

# Introduction to Catastrophe Bond Issuance

*Jeff Boyd, CCM*



# Agenda

---

Catastrophe Bond  
Fundamentals

Selecting the  
Right Trigger

The Issuance  
Process

The Catastrophe  
Bond Market

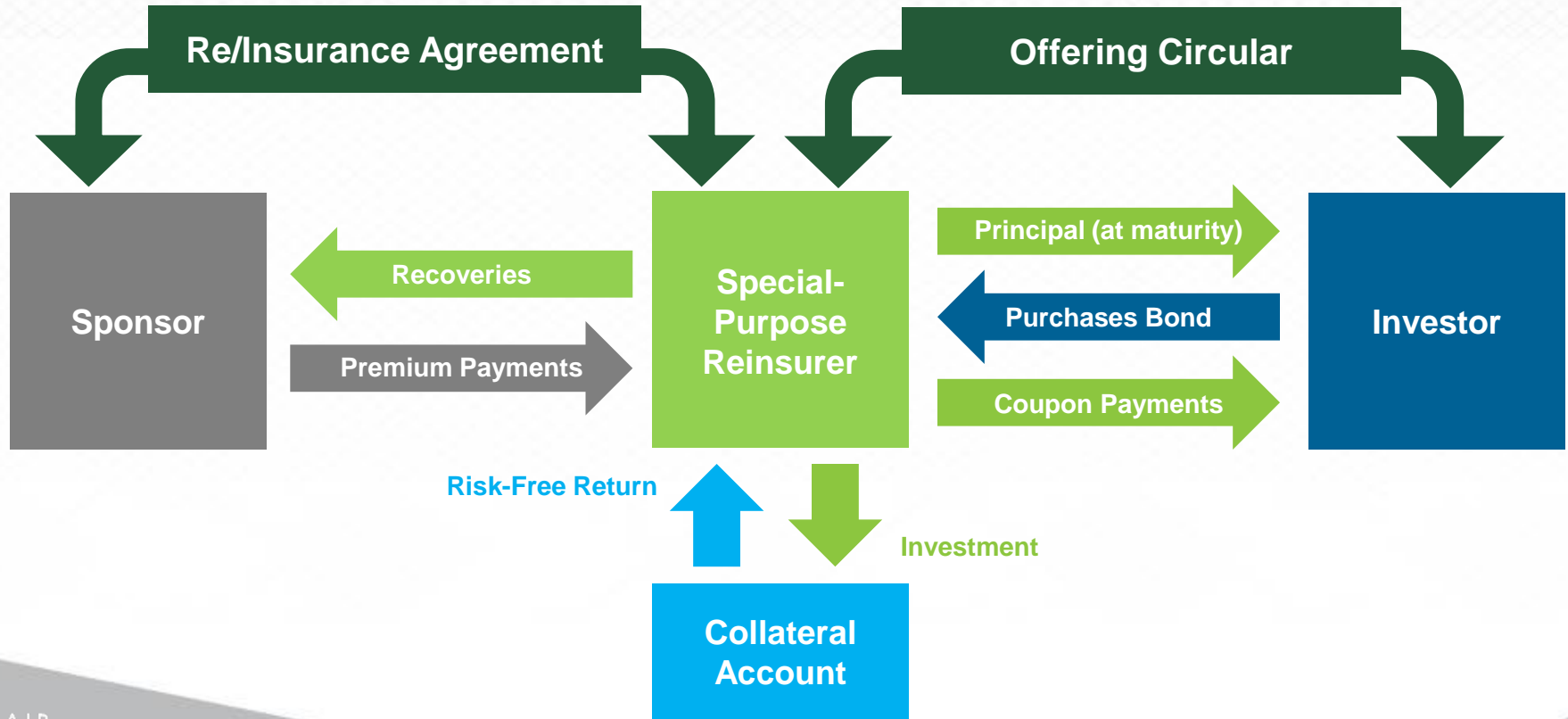
# Catastrophe Bond Fundamentals



# Catastrophe Bond Fundamentals



# Typical Structure of a Catastrophe Bond



# The Value Proposition of Catastrophe Bonds

## Sponsor Benefits

Diversification of reinsurance sources

Competing capital sources & potential cost savings

Collateralized protection

Highly customizable

Multi-year coverage & price stability

## Investor Benefits

Diversifying asset class

High coupons relative to similarly rated fixed-income products

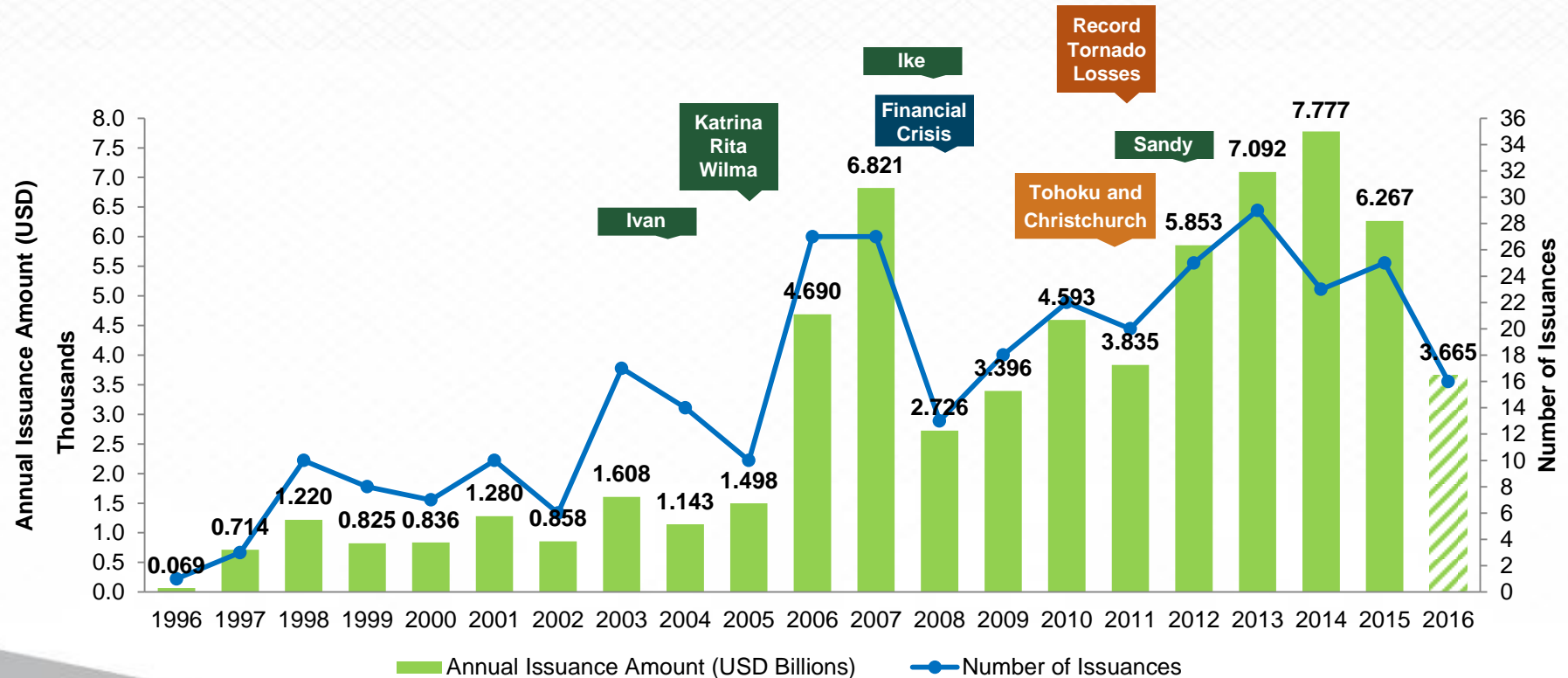
Tradable, liquid notes

Low-volatility instrument

