



Geospatial Science/Analytics and Insurance

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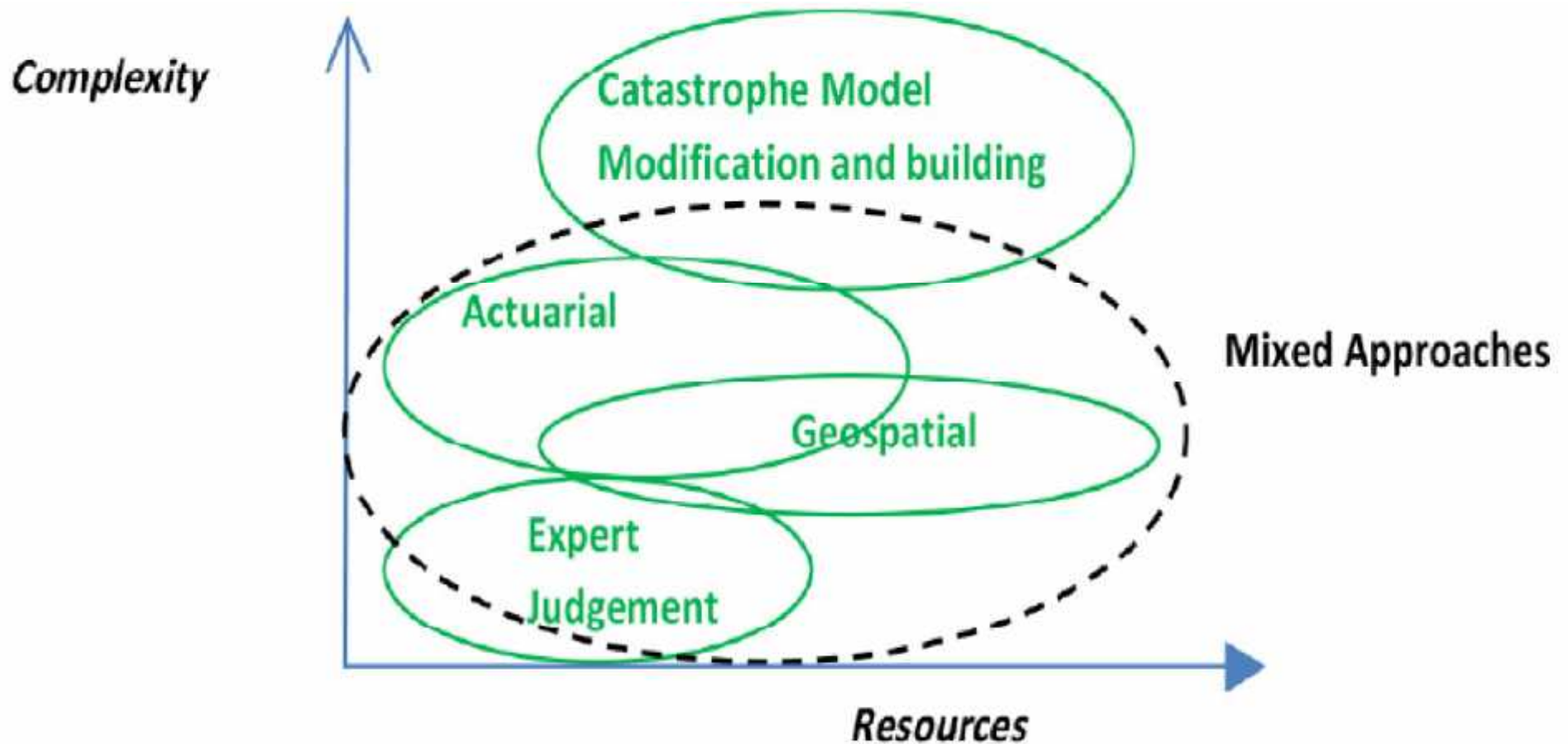
Managing Director & Senior Vice President



Why Use Geospatial Analytics?

- Assists in exposure management for underwriting decisions
- Enables the evaluation of drivers of losses versus accumulation
- Helps manage accumulations for modeled/non-modelled perils and/or countries
- Can be used in conjunction with modelled losses and/or actual claims for model sensitivity testing

