www.ICA2014.org

LEARN
INTERACT
GROW

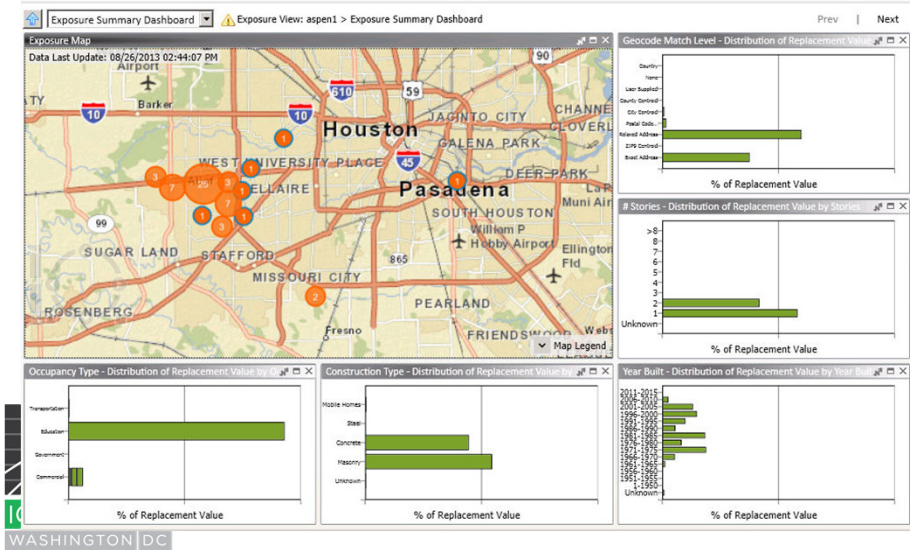
Commercial Property Insurance Data and Analytics --- Innovation and Globalization

Presented by Verisk Analytics
Session N-5A April 4, 2014

Commercial Property Insurance Data and Analytics --- Innovation and Globalization

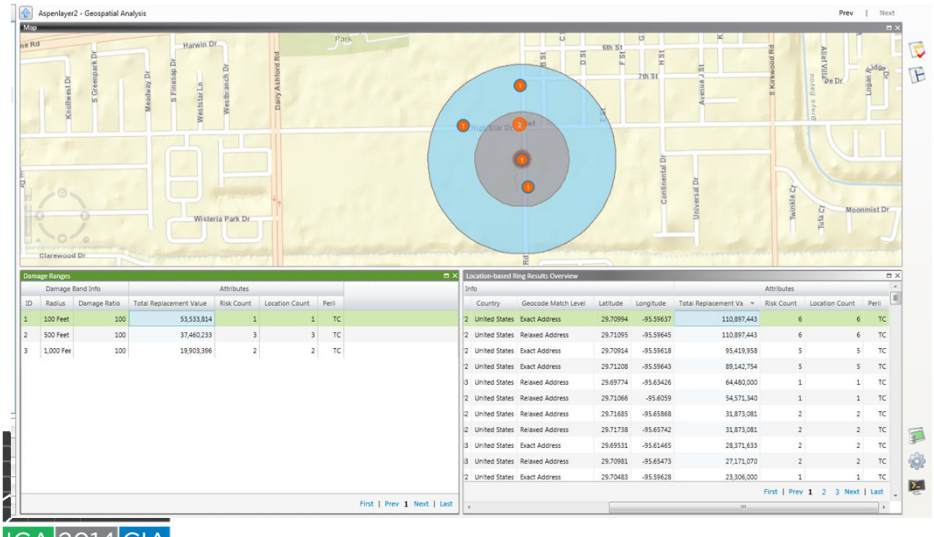
- Agenda
  - New approaches to managing accumulations of risk
  - New approaches to gathering exposure data
  - New approaches to rating
  - Innovation in individual risk analysis
  - Exporting best practices
  - Workflow improvement