# Catastrophe Bonds Are Not Highly Correlated with Financial Markets



# Catastrophe Bonds Have Become an Integral Strategic Risk-Transfer Tool



Sources: AIR, Artemis

CONFIDENTIAL

©2016 AIR WORLDWIDE



# Selecting the Right Trigger



# Selecting the Right Trigger



# Selecting the Right Trigger

**Parametric**



**Industry Loss Index**



**Indemnity**



**Modeled Loss**



**Hybrids**



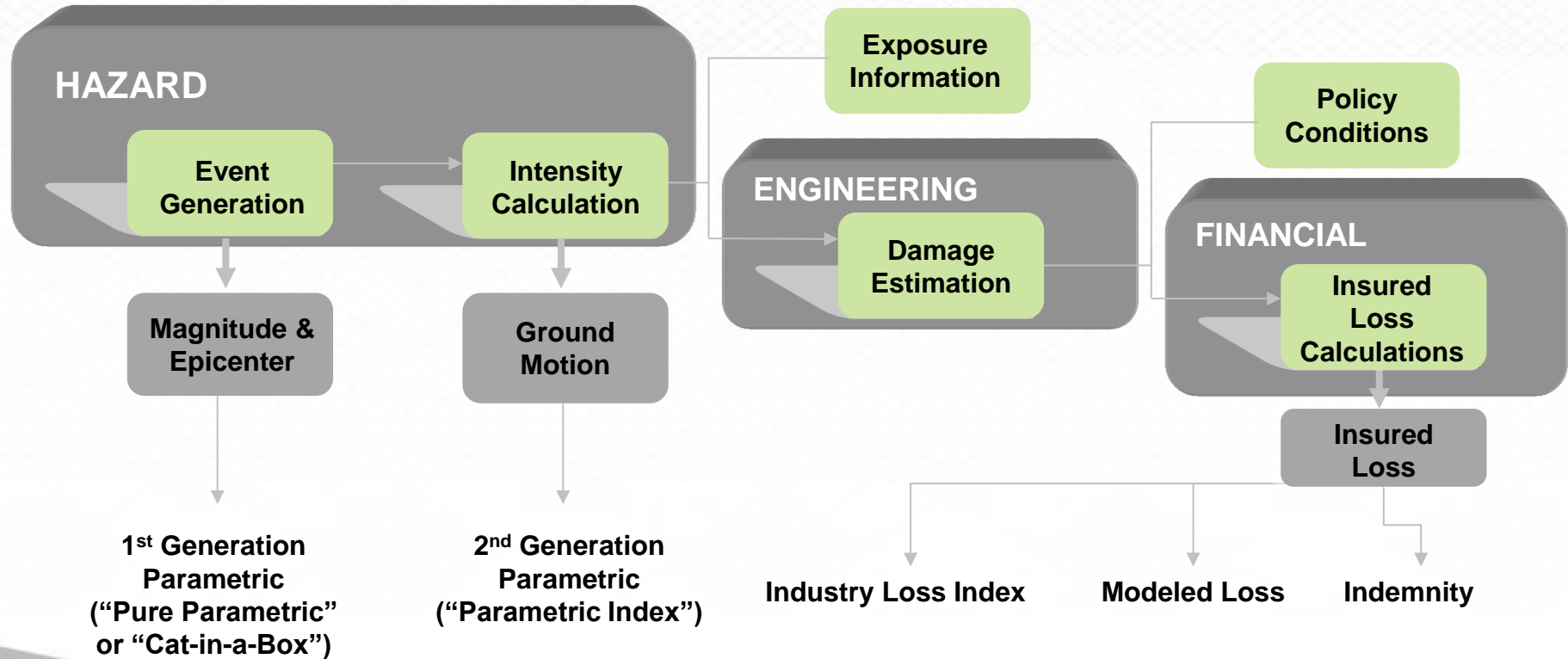
# Defining and Dealing with Basis Risk

**Basis risk is the difference between the losses you wish to protect against and the recoveries from the transaction**

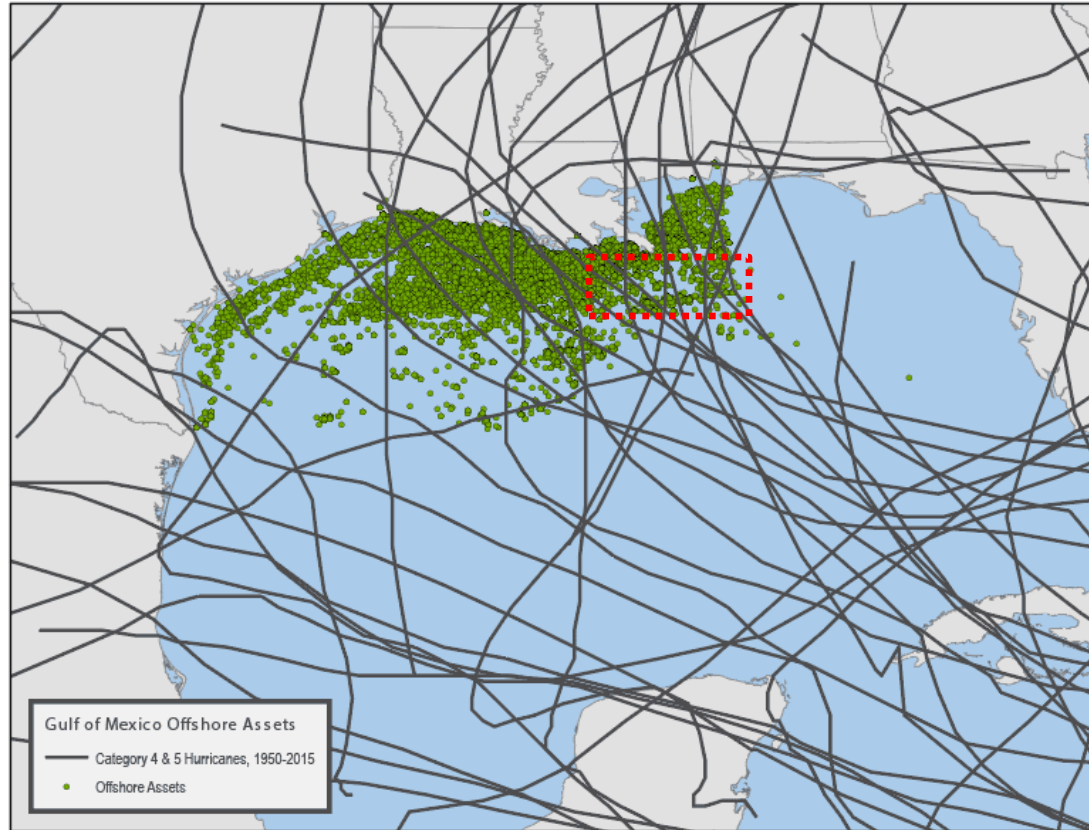
- Minimizing basis risk helps ensure you will receive a recovery when you really need it
  - Optimize your structure to maximize the fit between your loss potential and the transaction's recoveries
- 