Approaches to Understanding and Quantifying Risk



Geospatial/Hazard Analytics

Geospatial Analysis



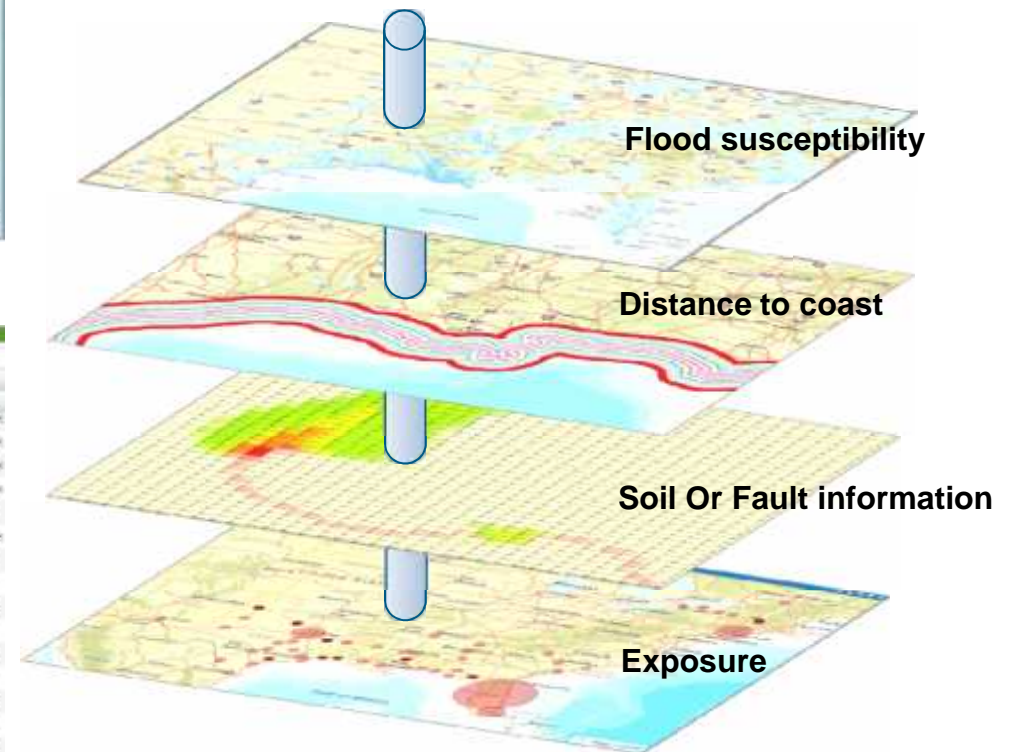
Hazard Analysis

Results Table

Altitude Profile | Flood Zone Profile | Flood Profile

Location ID	State	City	Country	Profile Date	Latitude	Longitude	Distance to Water Body	Distance to 100 Year Flood Feet	Flood Zone	100 Year Flood Zone	Simulation
2178	Ohio	COLUMBUS	United States	4/22/12	40.187128	-83.004623	> 5	0.25	Outside	0	500 - 1000 Feet
20235	Ohio	SANDUSKY	United States	4/27/14	42.248323	-82.87940	> 5	0.88	Outside	0	500 - 1000 Feet
6380	Ohio	SANDUSKY	United States	4/27/14	42.248349	-82.923173	> 5	1.12	Outside	0	500 - 1000 Feet
7444	Ohio	GLYNNESBURG	United States	4/19/12	41.189889	-81.66941	> 5	0.04	Outside	0	500 - 1000 Feet
11229	Missouri	ALTONA	United States	4/19/12	38.977802	-91.718183	> 5	2.39	Rio Delta	0	> 1000 Feet
10880	Missouri	WINSTON	United States	4/4/10	38.103333	-94.312222	> 5	0.07	Outside	0	500 - 1000 Feet
4254	Missouri	WENTZ	United States	9/4/02	39.853421	-94.382118	> 5	0.05	Outside	0	> 1000 Feet
8028	Missouri	WENTZ	United States	5/17/10	39.853787	-94.382118	> 5	0.05	Outside	0	> 1000 Feet
14199	New Jersey	WATSON	United States	9/10/12	40.924777	-74.148888	> 5	0.02	Outside	0	25 - 100 Feet
2086	New Jersey	BRIDGE CITY	United States	8/7/04	40.722051	-74.082153	0.20	0.11	Outside	0	25 - 100 Feet
5812	New Jersey	WATSON	United States	9/10/12	40.924777	-74.148888	> 5	0.02	Outside	0	25 - 100 Feet
11212	Texas	WINDOOGS	United States	7/12/10	30.002222	-95.183333	> 5	0.11	Outside	0	40 - 100 Feet
8812	Texas	WINDOOGS	United States	7/12/10	30.004444	-95.218888	> 5	0.02	Outside	0	25 - 100 Feet
11460	Pennsylvania	JANCASTON	United States	1/1/03	40.075107	-76.889619	> 5	0.77	Outside	0	500 - 1000 Feet
12813	Pennsylvania	JANCASTON	United States	1/1/03	40.075107	-76.889619	> 5	0.77	Outside	0	500 - 1000 Feet
12813	Pennsylvania	JANCASTON	United States	1/1/03	40.075107	-76.889619	> 5	0.77	Outside	0	500 - 1000 Feet

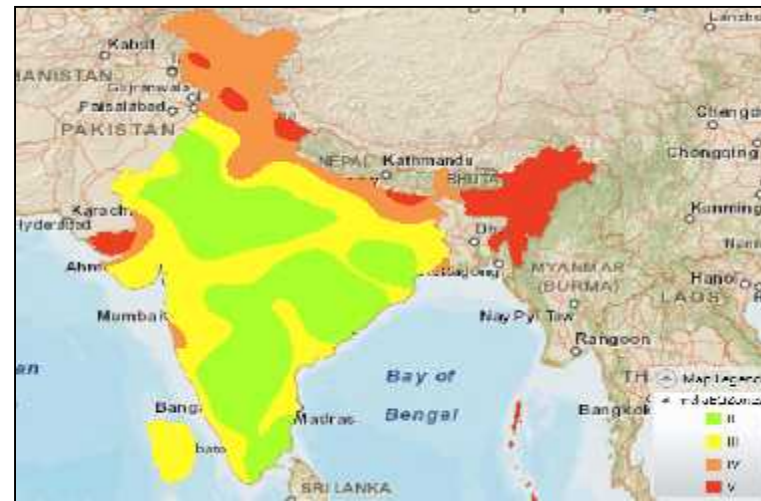
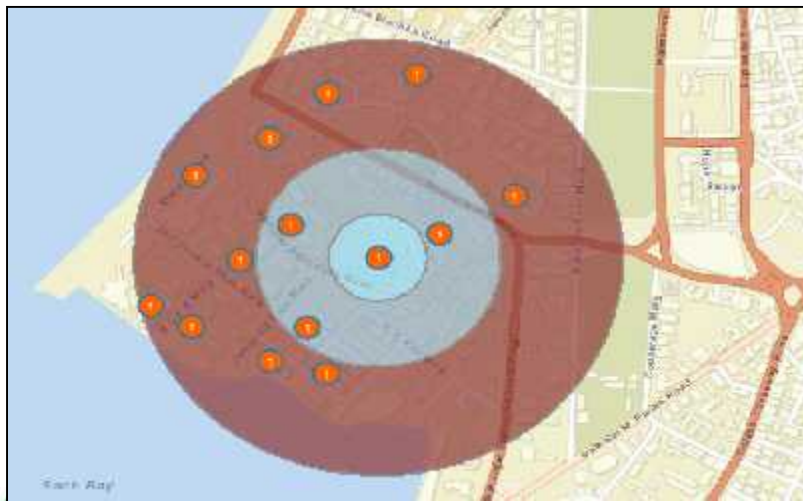
Multiple Hazard Layers Enable Comprehensive Risk Analysis