Convenient Visual Displays Provide Insight into Clusters of Risk



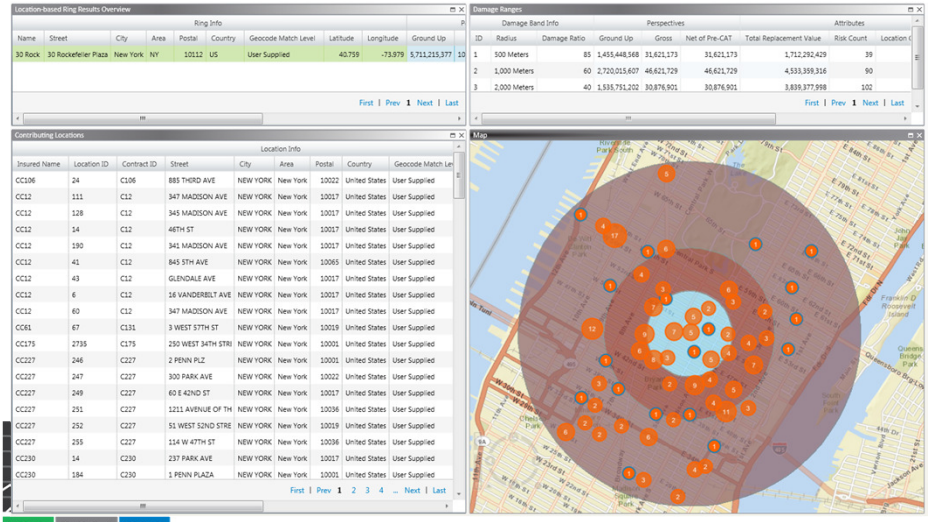
WASHINGTON DC

Ring Analysis Identifies the Cluster of Risk



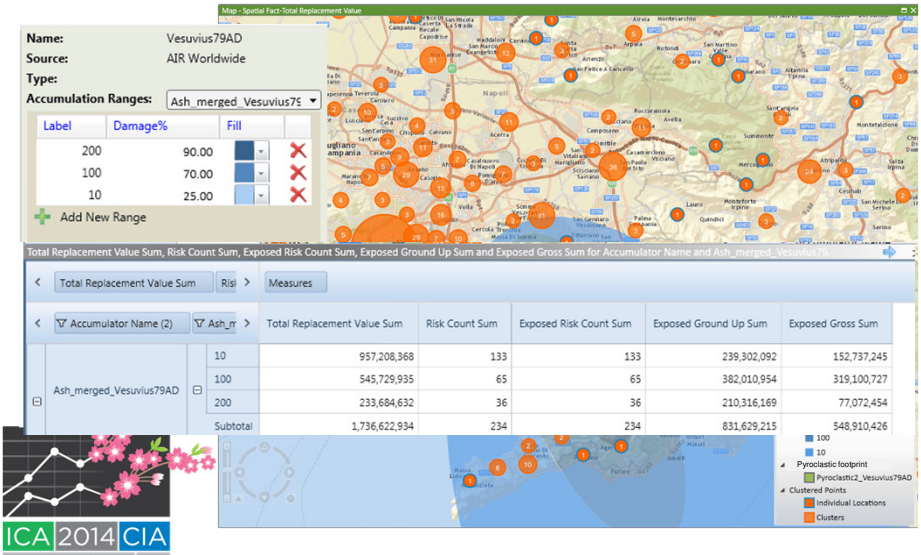
ICA 2014 CIA
WASHINGTON DC

Ring Analysis Can Help Identify Locations at Risk from a Terrorist Attack



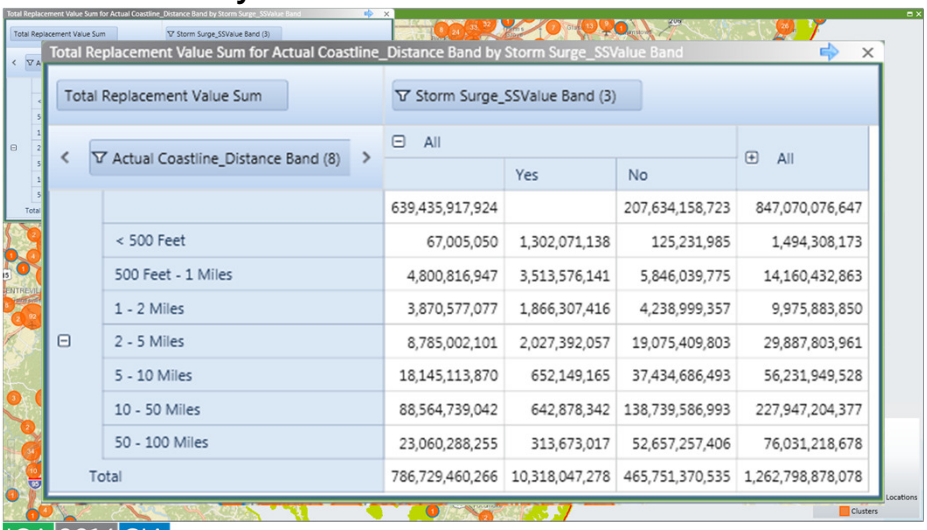
ICA 2014 CIA WASHINGTON DC

Apply Customized Damage Ratios for Vesuvius 79 A.D. Ash and Pyroclastic Footprints



ICA 2014 CIA WASHINGTON DC

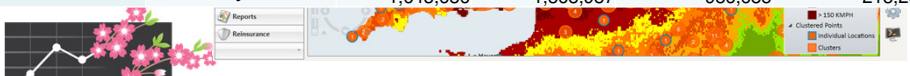
Geospatial Analysis of Portfolio Can Help Identify Risk Before an Event Occurs



ICA 2014 CIA WASHINGTON DC

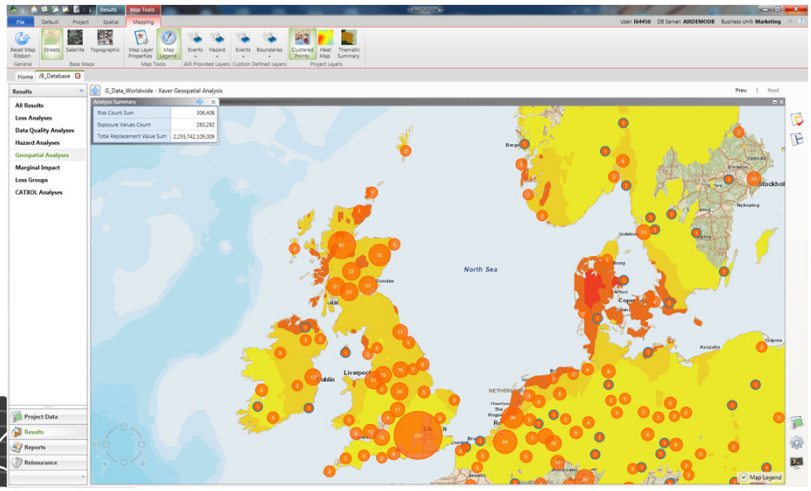
Perform Accumulations and Report on Lloyds Realistic Disaster Scenarios