- Lower basis risk is preferred by sponsors
  - Speedier loss determination and more transparent triggers are preferred by investors (and sponsors)
  - There are trade-offs between time, transparency, and basis risk with each trigger option



# AIR Can Model All Traditional Cat Bond Triggers as well as Customized Triggers



# First-Generation Parametric Trigger: Pure Parametric or “Cat-in-a-Box”



# Second-Generation Parametric Trigger: Parametric Index

$$EventIndex Value = \sum_{j=1}^{1043} \left( \min(a_j \cdot x_j + b_j \cdot x_j^2 + c_j \cdot x_j^3, Cap_j) \right)$$

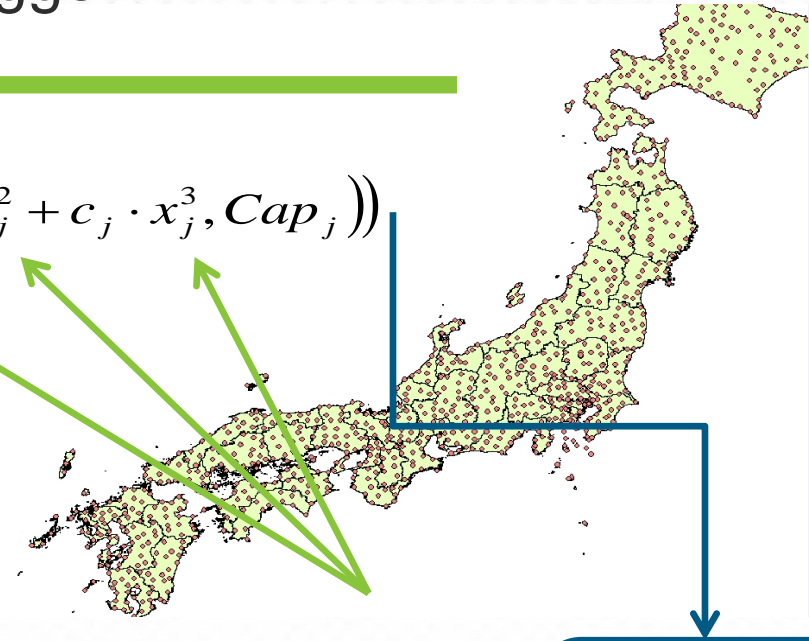
$$x_j = \max(0, PGA_j - 0.05)$$

Where:

$a_j$ ,  $b_j$ ,  $c_j$ , and  $Cap_j$  are the parameters at Location  $j$

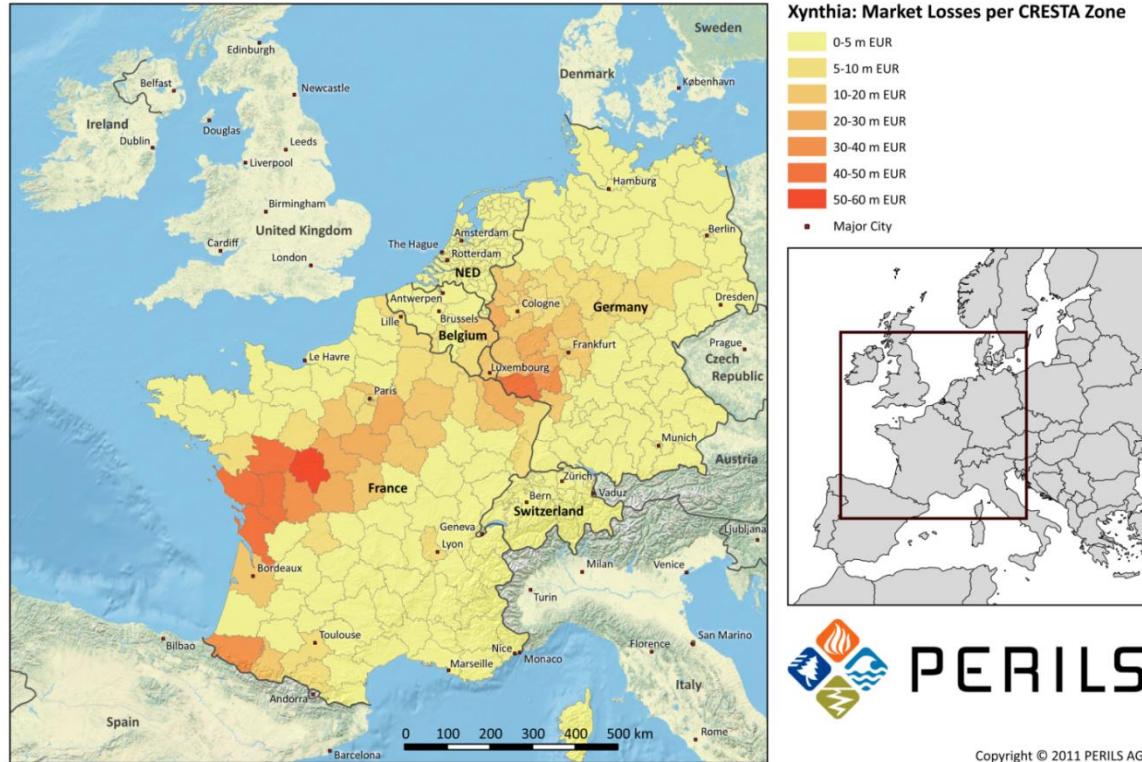
$PGA_j$  is the Peak Ground Acceleration ("PGA") at Location  $j$

