

# Modeling Events in Real Time

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# A Spectrum of Verisk Solutions for Real Time Event Response



**Respond**



**AIR ALERT**



**Geomni**



# AIR Released 50 Real Time Postings Throughout 2017 and 2018

**Hurricane Harvey**  
Aug-Sept 2017

**Hurricane Irma**  
Sept 2017

**Hurricane Maria**  
Sept 2017

**Typhoon Jebi**  
Sept 2018

**Hurricane Florence**  
Sept 2018

**Hurricane Michael**  
Oct 2018



**California Wildfires**  
Oct 2017

**California Wildfires**  
Dec 2017

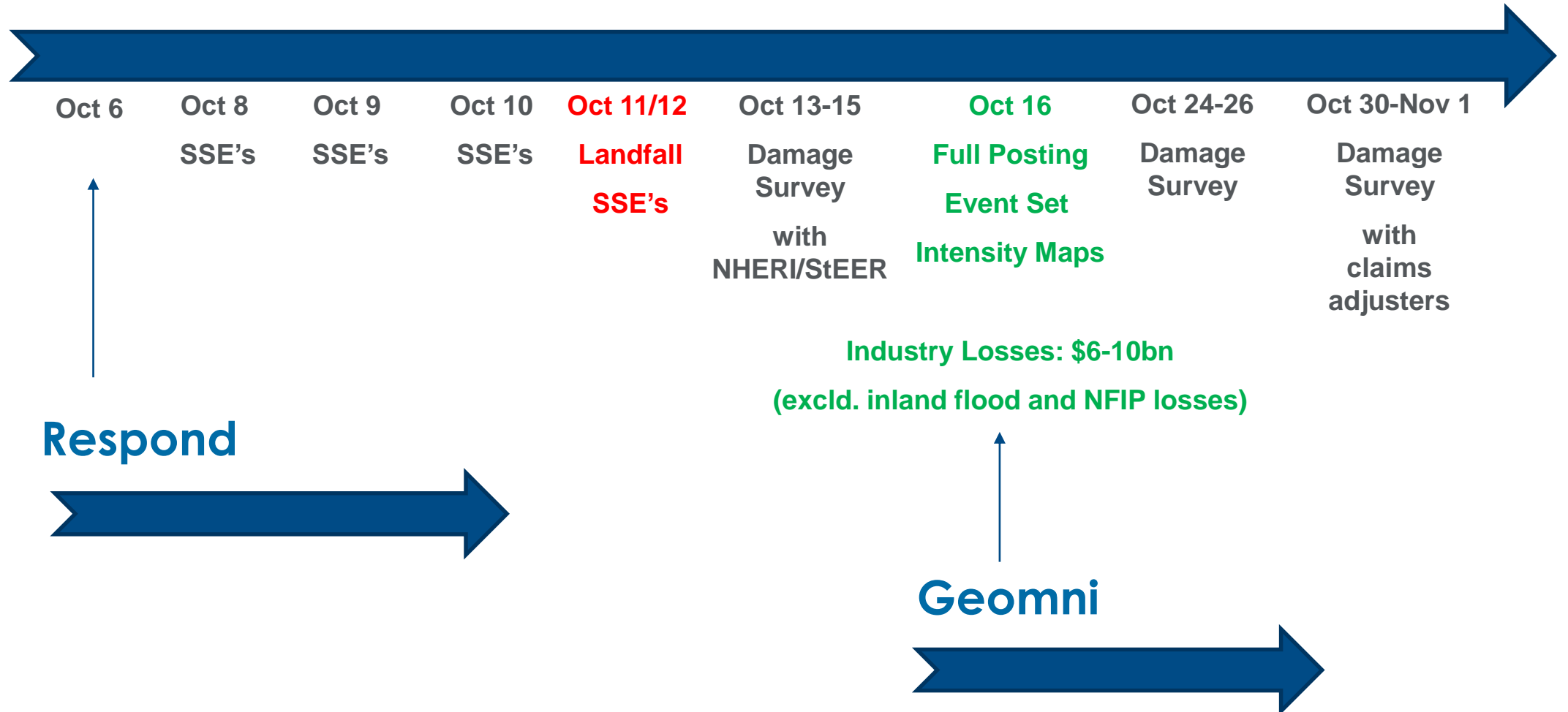
**Atlas  
Tubbs  
Nuns  
Sulphur  
Redwood  
Oakmont  
Pocket**