	Construction	Wind Speed Band (m/s)			
		< 80 KMPH	80 – 100 KMPH	100 – 120 KMPH	120 – 150 KMPH
Residential	Wood	1,571,355	520,386	176,335	352,896
	Concrete	1,881,467	80,600	456,857	421,627
	Masonry	444,391	340,087	338,252	358,656
Commercial	Steel	4,754,965	1,742,971	22,756	13,104
	Concrete	1,346,692	64,948	820,920	317,417
	Light Metal	3,243,782	1,174,479	780,265	212,264
	Masonry	1,643,686	1,368,987	986,685	213,295

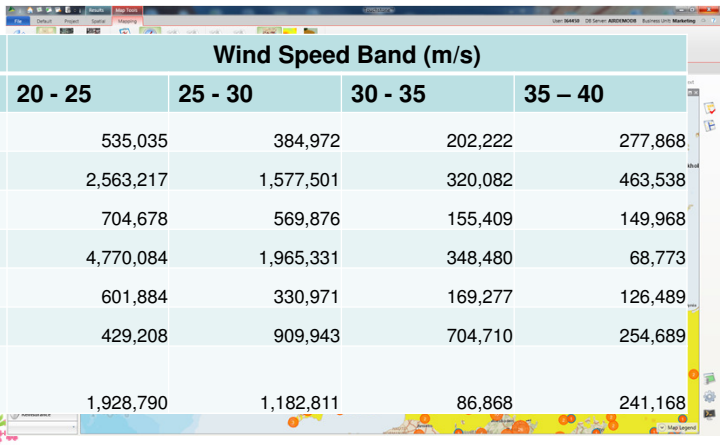


ICA 2014 CIA WASHINGTON DC

Exposed Property Analysis for Xaver based on ALERT



Conduct Post Event Damage Estimation (ETC Xaver)



Country	Wind Speed Band (m/s)			
	20 - 25	25 - 30	30 - 35	35 – 40
Belgium	535,035	384,972	202,222	277,868
Denmark	2,563,217	1,577,501	320,082	463,538
France	704,678	569,876	155,409	149,968
Germany	4,770,084	1,965,331	348,480	68,773
Ireland	601,884	330,971	169,277	126,489
Netherlands	429,208	909,943	704,710	254,689
United Kingdom	1,928,790	1,182,811	86,868	241,168

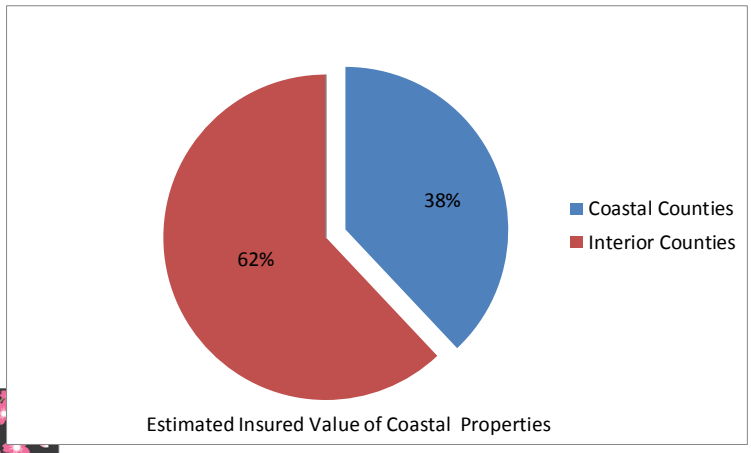
New Approaches to Gathering Exposure Data

- ISO/Verisk is employing innovative approaches to gathering detailed exposure information
  - On Site Building Surveys now capture wind related building characteristics
  - Desktop surveys supplement surveys
  - Aerial Imagery – Data Capture Underway

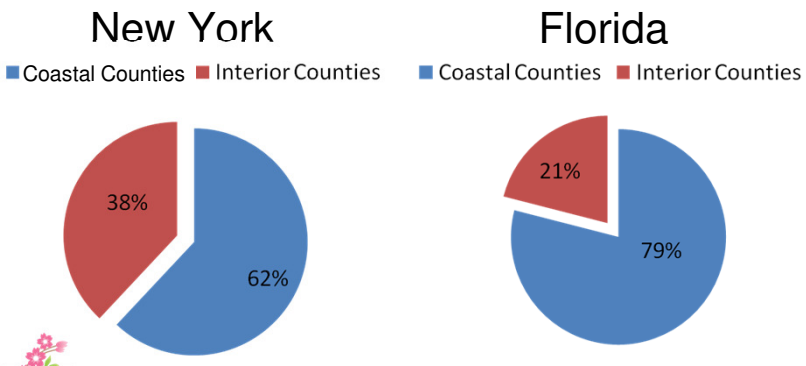
Enhanced Wind Rating - Background

- Exposure to wind losses has grown significantly in the U.S.
  - Exposures along the coast have increased
  - "Tornado Alley" presents additional exposure
- Traditionally, wind rating was based on fire construction codes, with modifications