Each  $j$  is one of the 1,043 Calculation Locations (the K-NET stations), which record PGA



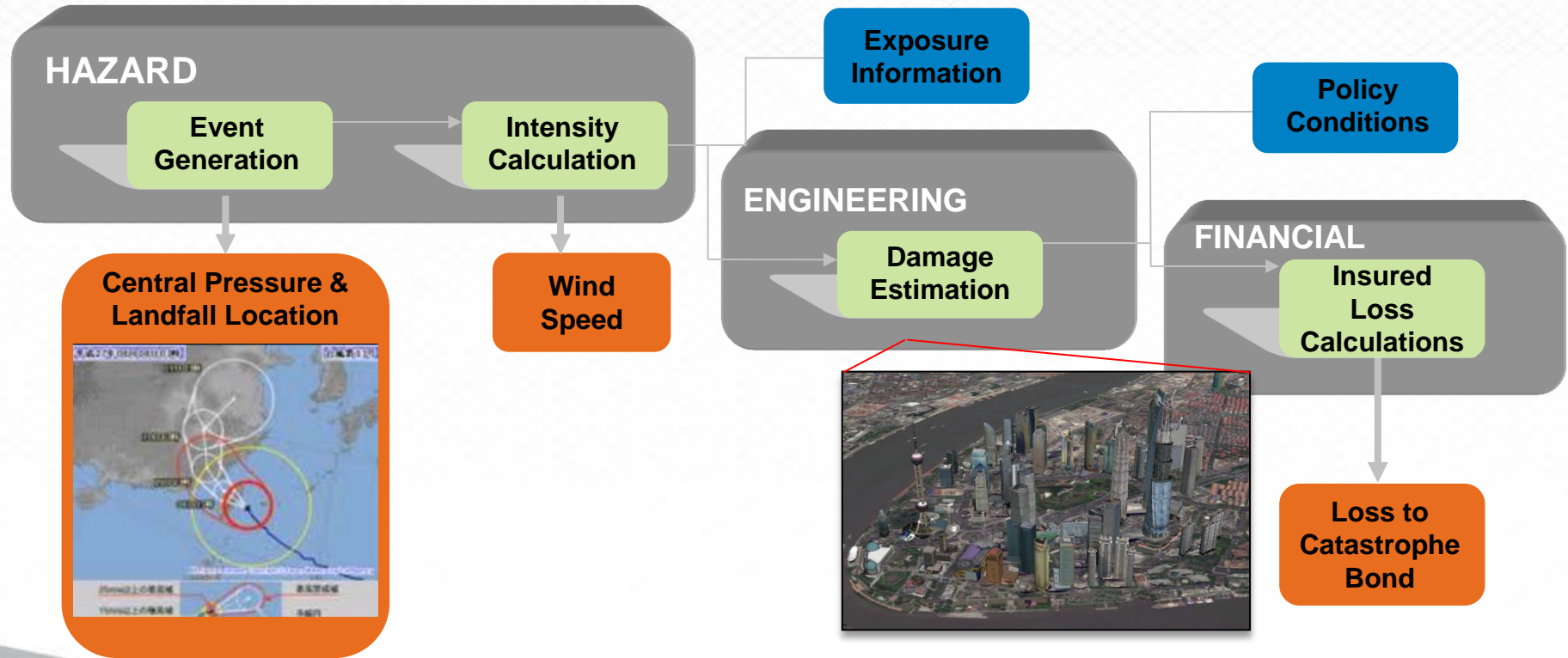
Calculation Location	Latitude	Longitude	$a_j$	$b_j$	$c_j$	$Cap_j$	Peak Ground Acceleration ( $PGA_j$ )	Calculation Location contribution to Event Index Value
1	35.297	136.750	0	0	0	0	0.17	0.00
2	35.297	136.915	0	0	20,993	459.7	0.14	13.16
...	...	...	...	...	...	...	...	...
1043	...	...	...	...	...	...	...	...