**Thomas  
Creek  
Lilac  
Rye  
Skirball**

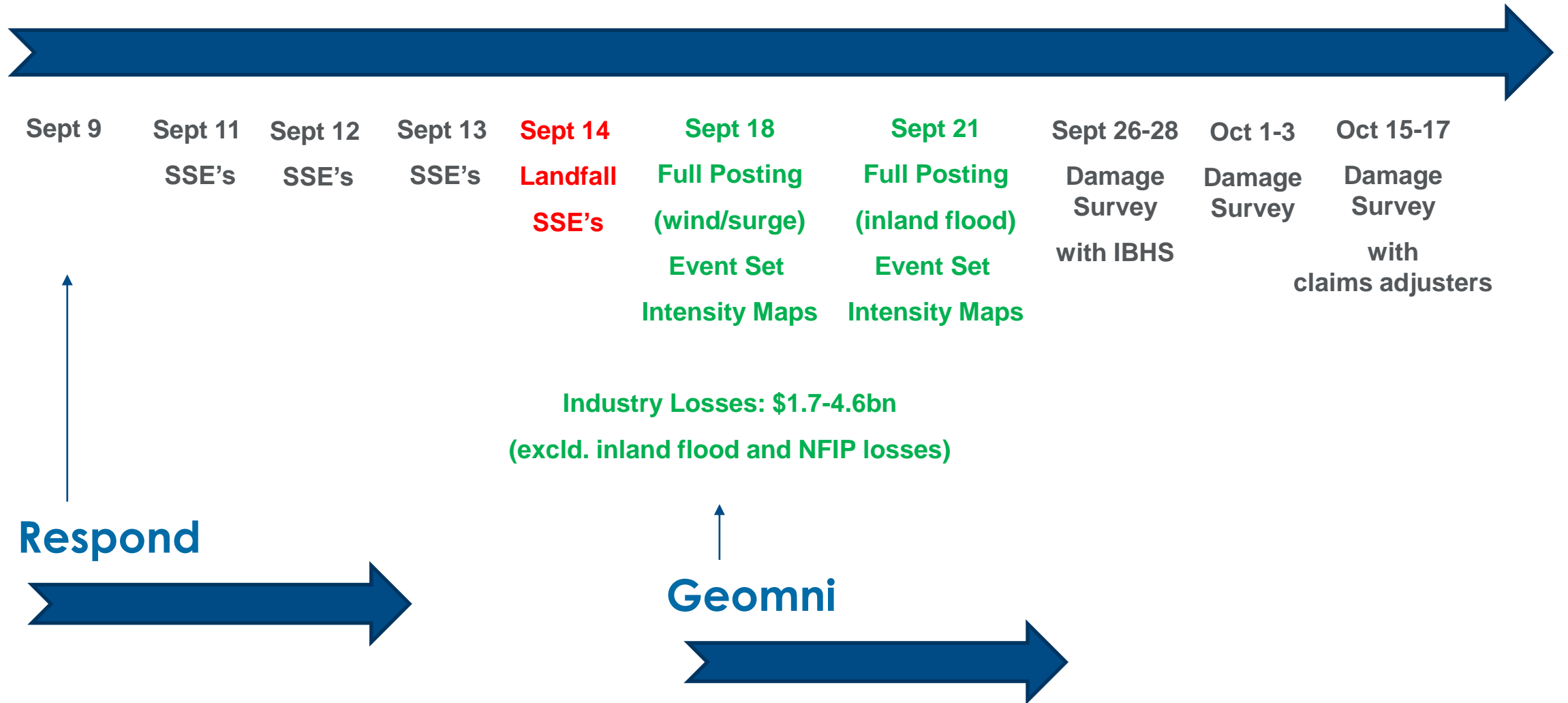
**California Wildfires**  
Nov 2018