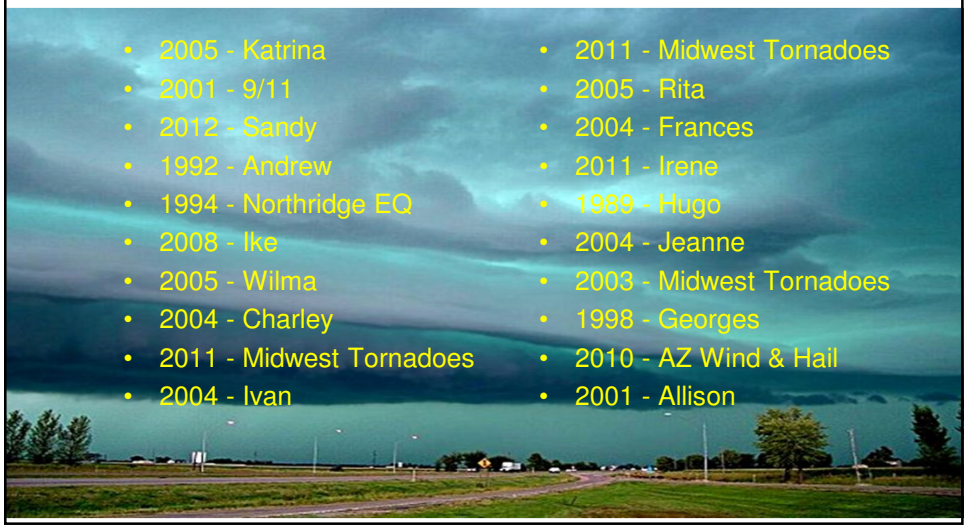
Exposure in Coastal Areas Contributes Significantly to Hurricane Risk in the U.S.



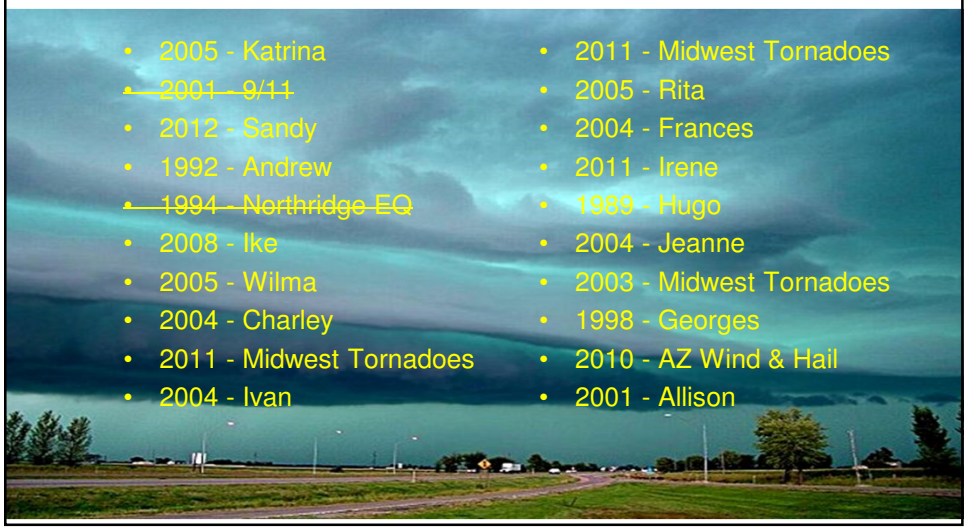
Exposure in Coastal Areas Contributes Significantly to Hurricane Risk



Top Catastrophe Events: PCS Top 20



Top Catastrophe Events: PCS Top 20



Fire Class Code Data Is Not Sufficient for Catastrophe Risk Management

SPI
Construction Class 6

- 111 - Masonry
- 114 - Unreinforced Masonry - Bearing Wall
- 115 - Unreinforced Masonry - Bearing Frame
- 116 - Reinforced Masonry
- 117 - Reinforced Masonry Shear Wall (with MRF)
- 118 - Reinforced Masonry Shear Wall (without MRF)
- 131 - Reinforced Concrete
- 132 - Reinforced Concrete Shear Wall (with MRF)
- 133 - Reinforced Concrete Shear Wall (without MRF)
- 134 - Reinforced Concrete MRF - Ductile
- 135 - Reinforced Concrete MRF - Non Ductile
- 151 - Steel
- 152 - Light Metal
- 154 - Steel MRF - Perimeter
- 155 - Steel MRF - Distributed

ICA 2014 CIA
WASHINGTON DC

Features of the Program

- Verisk is conducting on-site building surveys
  - Compiling information on approximately 40 characteristics
  - Supplementing with aerial imagery
  - As collected, information is available in Enhanced Building Underwriting Reports
- Enhanced BG II loss costs developed
  - Starts with Existing BG II loss lost
  - Applies debits/credits based on individual building characteristics
  - Enhanced loss cost available in SPI/ProMetrix

ICA 2014 CIA
WASHINGTON DC

Field Surveys/Roof Observations

Trained field staff are currently surveying wind-specific eligible risks in ProMetrix, since April 2011

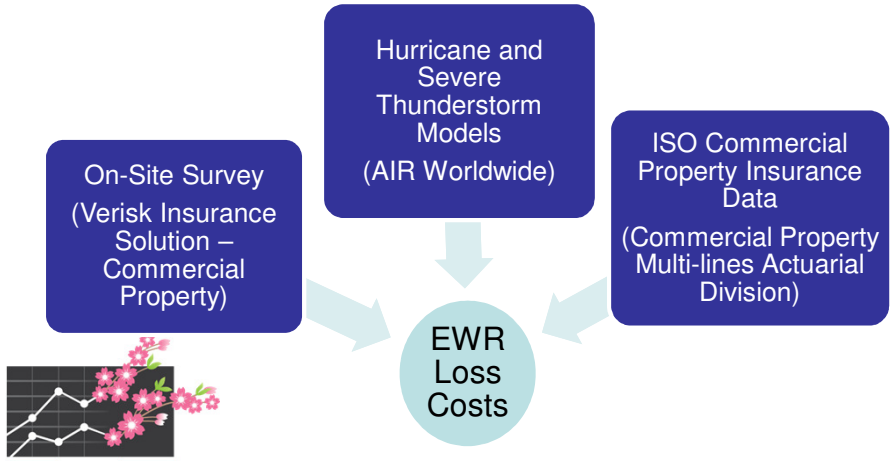
Database resurvey projects are also underway