# Industry Loss Index: Using Market Share of Insurance Industry

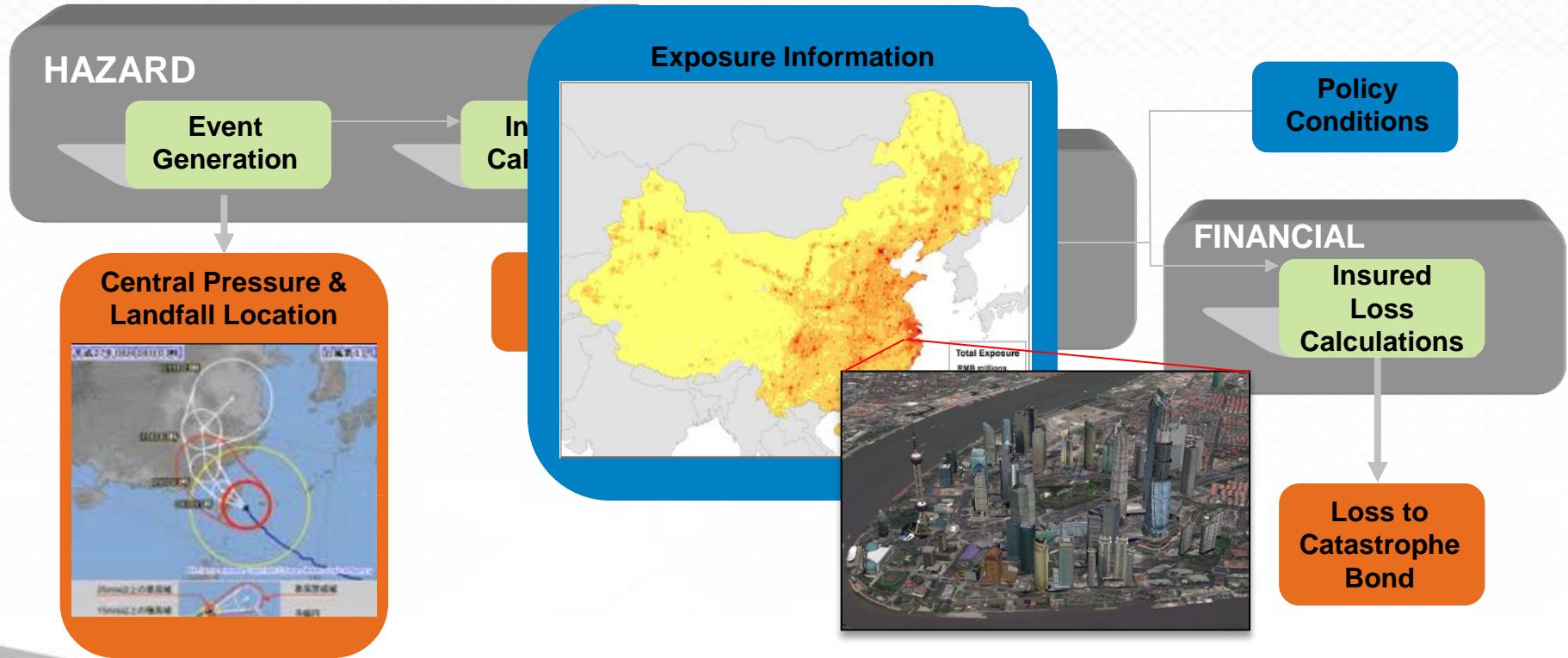




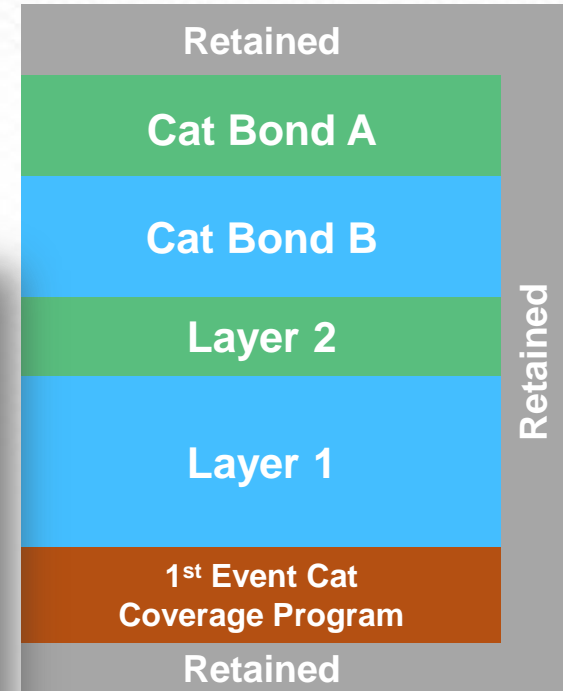
# Modeled Loss Trigger: Using Actual Event Characteristics



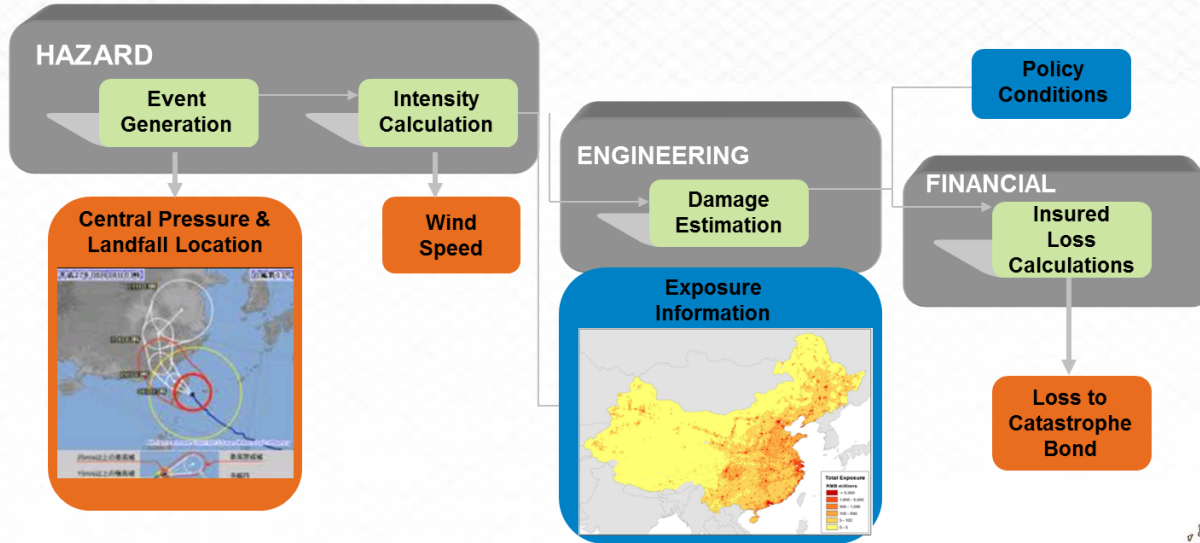
# Modeled Loss Trigger: Using Actual Event Characteristics



# Indemnity Loss Trigger: Ultimate Net Loss

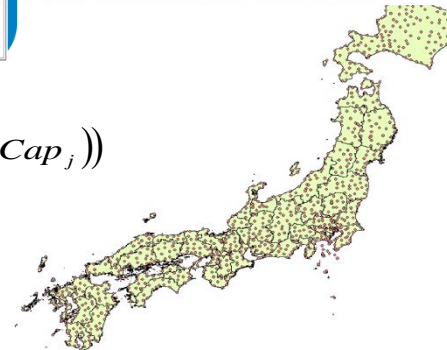


# Hybrid Cat Bond Triggers: Creative Terms



$$Event\ Index\ Value = \sum_{j=1}^{1043} \left( \min(a_j \cdot x_j + b_j \cdot x_j^2 + c_j \cdot x_j^3, Cap_j) \right)$$