**Camp  
Woolsey**

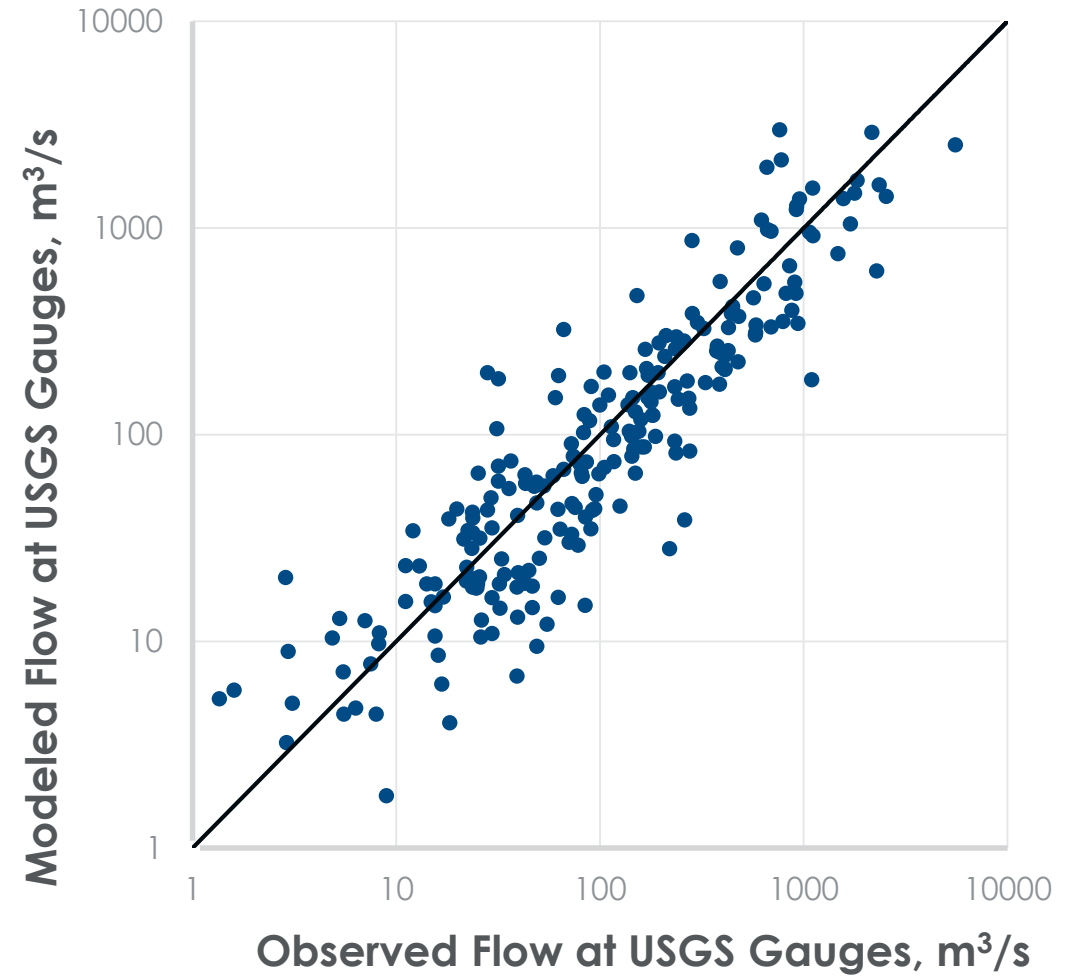
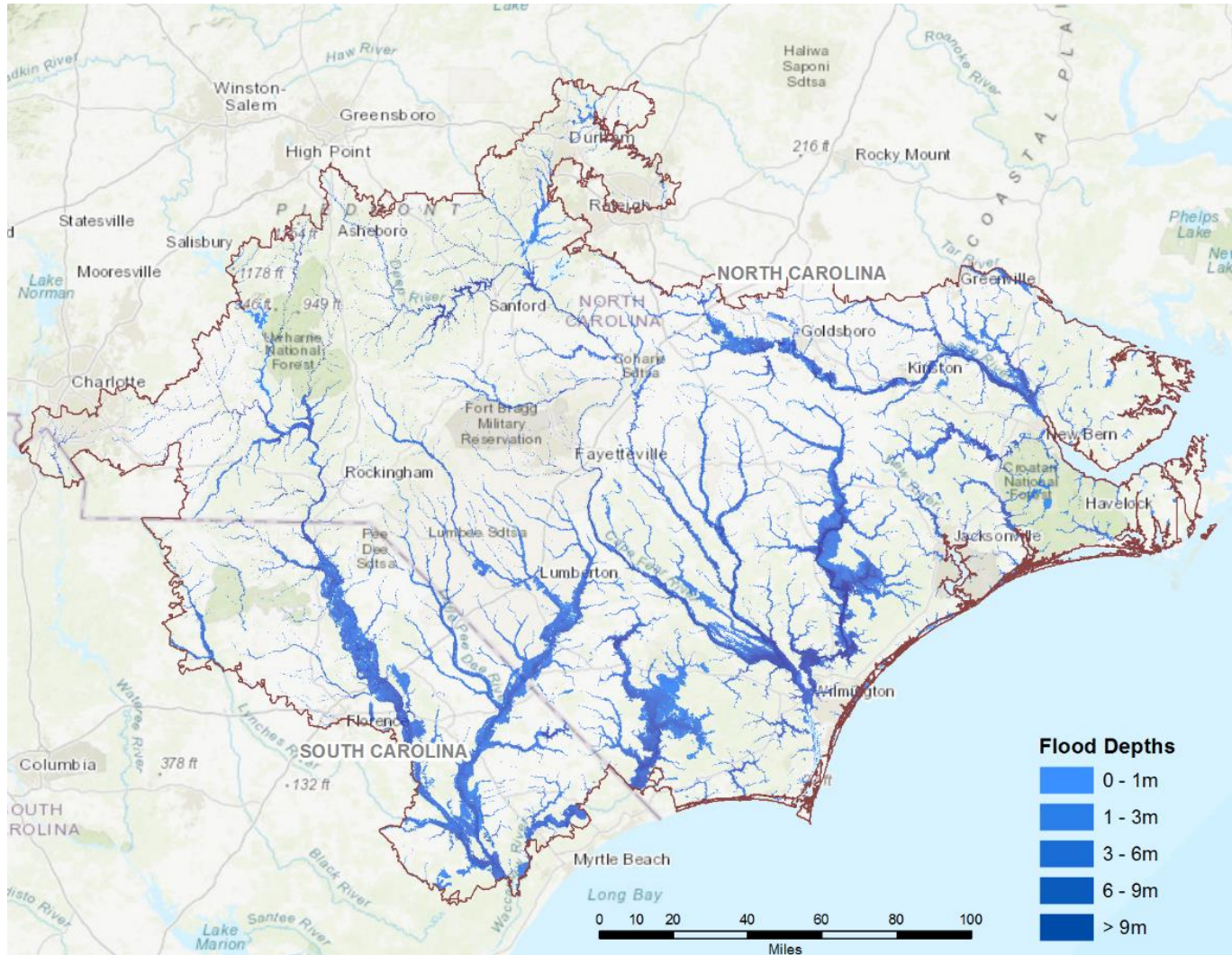
# Hurricanes Michael (2018)