Field Surveys/Roof Observations

Information recorded about:

- Environmental conditions
- Roof envelope
- Wall envelope
- Structural frame

Enhanced Wind Rating Program



21

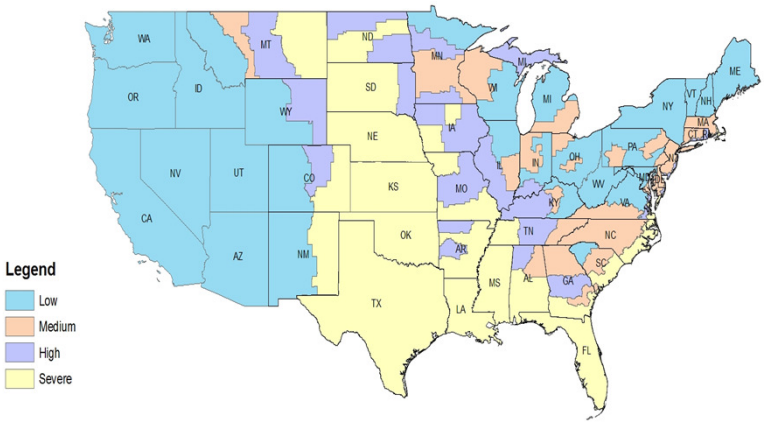
Eligibility for EWR Program

- BG II Specific Rated Properties
- Geographic Risk Factor and Building Size Criteria

Geographic Risk Factor	Building Size (1000 ft²)		
	10 - 25	>25 - 50	>50
Low			
Medium			X
High		X	X
Severe	X	X	X

22

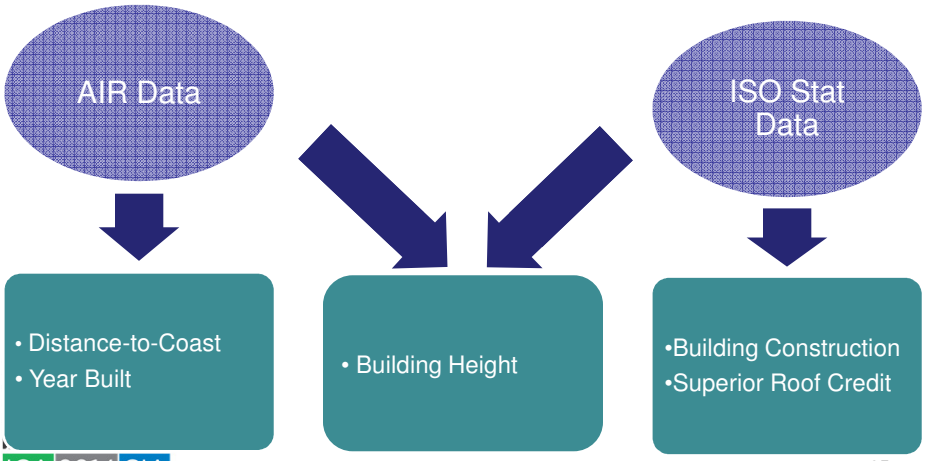
Wind Risk Map



Phase I Factors

- Distance to Coast (DTC)
  - Reflects Terrain characteristics
  - Applicable only to coastal states
- Year Built
- Building Height
- Building Construction
- Superior Roof
- BCEGS Grade