Using Geospatial Analytics for Accumulation

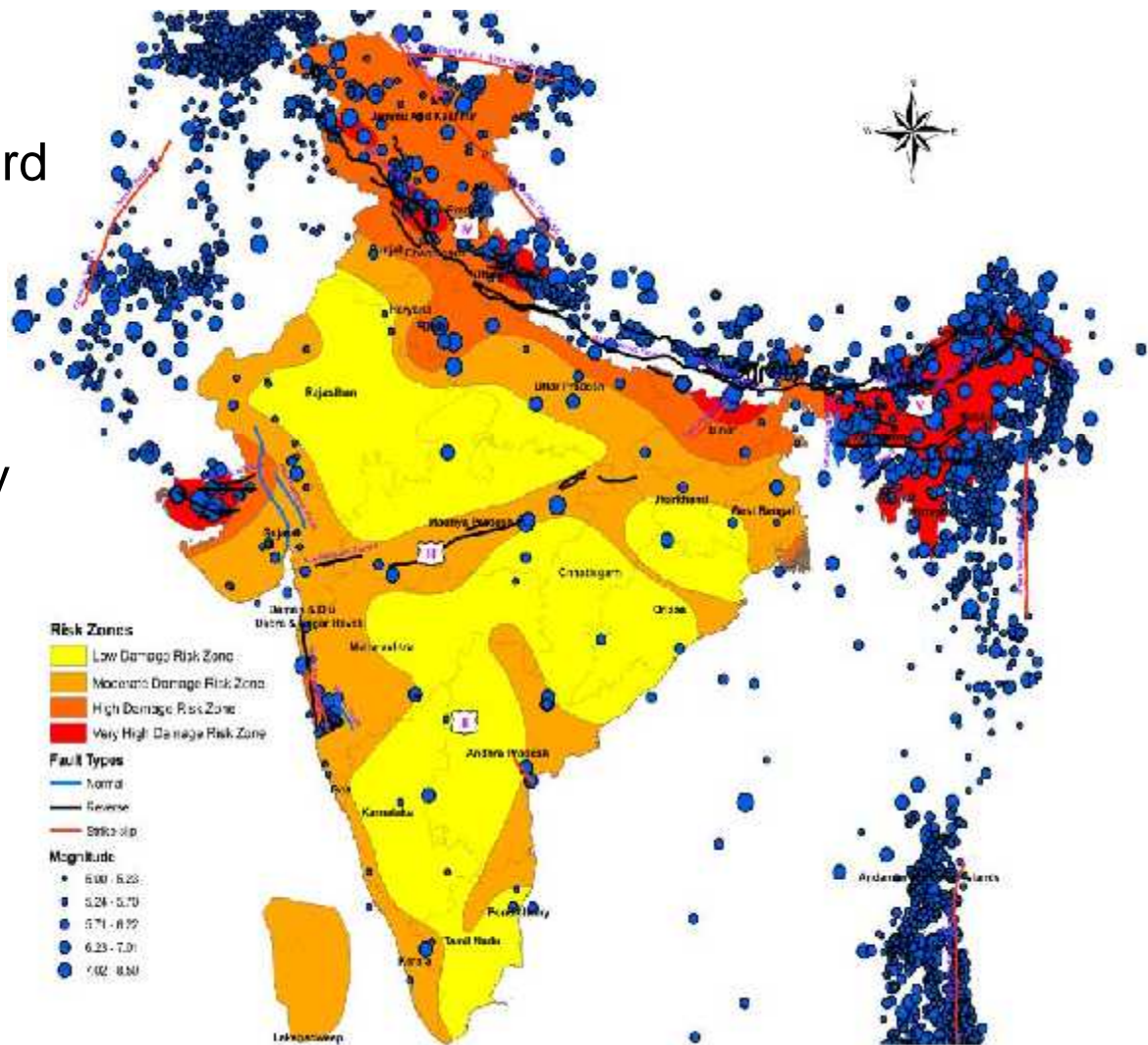


Accumulate based on geographic regions and custom zones and within concentric rings

