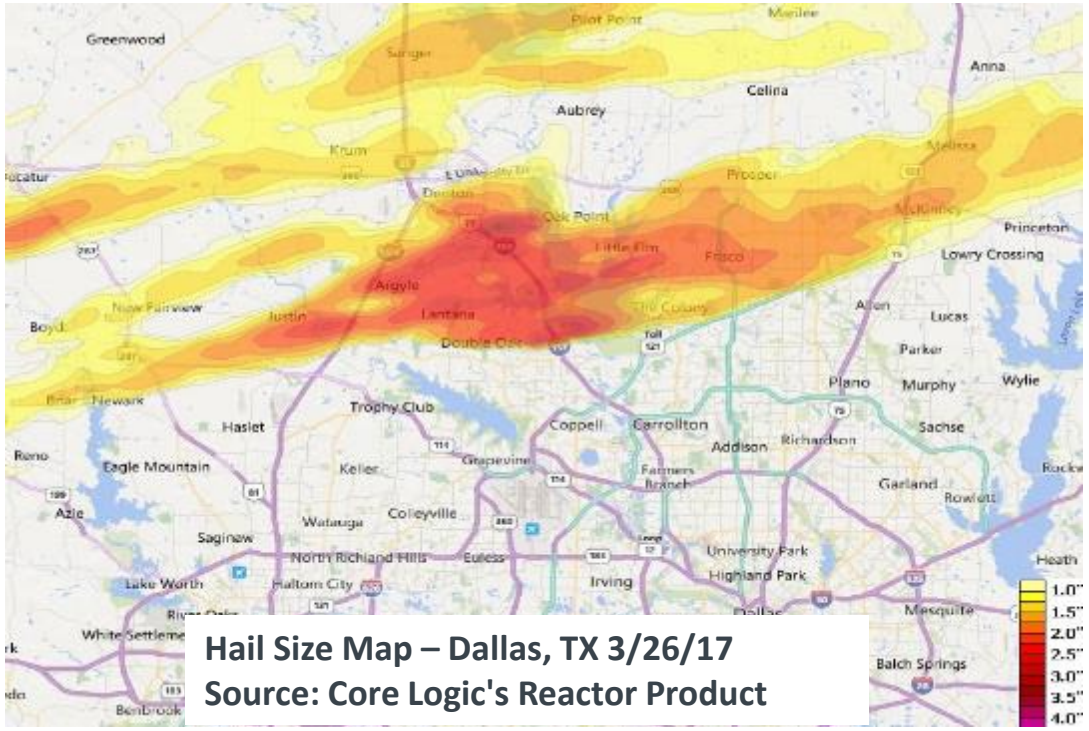
- **Hail Footprint Based**

  Deliverable: Frequency of observed hail size at property

  - Realistic, high-resolution hail footprints derived from proprietary radar-based weather forensic algorithm from CoreLogic
  - Granularity is improved by 5-6x over using reports

- **Hail Footprint Statistics Dallas Hailstorm**

  - **Dallas Area: 200 sq miles**
  - **1-1.25” : 20 sq miles (10% of land)**
  - **1.25-1.5” : 10 sq miles (5% of land)**
  - **1.5”-1.75”: 3 sq miles (2% of land)**
  - **1.75”-2.0”: 3 sq miles (1% of land)**
  - **+2.0”: 1 sq miles (0.5% of land)**