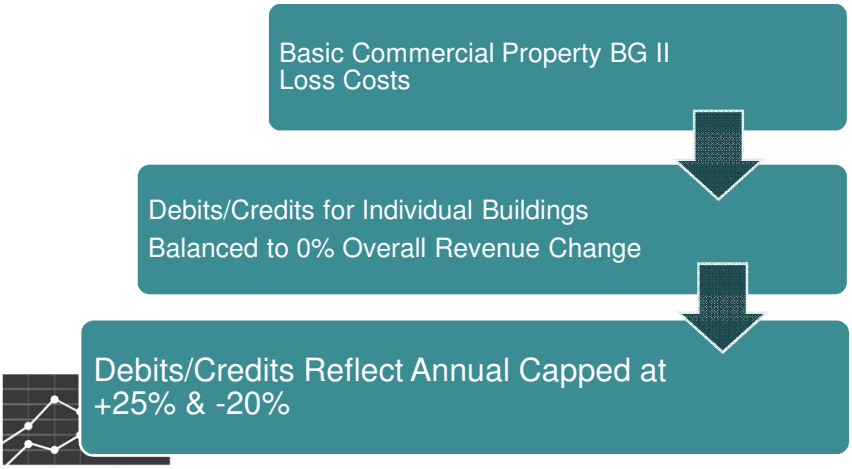
Data Used to Derive Factors



ICA 2014 CIA WASHINGTON DC

25

Summary of EWR Program



ICA 2014 CIA WASHINGTON DC

26

Exposure Data Relevant for Modeling Individual Risks

Location			
Geocode Match Level	Street Address	City	Postal Code

Replacement Value
Building

Policy Terms	
Limits	Deductibles

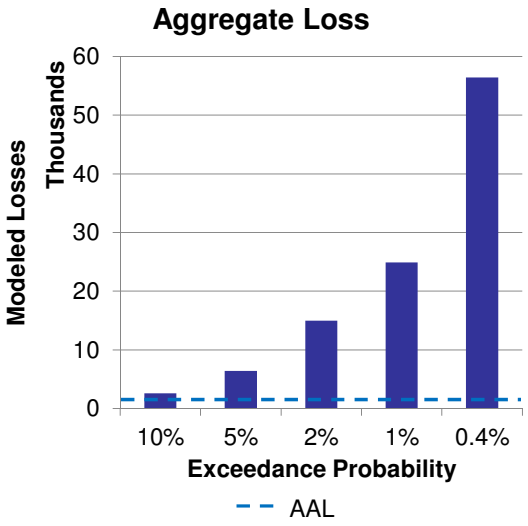
Primary Building Characteristics			
Construction	Occupancy	Age	Height

Additional Building Characteristics					
Window Protection	Glass Type	Glass Percent	Roof Geometry	Roof Covering	Roof Covering Attachment
Roof Deck	Roof Deck Attachment	Roof Anchorage	Wall Type	Wall Siding	Exterior Doors
Soft Story	Building Shape	Torsion	Foundation Type	Foundation Connection	Special EQ Resistant Systems

ICA 2014 CIA WASHINGTON DC

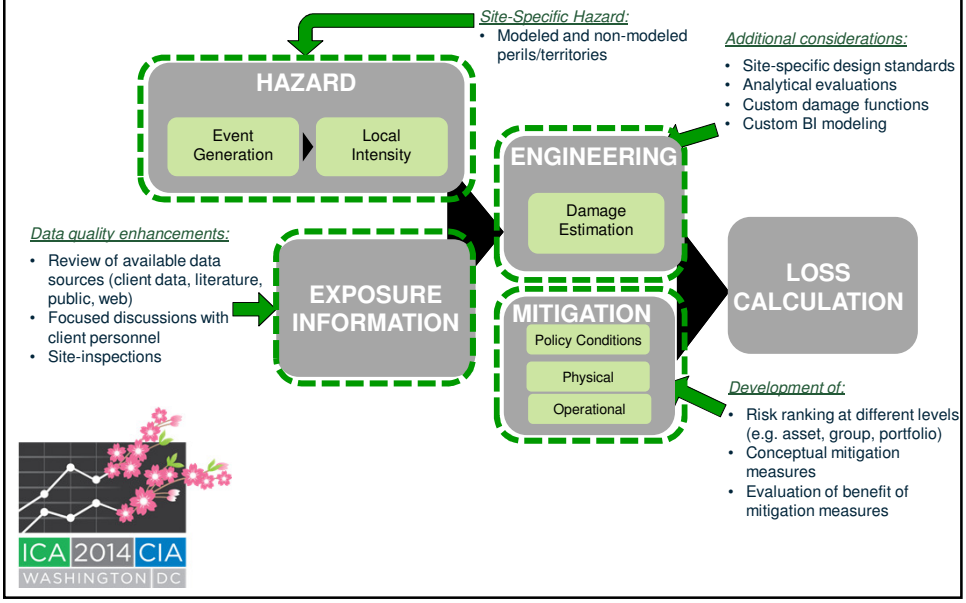
Individual Risk Modeling Can Produce a Detailed EP Curve for a Single Property

The Monroe Building
2001 Pennsylvania Ave.
Replacement Value: $38.5m



ICA 2014 CIA WASHINGTON DC

Complex, High Value Locations May Warrant Individual Risk Engineering Analysis

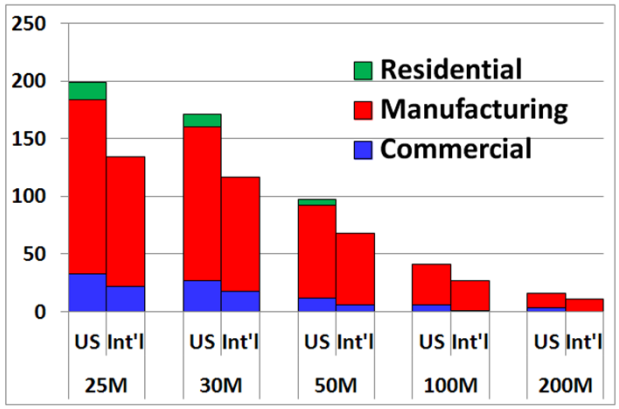


Analytics Developed in One Geographical Area Expanded to Other Areas

- Loss costs and Excess layer pricing tools based on US risks are expanded to an International focus.
- As an example, Excess layer pricing tools (Property Size of Loss Distributions) may be extended to an International focus by using COPE-ARM adjustments (Construction, Occupancy, Protection, Exposure, Amount of Insurance, Replacement Costs, Misc).
- These techniques may be applied to Ground-Up loss costs as well.