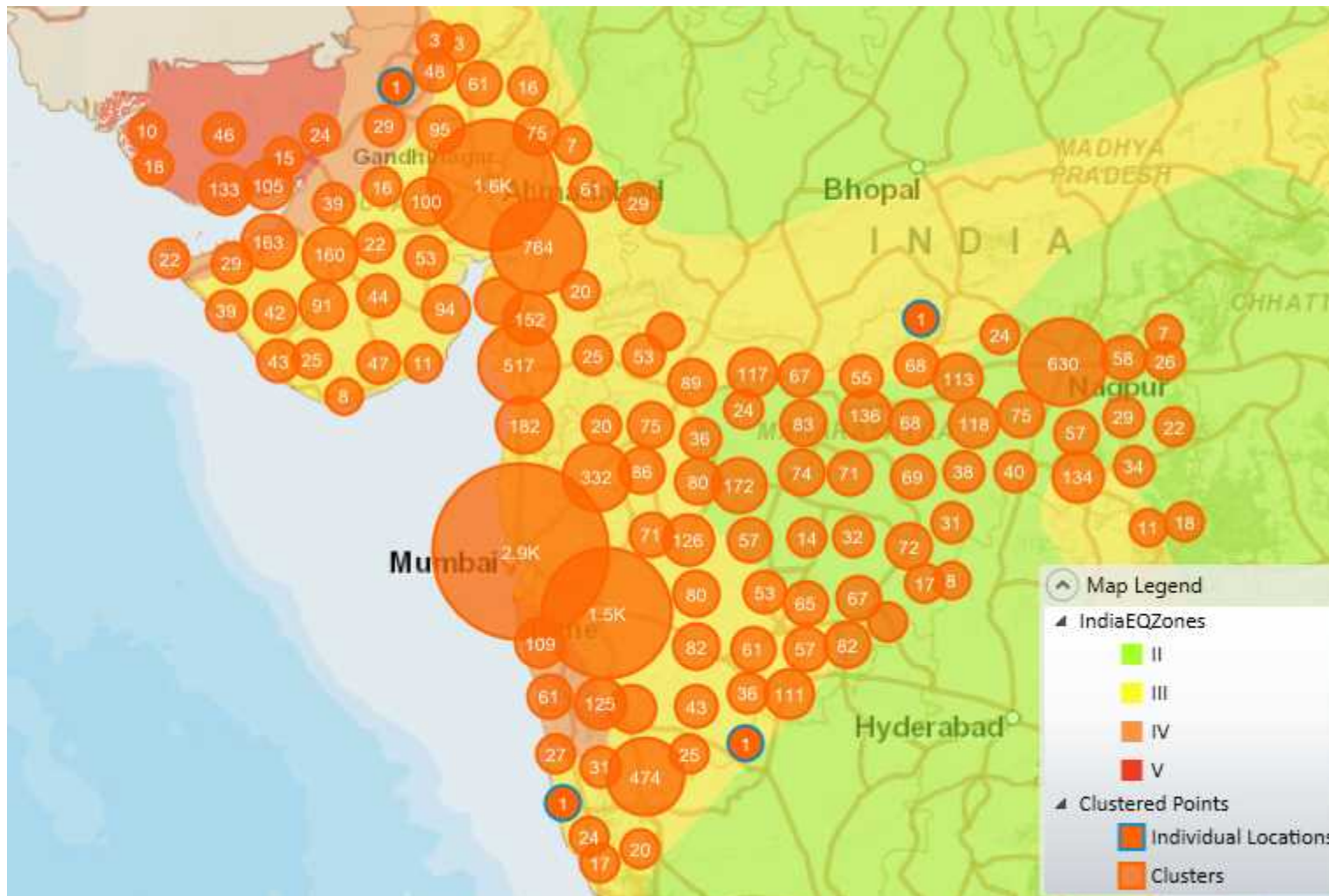


Accumulation by Custom Zones

- Exposure can be accumulated based on third party hazard information
- Shapefiles can be imported/used seamlessly



Overlaying Exposure on Hazard Data Helps in Making Informed Underwriting Decisions



Display Accumulation by State and District

Risk Count Sum and Total Replacement Value Sum for India EQZones_RISK_LEVELBand, CRESTA Zon

< Risk Count Sum Total Replacement Value Sum Measures

< India EQZones_RISK_LEVELBand (4) CRESTA

			Risk Count Sum	Total Replacement Value Sum
II	+		2,619	531,340,691,053
III	+		11,388	7,584,768,078,902
IV	+	Gujarat		
		Banas Kantha	42	2,423,932,033
		Jamnagar	213	2,128,825,563,578
		Kachchh	11	7,112,701,930
		Patan	12	26,773,841
		Rajkot	39	8,179,646,121
		Surendranagar	4	79,988,300
		Subtotal	321	2,146,650,605,825
		Maharashtra	330	176,883,386,325
		Subtotal	651	2,323,533,992,150
V	+		343	532,795,293,236
Subtotal	+		15,001	10,972,438,055,341

Use Historical Footprint to Customise Damageability for Ranges of Wind Speeds

Values to Analyze:

- ☒ Location Values
- ☐ Exposed Limits
- ☒ Accumulate Values By:
 - ☐ Zones
 - ☐ Rings
 - ☐ Custom Boundaries
 - ☐ AIR Event Footprints
 - ☒ Custom Event Footprints

Spatial Outputs:


- ☐ Static Hazard
- ☐ Custom Hazard
- ☐ Detailed Loss Results
- ☐ Additional Attributes

Analysis Options:

- ☒ Settings & Save By
- ☐ Reinsurance

Results Display and Storage:


- ☐ Enable Dynamic Results

Analysis Management 

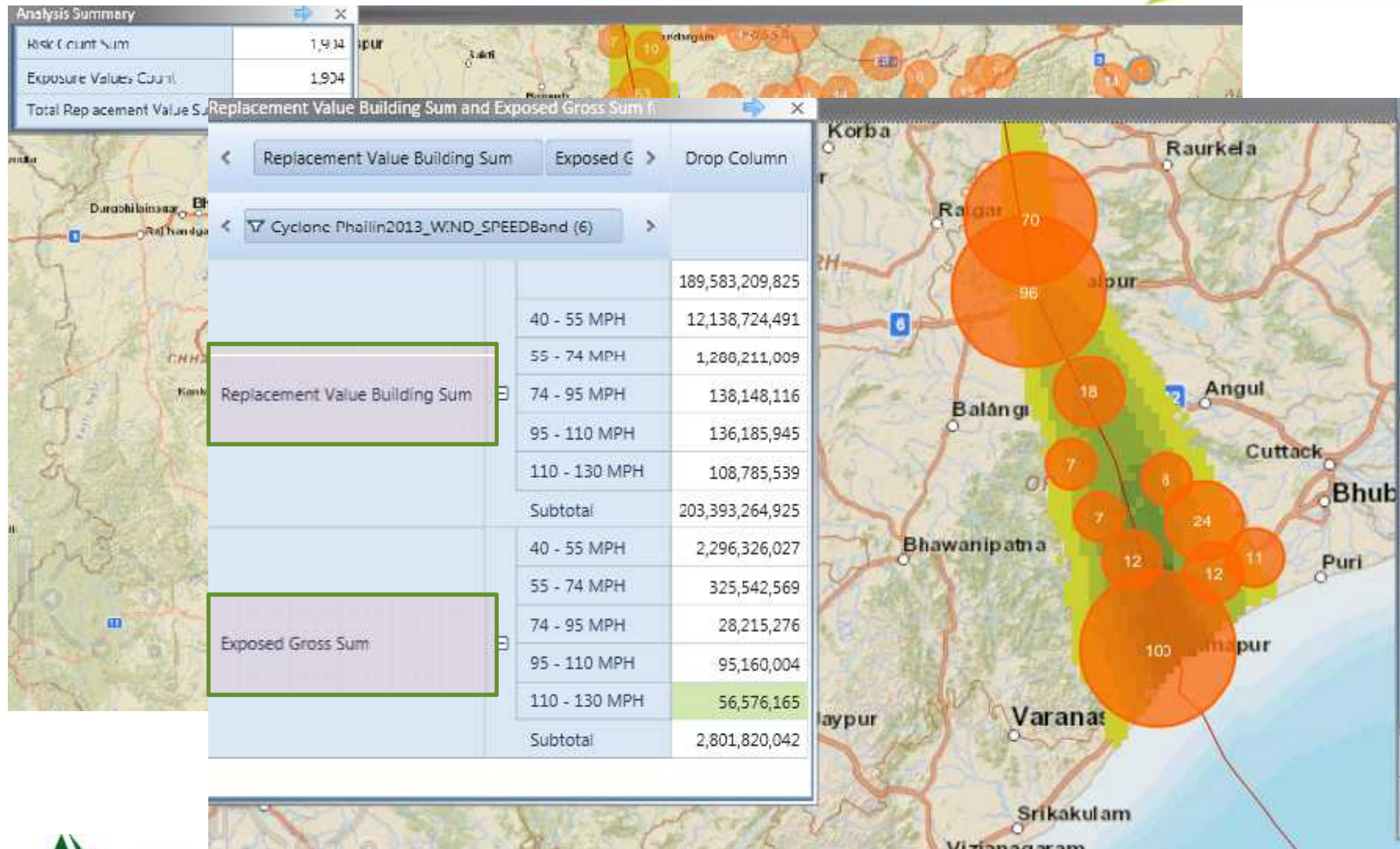
Peril	Name
Aa	Aa
<input checked="" type="checkbox"/> Wind	Cyclor