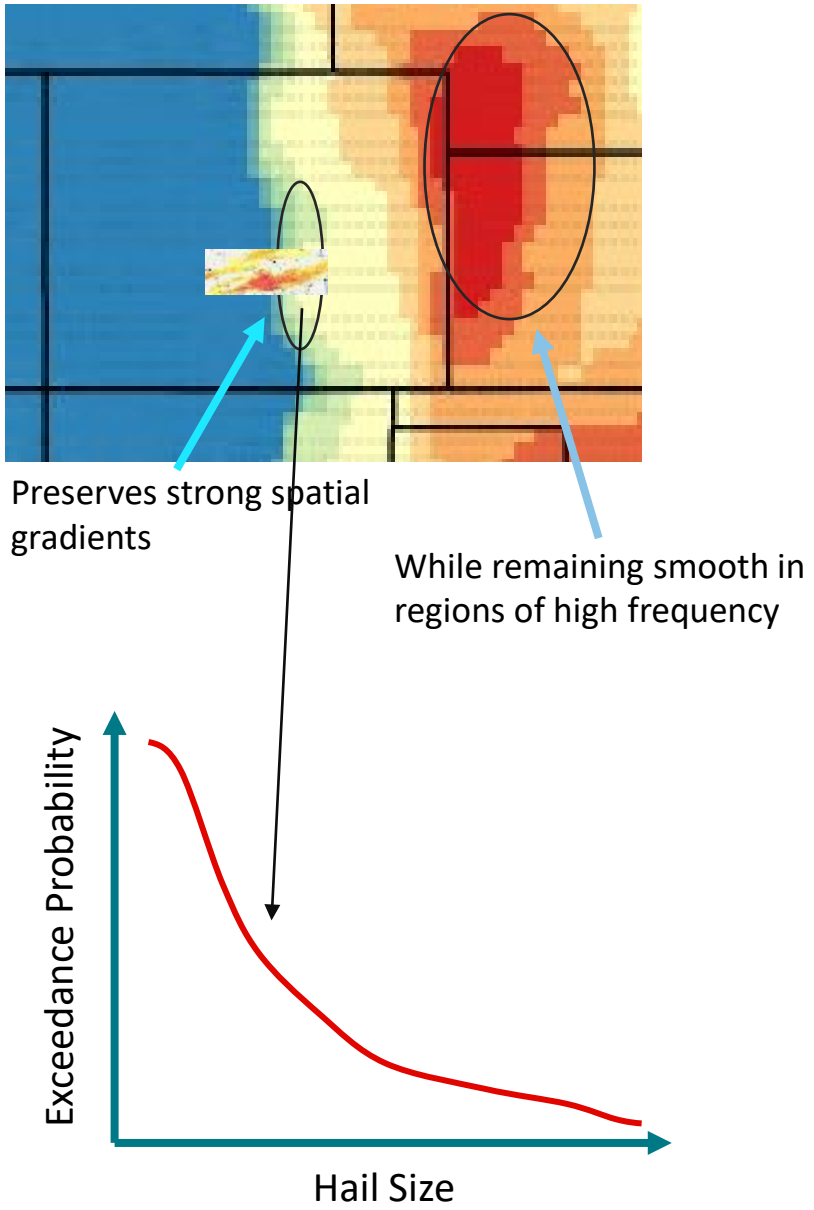


Hail Size Map – Dallas, TX 3/26/17
Source: Core Logic's Reactor Product

Developing Hail Risk From Footprints

Steps to create an EP Curve

- Footprint Catalog
  - 2009-2016 hail footprints based on CoreLogic Hail Verification Technology
- Smooth Historical Footprints
  - **Environment-Conforming Smoothing:** Identifies regions with strong but physical gradients in storm behavior, while also sufficiently smoothing in regions with naturally high variability
    - SPC (Storm Prediction Center) hail reports, 1950-2016
    - NARR (North American Regional Reanalysis) daily historical environmental data 1979-2016
    - Combine frequency of environments and reports to create zones of homogenous hail storm frequency and behavior

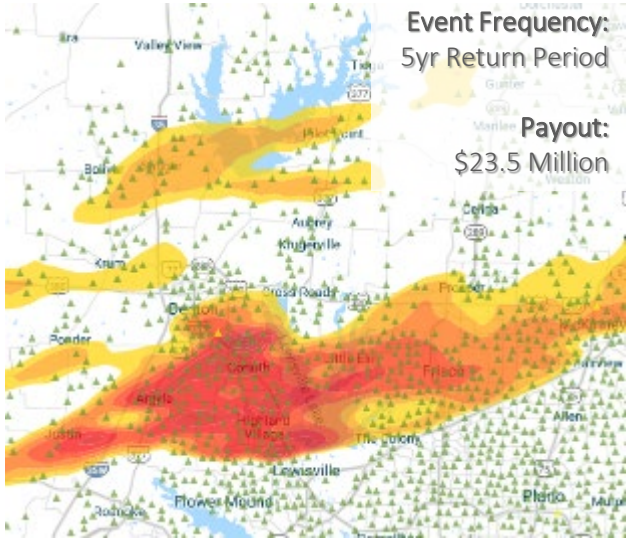


Aggregation of Risk / Risk Management

Risk Management

- A consistent modeling framework is needed to:
  - Estimated Frequencies and corresponding losses by location
  - Gather event footprints that inform the trigger
  - Risk Management / Aggregation / Reinsurance