The Property Per Risk Benchmarking Issues

Comparison of Large Fire Losses by Occupancy – US vs. International



- Very similar large loss distributions for Commercial and Manufacturing – US vs. International
- Drop off from 25M to 200M also quite similar across aggregated 7 International countries
- International counts used is validating PSOLD International results

ICA 2014 CIA WASHINGTON DC

31

Basic Steps in Adjusting US Excess Loss Curves for International

- **Step 1: Validate US Curves – Want Strong Proxy Anchor**
  - US market is comparable to size of 7 initial target countries combined
  - Evaluate credibility of US original and fitted data – in total and by component
  - Validate using actual vs. expected large losses (from 25mm to 250mm; NFPA 20 years)
- **Step 2: Adjust US Curves to International – COPE (ARM)**
  - Assess differences in Amounts of Insurance, Occupancy, Protection, Construction, etc.
  - Using various industry exposure databases – US vs. International
  - Consolidate individual selections to total COPE adjustments
- **Step 3: Validate Proxy Curves with Industry Data**
  - Industry large loss information (AXCO Insurance Information Services, FPA-UK, other sources)
  - Compare actual vs. expected claim counts at various attachment points
  - Cross country comparisons – counts and occupancy differences
- **Step 4: Use Individual Account Information for Benchmark Refinement**
  - Submissions: individual large claims
  - Aggregated exposure information

ICA 2014 CIA WASHINGTON DC

32

Review Macro Industry Application for Validation (US)

Summary – Actual vs. Expected # of Claims (All Occupancies vs. Severe)

Threshold (mm's)	All Occupancies 20 year NFPA Actual	PSOLD 2012 2.5mm Scaled	PSOLD 2012 Fitted Range	Severe /All Occupancies
500	*3*	*0.5*	*0 - 1*	66.3%
400	*6*	*1.4*	*1 - 2*	66.1%
250	12	7.1	6 - 11	65.5%
200	13	12.4	11 - 19	64.8%
150	19	21.8	19 - 33	62.9%
100	40	43.7	38 - 67	57.7%
80	52	59.1	51 - 91	53.9%
50	89	108.4	93 - 166	43.7%
25	182	314.0	270 - 481	26.7%

Good all-industry validation of large claims from 25M to 200M, and perhaps 250M if accept potential protection improvements in the last 20 years

For example, over the last 20 years, there were 40 Fire claims (trended) above 100M, while all-industry validation would produce 43.7 claim

The most severe occupancies of severe manufacturing/petroleum and HPR-heavy account for almost 2/3rds of the largest claims

Actual claims from National Fire Protection Association largest claims 1991-2010
- trended to 2012, but not developed beyond 1st report; does not include indirect losses such as TE
- does not include potential protection improvement credits (9 of the 13 >=200mm are from 1990s-trended)

Fitted using all rating groups (38) and states combined; adj. for 50% market share (last 20 year 40-60%)

* Severe Manufacturing/Petroleum & Highly Protected Risks-Heavy (52 CSP Classes; PSOLD RGs-35,38)

ICA 2014 CIA WASHINGTON DC

33

US to International Property Risk Excess Loss Factors

COPE Assessment Matrix – Steps

1. **Start with a list of potential differences between the US and target countries**
   - Standard in Property Underwriting is COPE – Construction, Occupancy, Protection, and Exposure
   - To this list, we add ARM: Amounts of Insurance, Rebuilding costs, Miscellaneous (social, etc.)
2. **Assess whether each item would favorably or unfavorably impact expected loss results compared to the US - Reduce (positive) OR Increase (negative)**
3. **Attempt to evaluate magnitude of the impact of each item**
   - **L**ow, **M**edium, **H**igh, or unknown
4. **Tally the expected cumulative effect of each of the COPE (ARM) items**
   - Include direction and magnitude of all items - Could vary for example by groups of occupancies
5. **Reconcile total impact assessment to historical excess loss layers vs. US**
   - Review actual number of large claims to US, using exposure base such as $B of subject premium
   - Review cross country comparisons
6. **Can do the same for Ground-up Loss Costs as proxy outside the US**

ICA 2014 CIA WASHINGTON DC

34

US to International Property Risk Excess Loss Factors

PSOLD International: COPE Assessment Matrix (for illustration only)

Commercial / Industrial

		US	Country A	Country B	Country C	Country D	Country E	Country F	Country G
Construction	C		H	M	L		M	M	M
Occupancy	O		L	H		M		H	L
Protection	P			M	M	M	H	M	H
Exposure (e.g. industrial facilities)	E			M	L	H			L
Amount of Insurance	A		M			M	L	H	M
Replacement Costs	R		M	L	H	L	L	H	M
Miscellaneous	M			M		L		H	
Total Indicated (before validation)				H		M	L	L	H

Impact Key *(compared to US)*	
Direction	Worse
	Better
	No difference
Magnitude	H = High
	M = Moderate
	L = Low

1. With US as base, compare each COPE+ attribute
2. Tally up expected impacts and qualitatively weigh them by COPE+ attribute
3. See how compares to actual large loss experience
4. Use same procedure for Ground-up Loss Costs, but include Frequency component – COPE+FARM

ICA 2014 CIA WASHINGTON DC

35

Loss Costs – Expansion to International Focus

- US Overall Loss Cost / Rating Factor Model
- Scope of ISO's Models
- Developing International Loss Costs with US Data
- Overall International Loss Cost / Rating Factor Model

ICA 2014 CIA WASHINGTON DC

36

US Overall Loss Costs/Rating Factor Model – Class Rated Risks

Base Loss Costs
- State
- Territory

Relativities
- Construction
  - 6 Types
- Protection
  - 10 PPC Grades
- Occupancy
  - 99 individual Class-Rated Types
- Rating ID
  - Class Rated
  - Non-Sprinklered
- Coverage
  - Buildings
  - Contents