$$x_j = \max(0, PGA_j - 0.05)$$

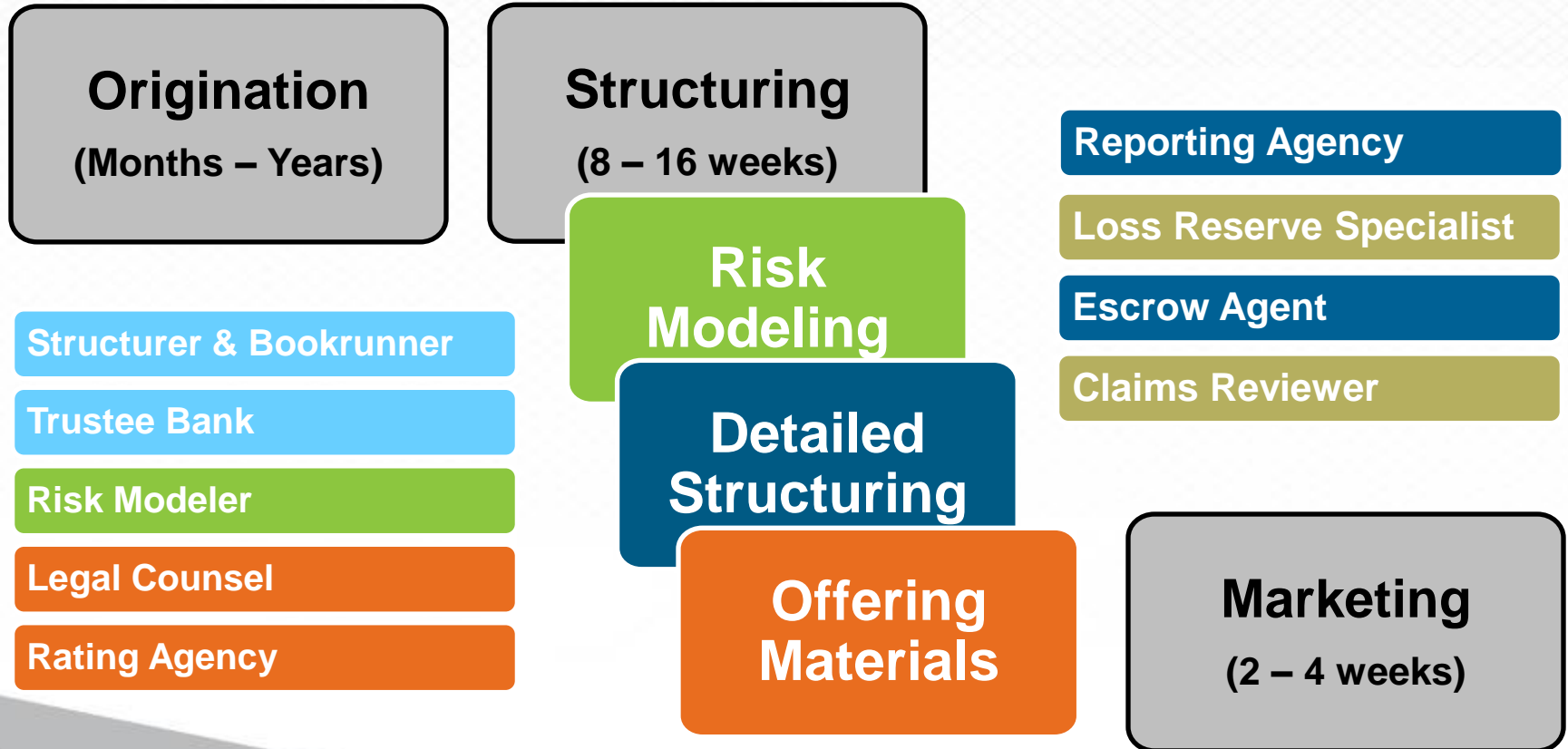


# The Issuance Process

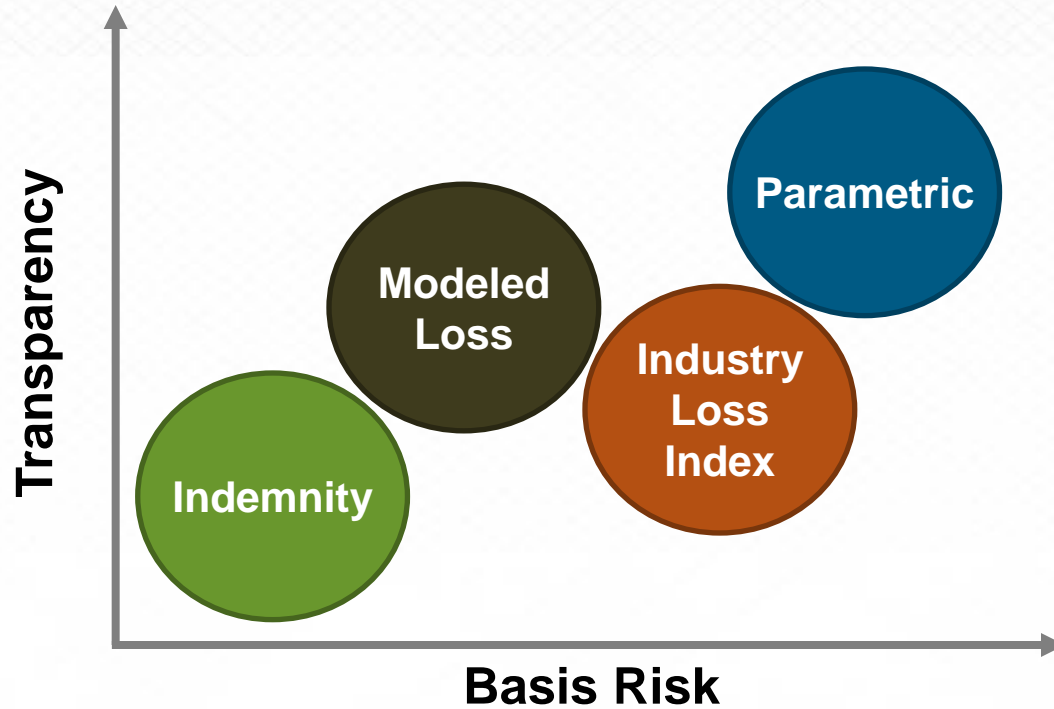




# The Issuance Process

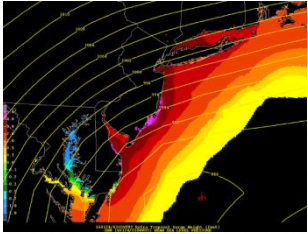


# Risk Modeling - Common Trigger Types



# Catastrophe Bonds Are Highly Customizable

**Parametric**



**Industry Loss Index**



**Modeled Loss**



**Indemnity**



**Hybrids**



**3 years**

**1 year**

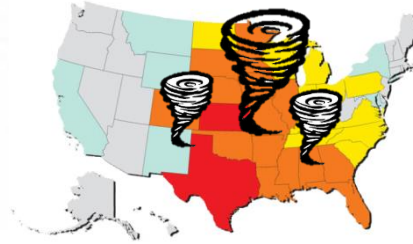


**5 years**

**Occurrence**



**Aggregate**



**Single Issuance**

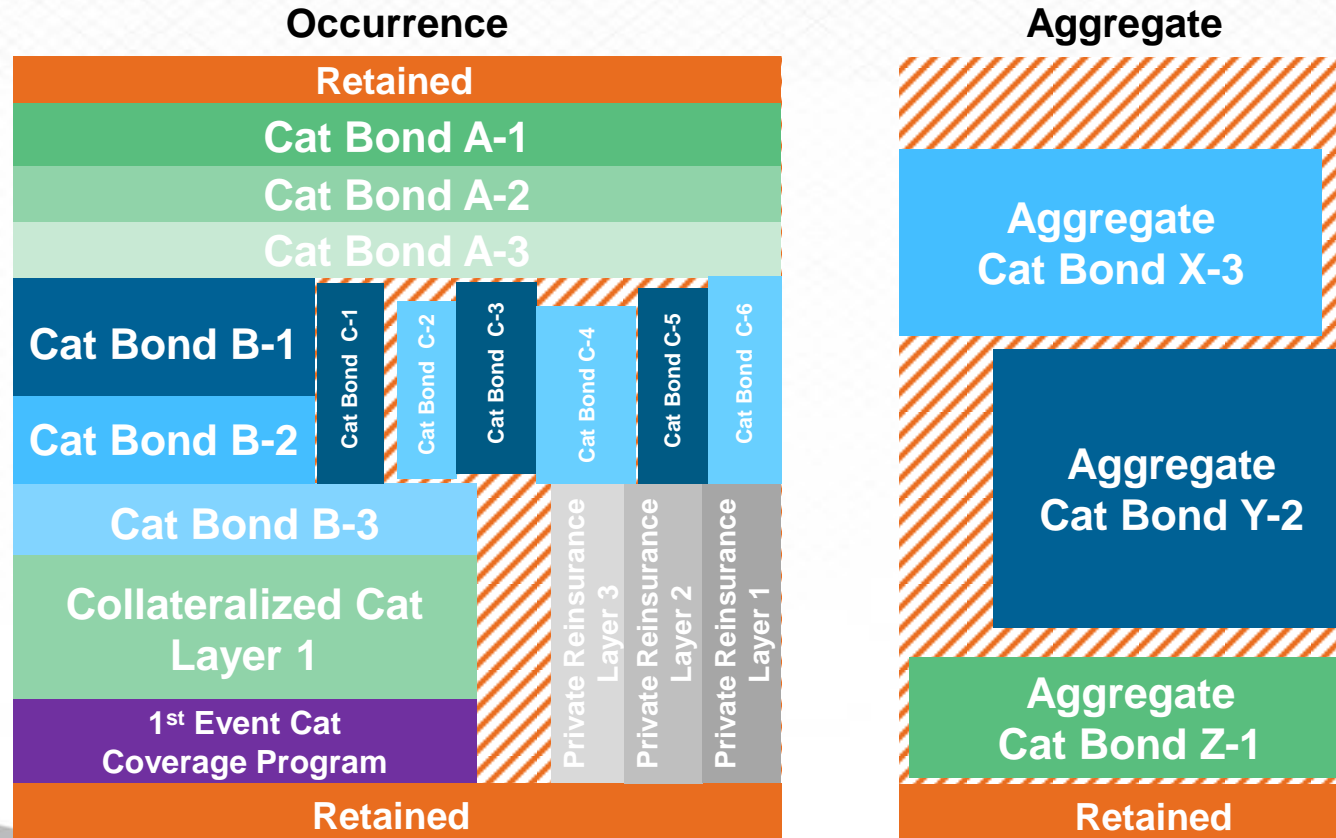


**Note Program**





# Catastrophe Bonds Complement Traditional Reinsurance & Risk Financing

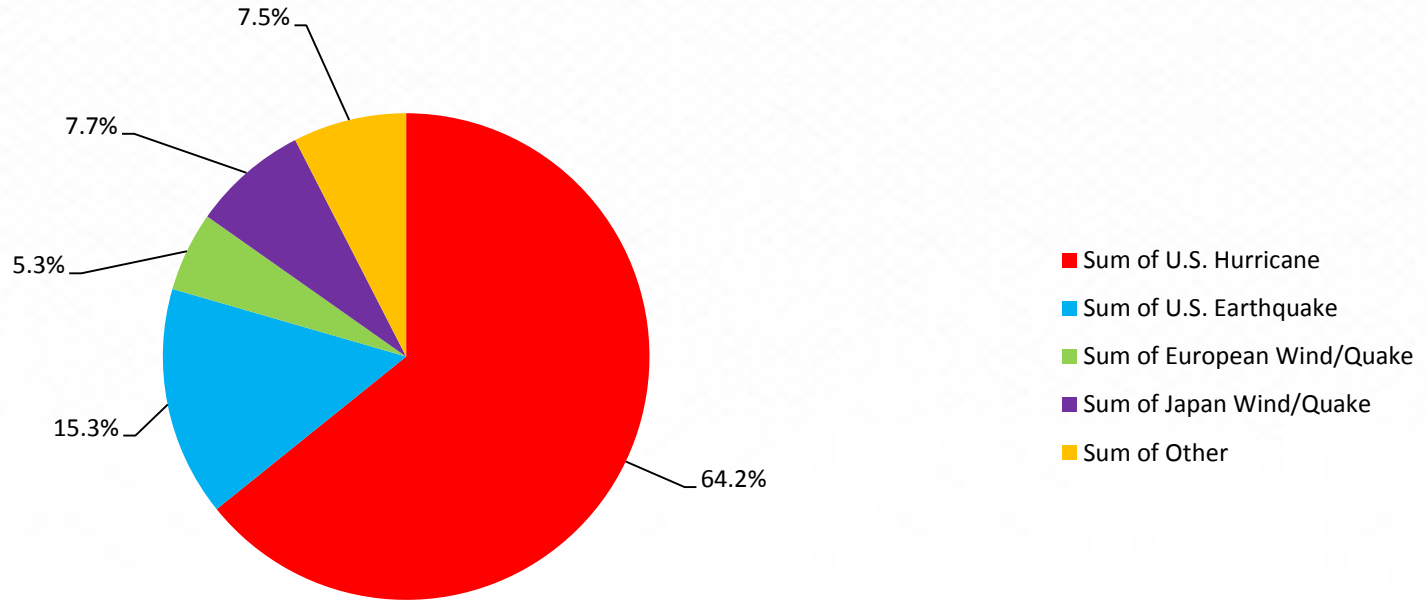