Name: CyclonePhailin2013
Source: AIR Worldwide
Type:
Accumulation Ranges: AIR Windspeed Footprint

Min	Max	Label	Damage%	File
0.00	40.00	< 40 MPH	0.00	
40.00	55.00	40 - 55 MPH	5.00	
55.00	74.00	55 - 74 MPH	8.00	
74.00	95.00	74 - 95 MPH	15.00	
95.00	110.00	95 - 110 MPH	18.00	
110.00	130.00	110 - 130 MPH	20.00	
130.00	155.00	130 - 155 MPH	28.00	
155.00	2,000.00	> 155 MPH	32.00	

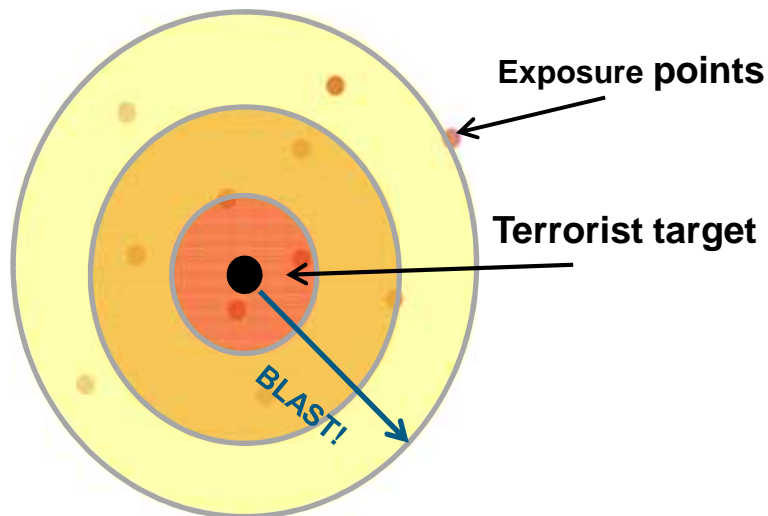
 Add New Range

Visualise Where Your Exposure Is Within the Footprint of the Cyclone



Concentric Ring Analyses – Managing Terrorism Risk

- Managing terrorism accumulations Worldwide
- Generate concentric rings with user-specified radii and damage ratios that can be centered on:
 - High value targets within exposure
 - AIR-defined targets
 - User-specified targets



A screenshot of the "Address List Editor" software interface. It shows a table with columns: "Ring Center Name", "Country (ISO Code)", "Latitude", and "Longitude". The first row is highlighted in pink and contains the values "Mumbai", "IN", "18.93848", and "72.82652".