# Hurricanes Florence (2018)



# Hurricane Florence (2018) Inland Flood Modeling



# 2018 California Wildfires

Nov 8

Nov 18; Containment

Woolsey: ~90%

Camp ~ 60%

Nov 21; Containment

Woolsey 100%

Camp: ~90%

Nov 14

- Perimeters
- Affected Zips

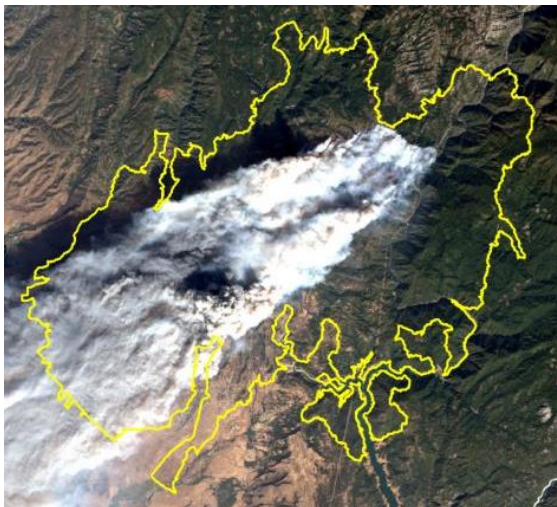
Nov 30

- Insured Losses:  
Woolsey: >\$2.5bn
- Burn Scar, Zips

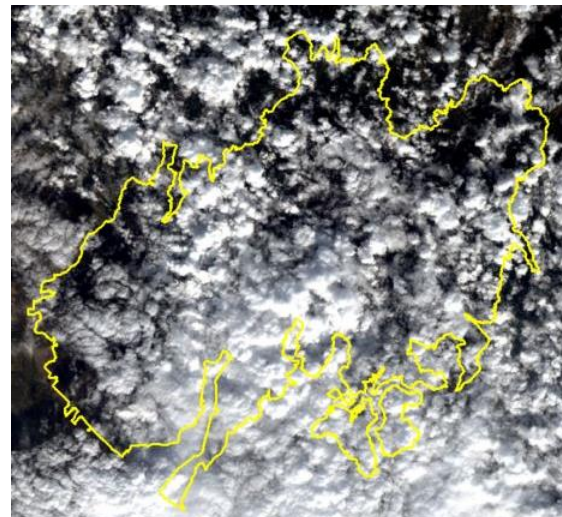
Dec 6

- Insured Losses:  
Camp: \$6-9bn  
Woolsey: \$3-4bn
- Burn Scar, Zips

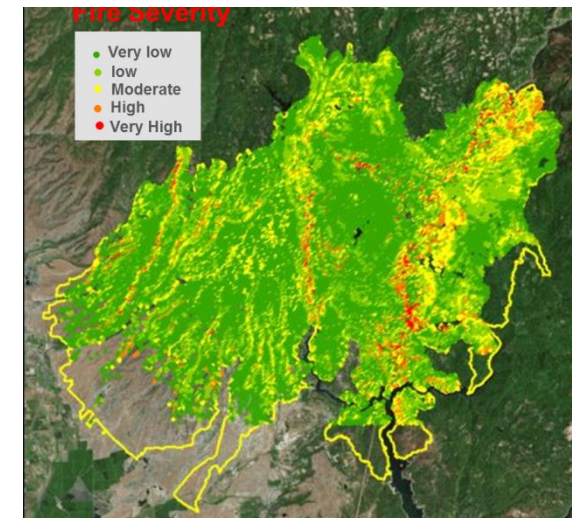
Nov 10 (Landsat 2)



Nov 24 (Landsat 2)



Nov 26 (Sentinel 2)



Camp  
Fire

# Prototyping A New Product

**AIR Catalog Viewer**

Peril: Tropical Cyclone | Catalog Type: Stochastic

Explore Event Data | Look Up Event ID

LandFall Characteristics

Only return events that meet attribute criteria at landfall

Central Pressure Range (Mbar)

cat 5 | cat 4 | cat 3 | cat 2 | cat 1

Min: 870 | Max: 913

Forward Speed (fs)

Min: 15 | Max: 75

Radius (Rmax)

Min: 0 | Max: 80

Number Of Landfalls

One | Multiple | None

Spatial Filters

Draw\_Layer: intersects | Hurricane Michael: intersects

[ADD SPATIAL FILTER](#)