# The Catastrophe Bond Market



# Catastrophe Bond Issuance by Region and Peril

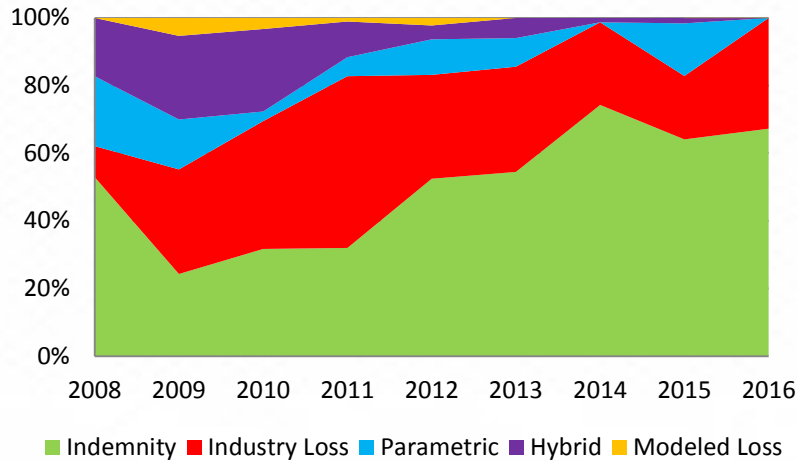
## % of Total Outstanding Principal by Peril\*



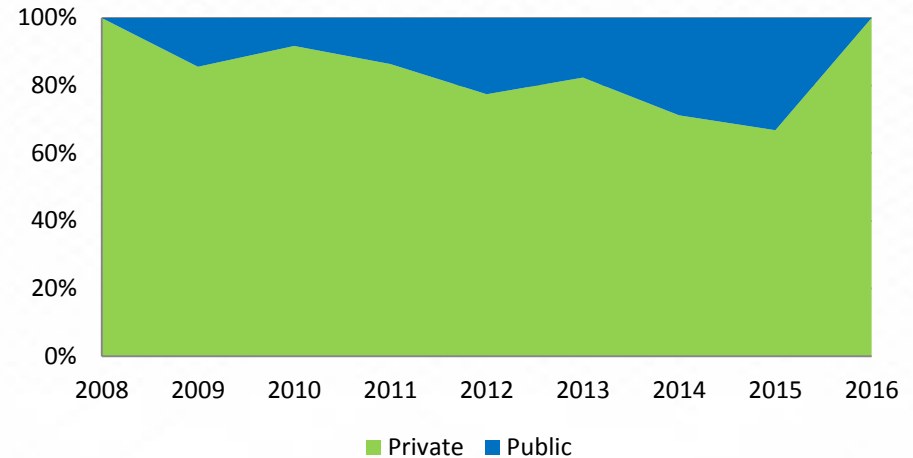
\*Multi-peril cat bonds were split into single perils based on their contribution to expected loss

# Trends among Triggers and Sponsors

## Trigger Type by Issuance Amount

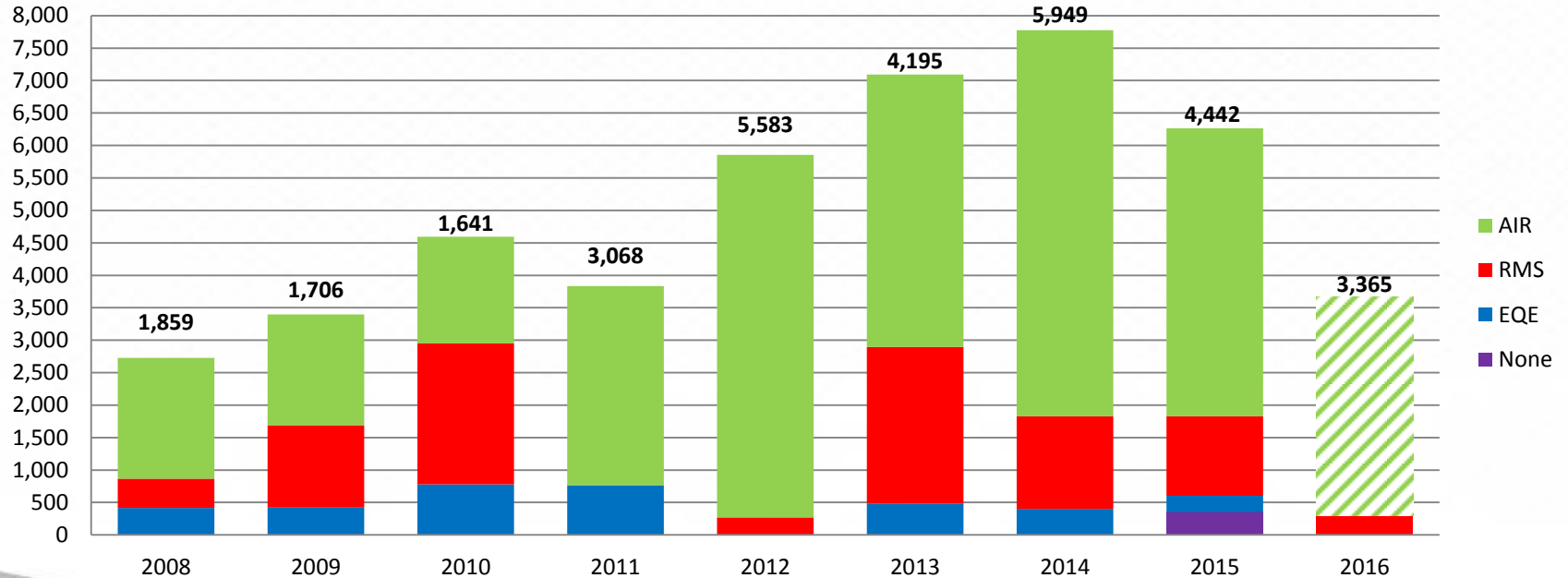


## Ceding Sector by Share of Issued Limit



# AIR Is the Leading Modeler of Catastrophe Bond Issuances

**Modeling Agent Distribution by Issuance Amount  
(\$ million)**



# AIR's Team Has a Proven Track Record of Outstanding Service



**Reactions**

NORTH  
AMERICA  
AWARDS

2013



**Reactions**

LONDON  
MARKET  
AWARDS

2013  
WINNER



**Reactions**

NORTH  
AMERICA  
AWARDS

2014



**Reactions**

L A T I N  
A M E R I C A  
A W A R D S

2015  
WINNER



**Reactions**

NORTH  
AMERICA  
AWARDS

2015  
WINNER



**Reactions**

LONDON  
MARKET  
AWARDS

2015



**Reactions**

NORTH  
AMERICA  
AWARDS

WINNER  
2016



**TRADING**  
Risk

AWARDS 2015  
WINNER

*AIR has been the risk modeler of choice for close to **USD 40 billion of issuance** since the inception of the ILS market*

# Thank you!

[jboyd@air-worldwide.com](mailto:jboyd@air-worldwide.com)