Policy-Specific Attributes: Limit of Insurance
Deductible
Blanket Average Rating

37

US Overall Loss Costs/Rating Factor Model – Specific-Rated Risks

Base Loss Costs
- State
- Territory

Relativities
- Construction
  - 6 Types
- Protection
  - 10 PPC Grades
- Occupancy
  - 50 individual Specific-Rated Types
- Rating ID
  - Specific Rated
  - Sprinklered
  - Non-Sprinklered
- Coverage
  - Buildings
  - Contents

Building-Specific Information
- SCOPES Result
- Prometrix Database
- Add'l Debits/Credits

Policy-Specific Attributes: Limit of Insurance
Deductible
Blanket Average Rating

38

Scope of ISO's Models

- ISO collects credible statistical data at a very detailed level from a broad base of insures in the US
- ISO gathers accurate and high quality building information from field representatives during on-site surveys
- Loss costs and relativities are developed using advanced GLM modeling and sophisticated analytical techniques
- ISO Loss costs are ideal for benchmarking

39

Developing Int'l Loss Costs with US Data

- Starting with ISO's loss costs and COPE relativities
- Identifying differences in COPE for US vs. Other countries
- Evaluating appropriate territory and protection classifications – protection varies from country to country
- Employing COPE FARM adjustments based on cross country comparisons
- Calibrating and validating with International experience

40

Proposed Overall Loss Costs/Rating Factor Model – International Risks

Base Loss Costs
- "Country"
- Territory

Relativities
- Construction
  - 6 Types
- Protection
  - PPC Grades
- Occupancy
  - 150 individual Relativities (Class and Specific Underlie)
- Rating ID
  - Sprinklered
  - Non-Sprinklered
- Coverage
  - Buildings
  - Contents

Policy-Specific Attributes: Limit of Insurance
Deductible
Blanket Average Rating

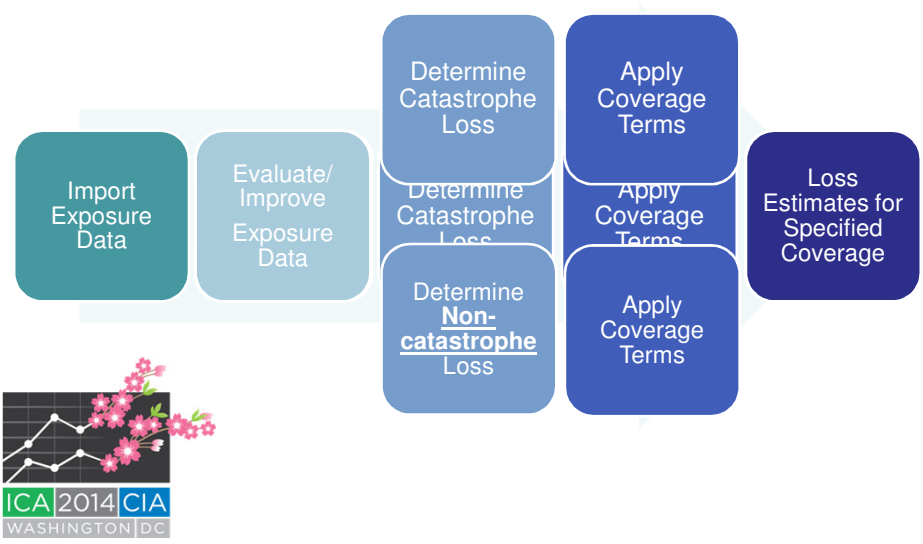
41

Calibrating the Model with Data

- ISO would collect international data to make sure the model is accurately reflecting the conditions in that country.
- ISO is able to leverage its rich experience and expertise in data collection and data analysis.
- ISO will protect the privacy of any data. Data provided to ISO will be kept private and confidential and will not be shared with any third parties. ISO has a long history of protecting the confidentiality of data reported to us.

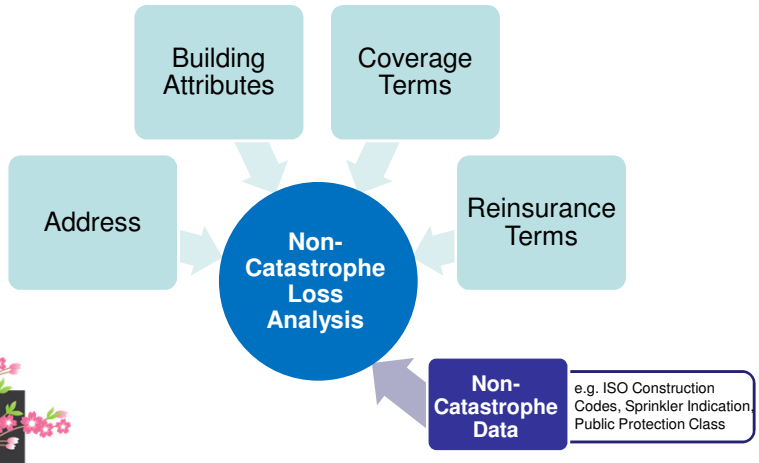
42

Catastrophe Modeling Workflow Can Be Leveraged for Detailed Evaluation of Non-Catastrophe Perils



ICA 2014 CIA WASHINGTON DC

Existing Exposure Data Structure Is Valuable to Both Catastrophe and Non-Catastrophe Analysis



ICA 2014 CIA WASHINGTON DC

Combined Loss Results