Map Layers

- M27\_track\_10k\_WSST
- Hurricane Michael
- Draw\_Layer
- LandfallTracks

Draw Tools

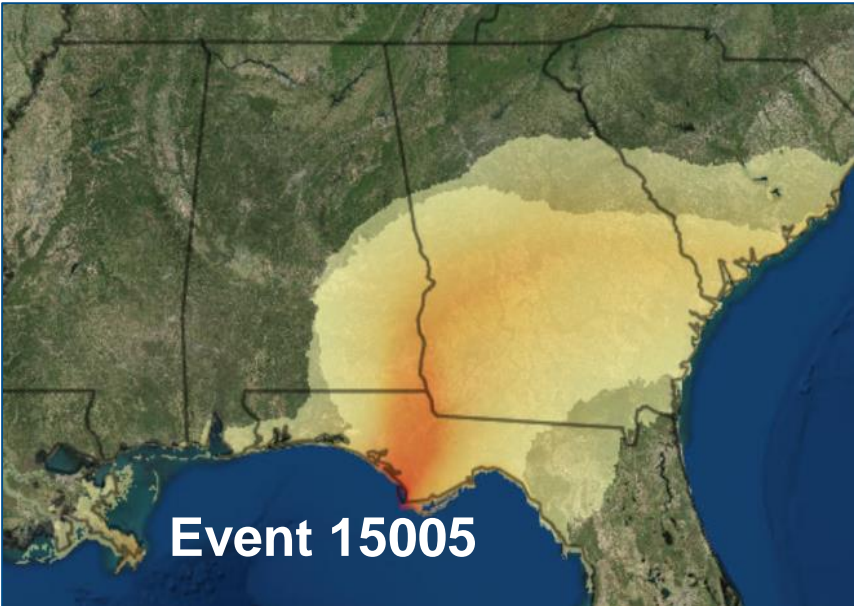
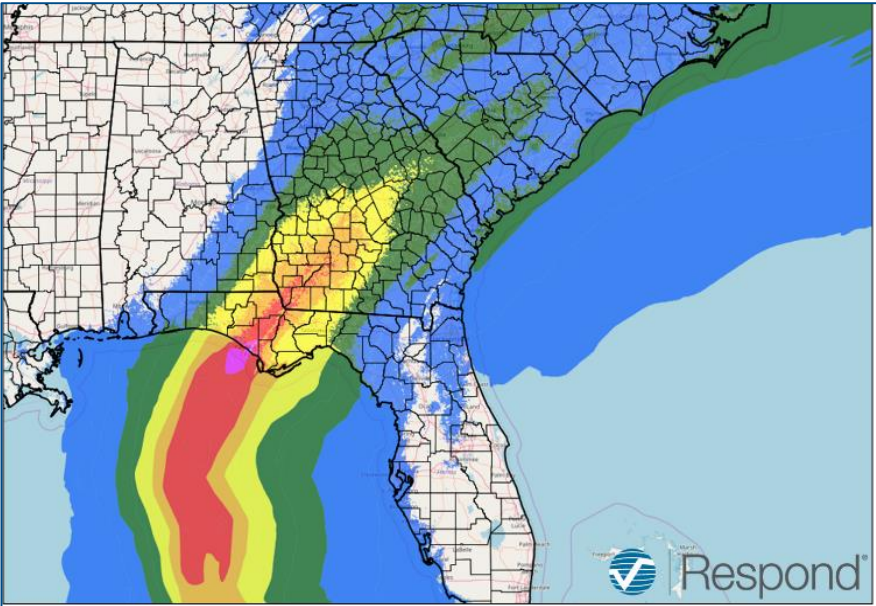
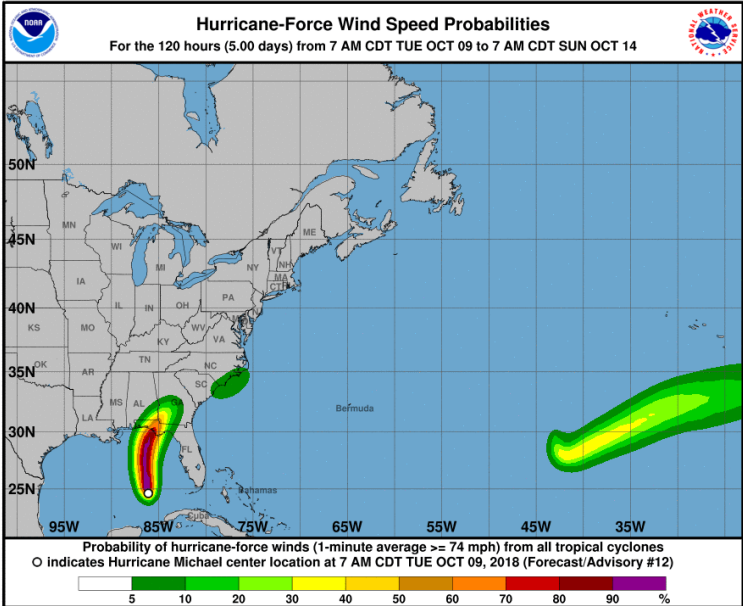
**Results** | My Events

Filter by Map Extent | Show Hourly Points | Show Event Intensity | Export to CSV

<input type="checkbox"/>	Event ID	Event In year	Num LF	LF Num	LF Lon	LF Lat	Lat RMAX	Lon RMAX	CP	RMAX	FS	Heading	Tide Ht	Time End	Adj Max	Region	Time LF
<input type="checkbox"/>	15107	27	1	1	-84.145	28.87394	28.87394	-84.145	958.610089	24.88	11.33	-79.7	-0.65	193	1	3	
<input type="checkbox"/>	16505	2	1	1	-85.58035	30.33895	30.2206	-85.9899	930.579407	32.01	13.14	1.79431	0.35	340	1	3	
<input type="checkbox"/>	45597	23	1	1	-85.74405	30.09947	30.0007	-85.5436	927.531877	12.01	30.48	33.46997	-0.08	116	1	3	
<input type="checkbox"/>	48050	9	1	1	-85.21997	29.92239	29.913	-84.4685	919.065674	37.93	16.33	-17.52566	0.59	342	1	3	
<input type="checkbox"/>	55554	14	1	1	-84.96009	29.91929	29.9125	-84.4188	935.320374	27.51	35.83	-15.56742	-0.3	285	1	2	
<input checked="" type="checkbox"/>	64572	24	1	1	-85.68448	30.0701	29.9211	-85.1113	938.02948	30.89	24.9	-24.49115	0.51	250	1	3	
<input type="checkbox"/>	95036	21	1	1	-85.24795	29.92277	29.9191	-84.9526	918.388489	14.74	7.23	-9.29583	0.34	385	1	3	
<input type="checkbox"/>	99012	21	1	1	-86.14189	30.29556	29.924	-85.3494	981.395508	46.24	7.2	69.69933	-0.6	225	1	3	
<input type="checkbox"/>	116930	27	1	1	-86.7923	30.33347	30.3383	-86.8042	919.065674	9.07	5.05	-4.17155	0.85	382	1	3	
<input type="checkbox"/>	132884	17	1	1	-86.16451	30.3087	30.043	-85.6294	919.404358	30.99	19.23	32.99263	-0.15	203	1	3	