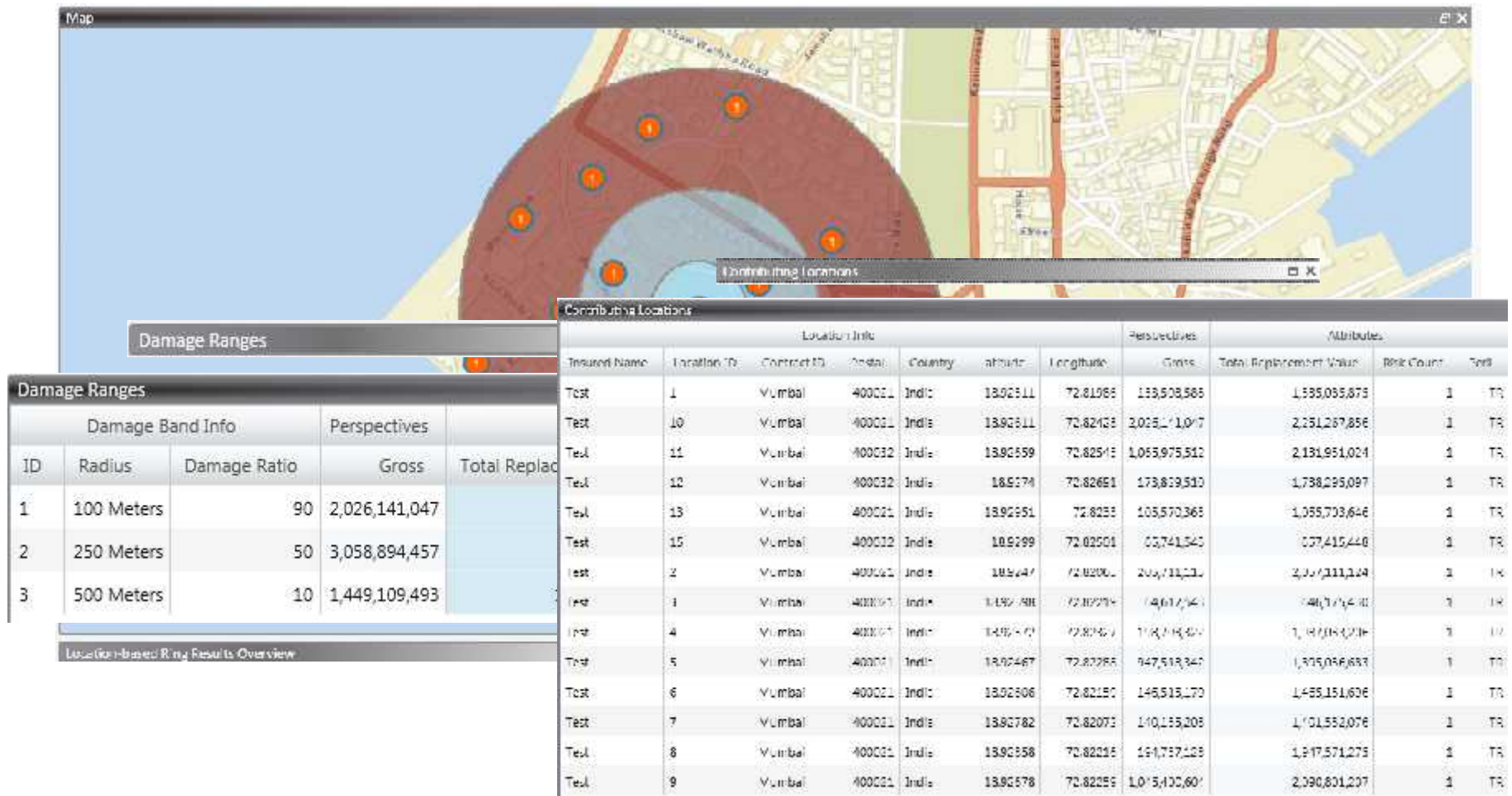
Ring Center Name	Country (ISO Code)	Latitude	Longitude
Mumbai	IN	18.93848	72.82652

A screenshot of the "Ring Definition" table in the software. It shows a table with columns: "Radius", "Unit", and "Damage Ratio". The table has three rows with values: 100.00 Meters, 250.00 Meters, and 500.00 Meters. The "Damage Ratio" column shows 90.00%, 50.00%, and 10.00% respectively. Each row has a red "X" in the "Damage Ratio" column. There is a green plus icon and the text "Add new concentric ring" at the bottom.

Radius	Unit	Damage Ratio
100.00	Meters	90.00% ✗
250.00	Meters	50.00% ✗
500.00	Meters	10.00% ✗