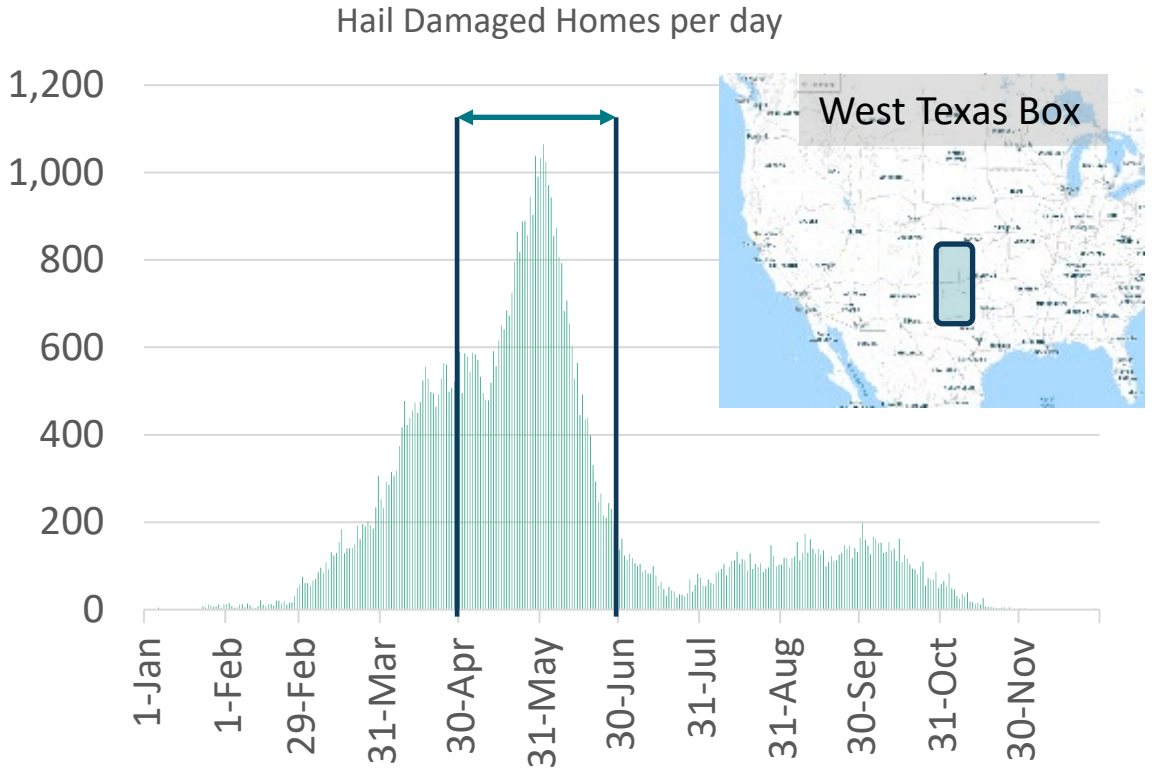
- Risk Management
  - Process is similar to non-parametric insurance



How Can We Validate Our Risk Aggregation?

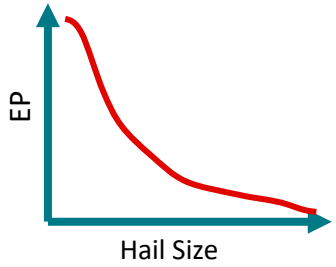
Forensic Trigger Impacts vs Risk Model Estimated Impacts

- Using the RQE SCS model, estimated average daily number of homes with damage exceeding $500 deductible due to hail
- Median May-June number of hail-impacted structures in West Texas
  - WVS (+1.5”, 2012-2019): 37,895
  - RQE (exceeding $500): 37, 428

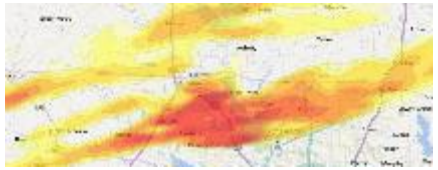


Building a Comprehensive Parametric Hail Solution

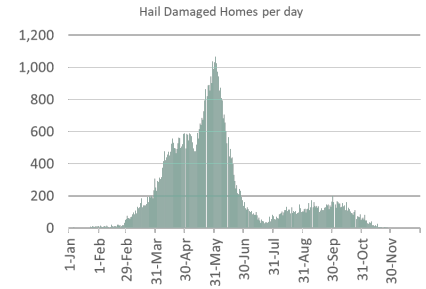
1) Policy triggering through Hail Verification Technology



2) Pricing built on exceedance probability curves derived from triggering data



3) Risk aggregation through RQE where EP curve and individual events are built from triggering data



The future of Parametric Solutions

- Technology
  - Consistent modeling framework covering all aspects of a program
  - Severe Convective Storm (SCS) perils
- Simplicity
  - If the triggering event occurs, only then is a predetermined payout made
- Faster Payouts
- Reduction in Costs