# Clients Can Use AIR Stochastic Footprints to Inform SSE Selection



# Recent and Upcoming Developments at AIR

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**Assistant Vice President, Consulting & Client Services**



# Expanding to Meet Client Needs

## Upstream Analytics



Exposure Management

 **Verisk**<sup>™</sup>  
Insurance Solutions

 **Sequel**



Underwriting

## More Natural Peril Models



Models for Extreme Events

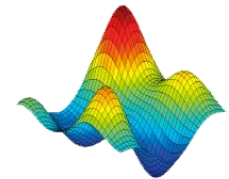
## Downstream Analytics



Real-Time Pricing  
and Portfolio  
Analytics

**TOUCHSTONE***re*<sup>™</sup>

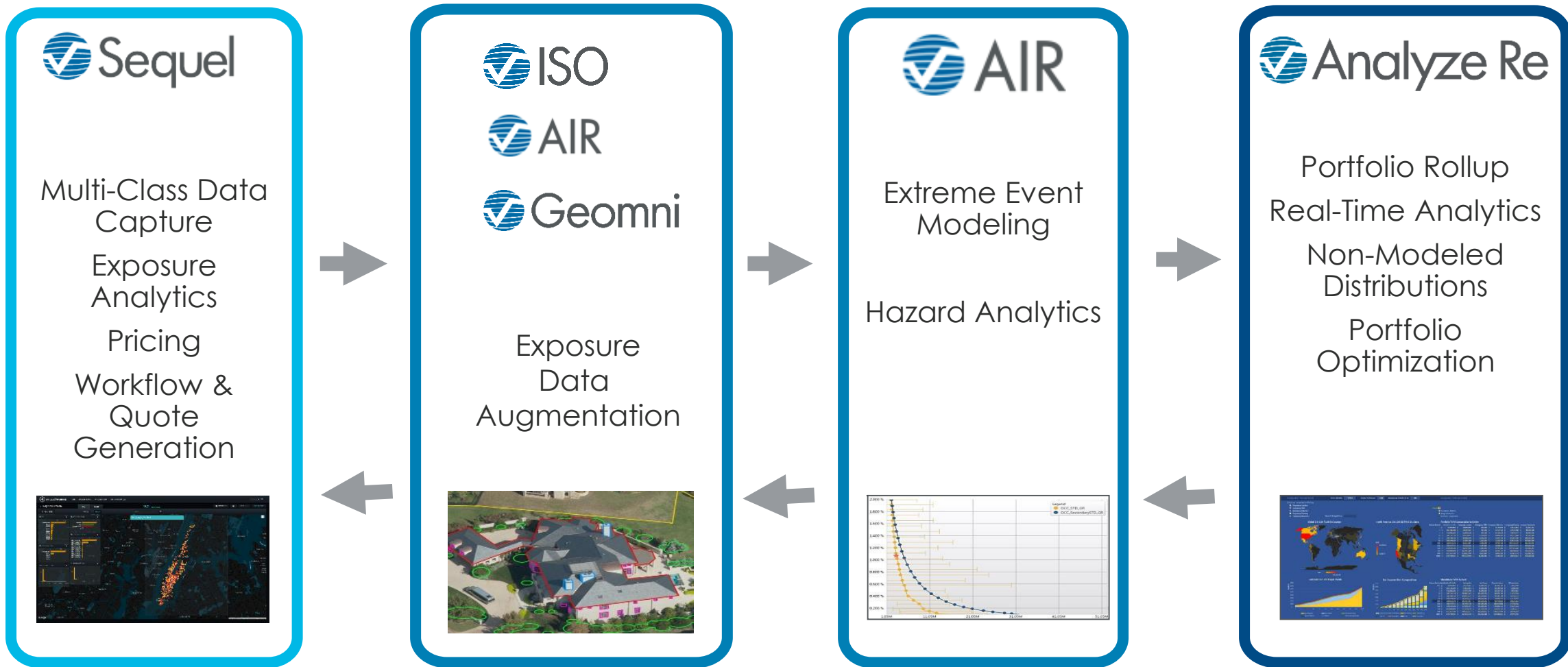
 **Analyze Re**



Portfolio Optimization

 **AIR**

# Delivering Analytics Throughout the (Re)Insurance Value Chain



Automation & APIs

# 2018 Updates

# AIR's Updated Wildfire Model for the United States

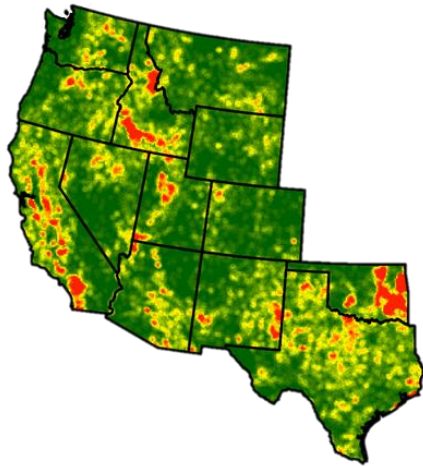


## Key use cases:

 Portfolio optimization

 Pricing

 Real-time event response