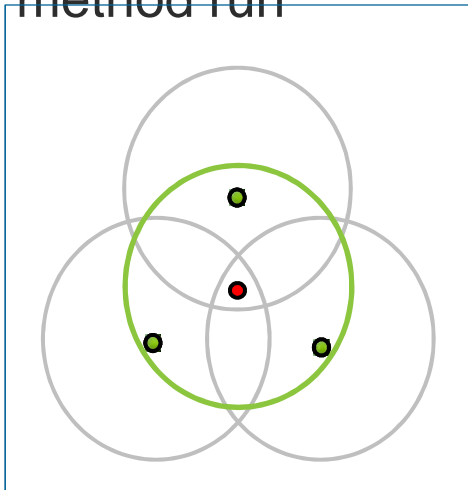
+ Add new concentric ring

Examine the Locations Contributing to Loss

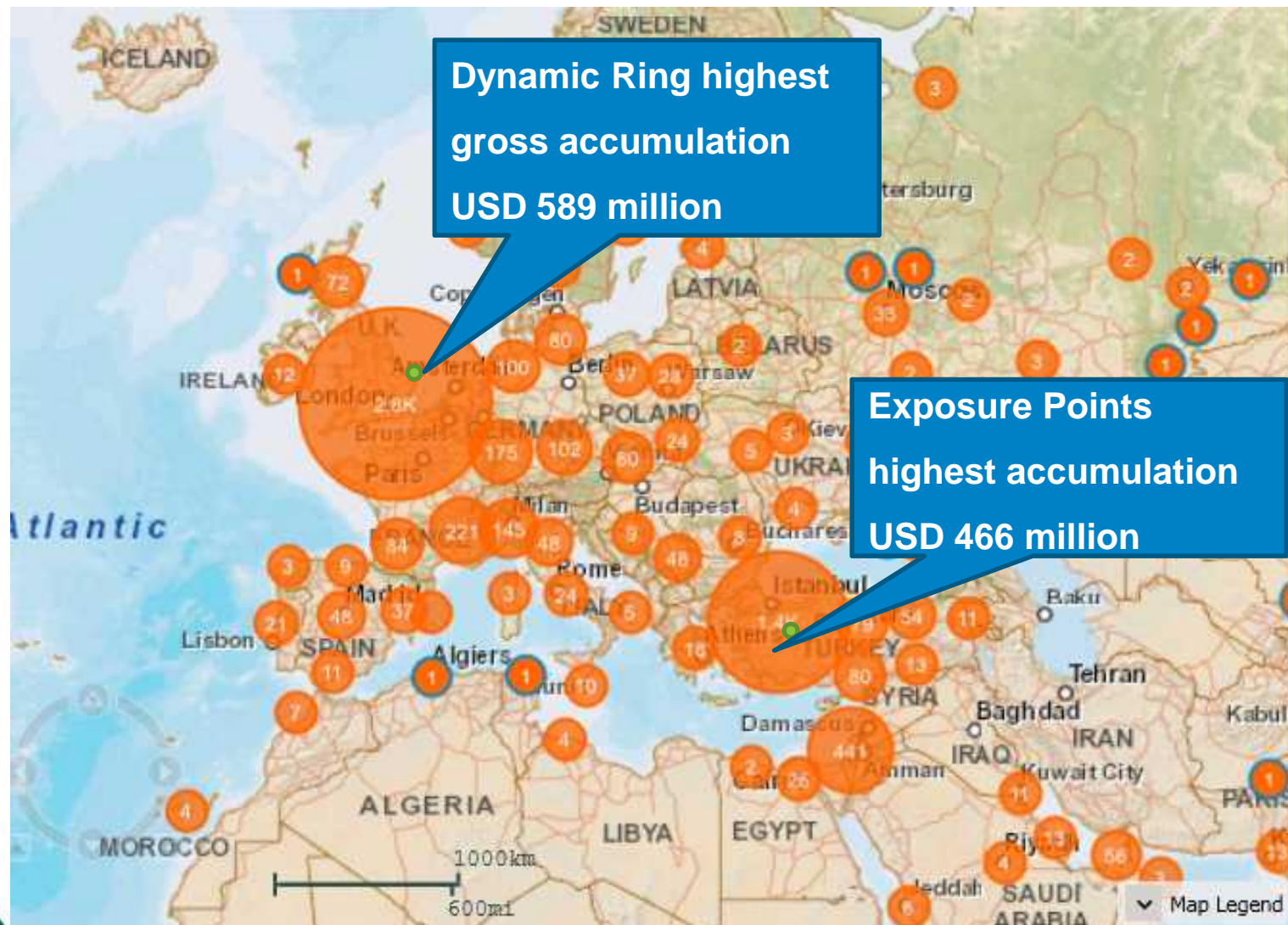


Accumulations by Dynamic Ring Analysis - Faster and More Accurate

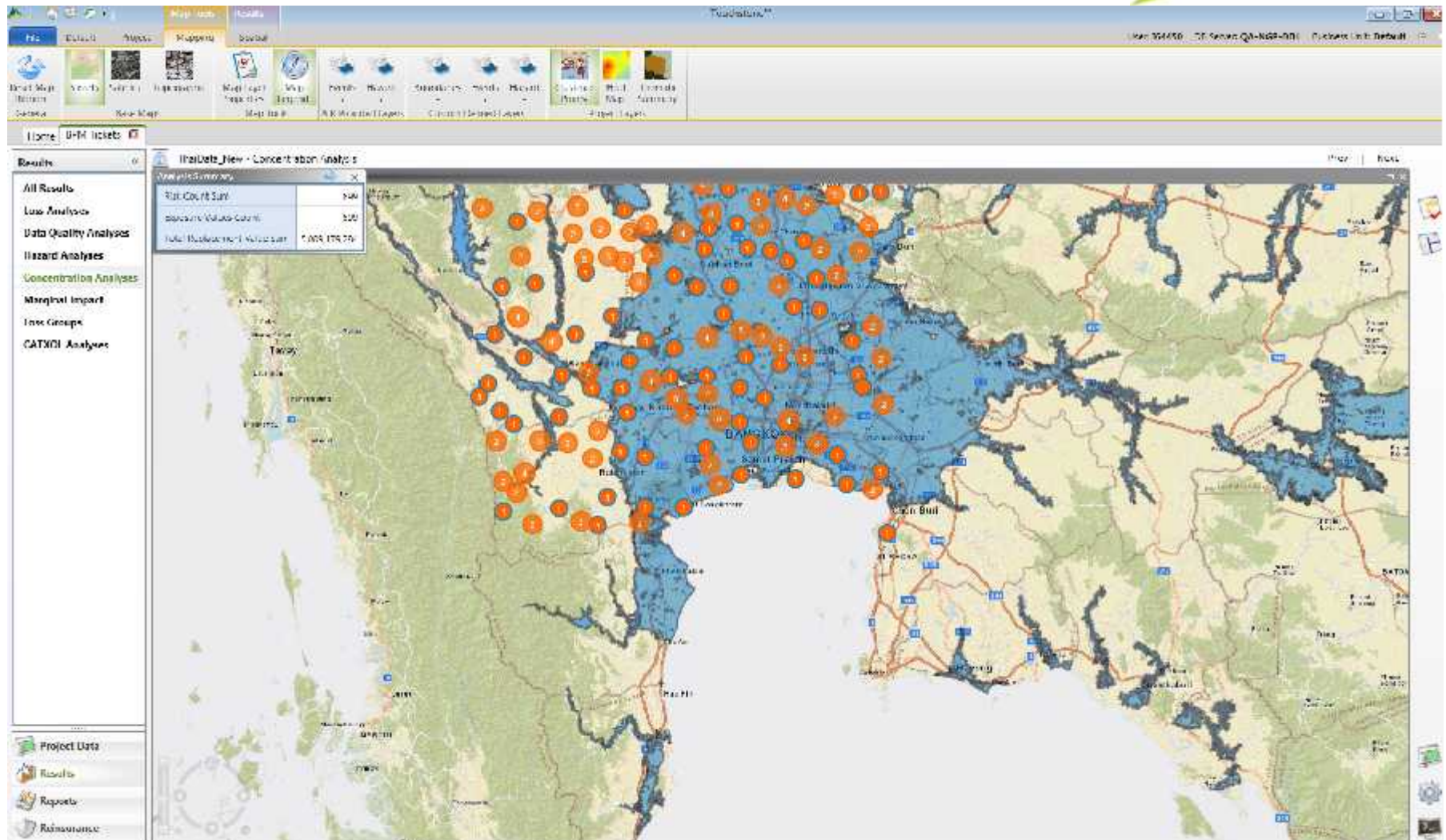
- Global portfolio of 300k locations
- 500m radius ring used
- Exposure Points method run
- Dynamic Ring method run



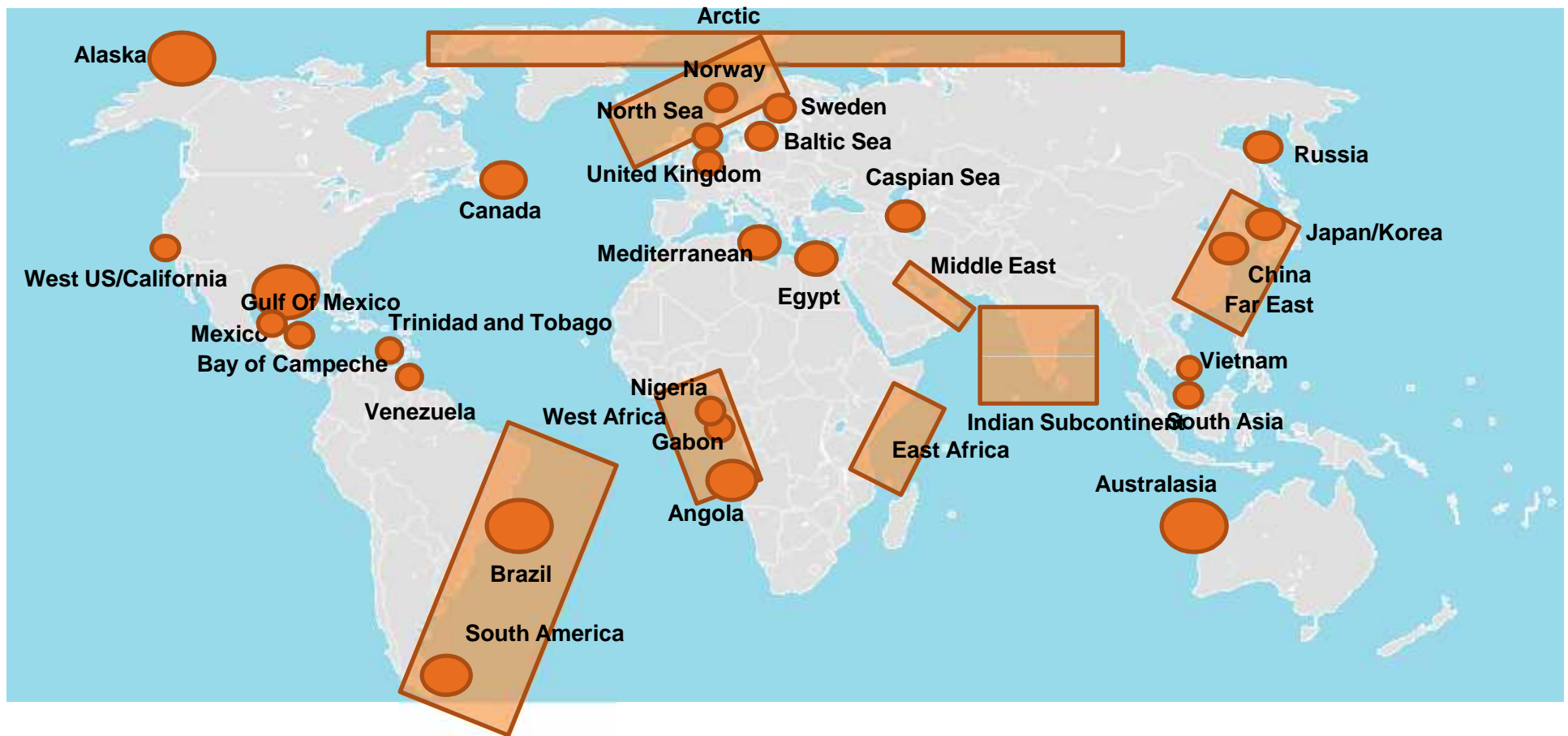
Accumulations by Dynamic Ring Analysis - Faster and More Accurate



Add a Layer to Simulate the Areas that Would Be Inundated by a 1-in-500 Year Flood



Accumulation of Worldwide Energy Exposure



Geospatial – applications are many



Accident and Health



Energy



Bloodstock



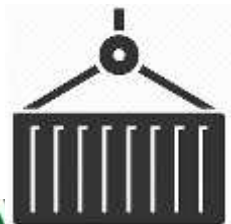
Terrorism



Offshore



Yachts



Cargo



More...

Data Scoring

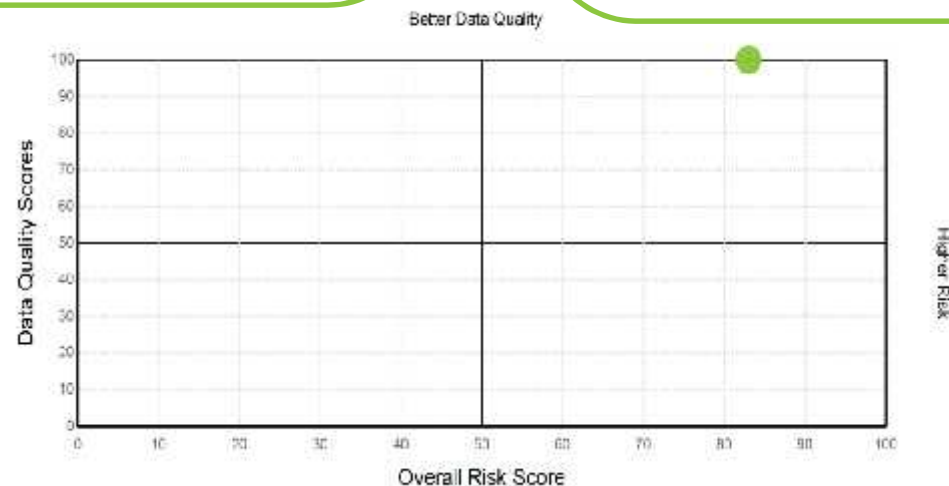
- Two metrics help understand
 - the magnitude of exposure data deficiencies
 - how those deficiencies combine with other aspects of risk

Data Quality Score

Measurement of completeness of
key attributes
and accuracy of address information

Overall Risk Score

Measurement of relative 'riskiness';
encompasses data quality,
hazard and replacement values



Summary

- Visualize clusters of exposure to ensure portfolio conforms with underwriting guidelines as well as long-term goals
- Assess the proximity of exposures to hazard sources, such as faults, liquefaction, storm surge and flood zones
- Combine exposure and loss analytics to provide a comprehensive view of the risk as well as analyze hazard and exposure information.
- View ground-up, gross, and net exposure views to better understand the effect of insurance and reinsurance terms
- Data can be sliced and diced to facilitate investigation of loss drivers