**Fully probabilistic model** captures 13 western states that comprise the majority of wildfire risk in the U.S.



**Accounts for fire behavior in urban areas and the WUI**, including spotting and embers



**Captures the complex relationship between weather and wildfire**, including antecedent drought, temperature & precipitation conditions



**Considers property- and community-level mitigation factors**, including building characteristics and defensible space

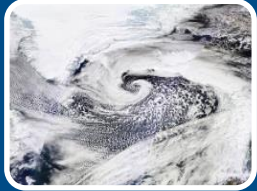


Robust model validation leverages **MTBS burn scar data set** (34 years and 20,000+ events) and **17 historical events**

# AIR's Updated Extratropical Cyclone Model for Europe



Coverage  
Enhancements



Better Clustering



Improved Extremes  
and Tail Risk Estimation



Robust Hazard  
Validation



Expanded Model  
Coverage &  
Refinement



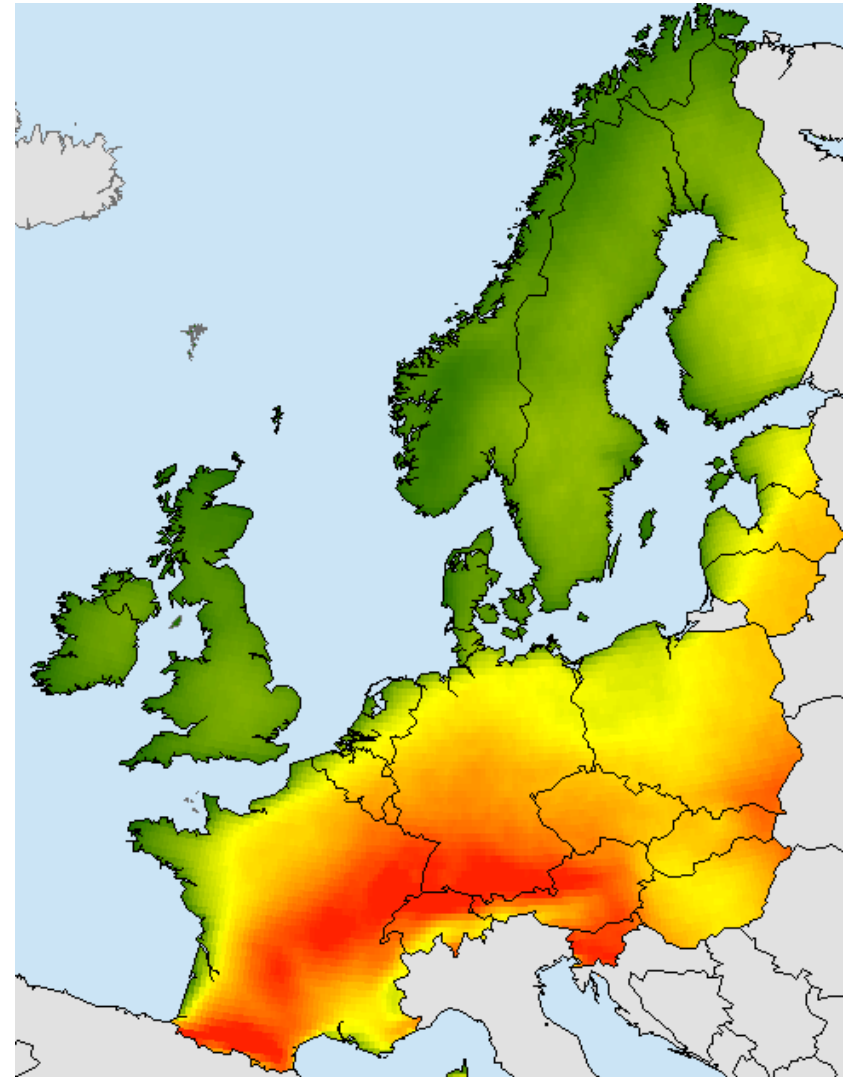
Better Risk  
Differentiation Based on  
Location



Robustness of Loss  
Estimates Backed by  
Claims Data

# AIR's New Severe Thunderstorm Model for Europe

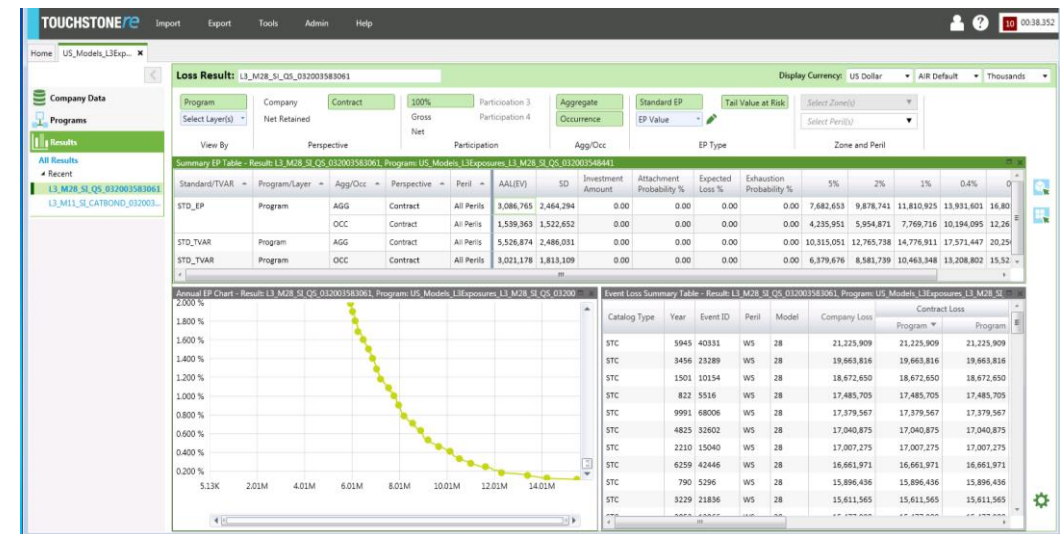
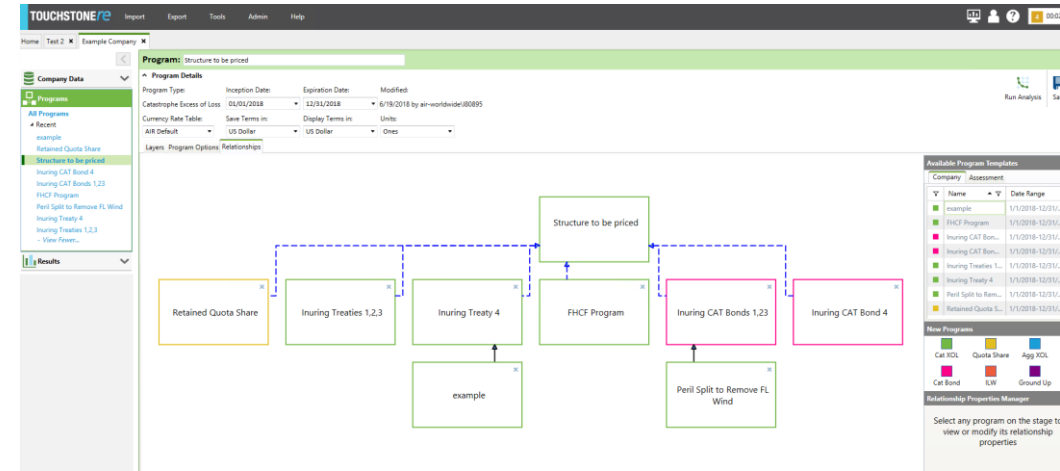
- Captures severe thunderstorm risk for 22 countries and many lines of business
- Quantifies risk through a unique variety of data sources
- Validated through extensive claims and loss data





# Touchstone Re: the Next Generation of Aggregate Modeling

- End-to-end pricing and portfolio workflows
- Touchstone integration
- New and improved functionality including:
  - Financial engine enhancements
  - Visual drag and drop for creating complex reinsurance structures
- Improved analysis performance
- Full suite of workflow APIs
- Brand new database schema



# Touchstone Focus™ Makes Modeling More Accessible to Insurers in Emerging Markets

**TOUCHSTONE** Focus
Nazanin Firouzbakht ?

Please enter risk address, postal code, or coordinates \*

Taft Ave, Ermita, Manila, 1000 Metro Manila, Philippines SEARCH

Taft Ave, Barangay 676, Manila, First District NCR, National Capital Region, PHL + ADD TO LOCATION LIST ✕

14.580019, 120.985880 Match Level : StreetName

**Estimated Loss** i

Construction\* Occupancy\*

Reinforced concrete Commercial

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Earthquake (in Percentage) i

AAL: 0.142	100 Year: 4.63	250 Year: 11.71
------------	----------------	-----------------

Tropical Cyclone (in Percentage) i

AAL: 0.097	100 Year: 2.173	250 Year: 4.247
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**Hazard** ▲ Guideline Violations:8

Earthquake ^

- 🌿
PGA (475 Year)
0.505 g
- 🌿
PGA (2475 Year)
0.805 g
- 🌿
Distance to Nearest Fault
5.69 miles (WMarkinaFit)
- 🌿
Distance to Nearest Historical EQ
6.11 miles (6.56 Mw(Year=1863))
- 🌿
Soil Type
Soft Soil, shallow Soil
- 🌿
Liquefaction Potential (475 Year)
High
- 🌿
Liquefaction Potential (2475 Year)
High
- 🌿
Tsunami Potential
Not available
- 🌿
Distance to Nearest Volcano
39.181 miles (Taal)

Tropical Cyclone ^

- 🌿
Wind Speed (50 Year)
89 mph
- 🌿
Wind Speed (100 Year)
97 mph
- 🌿
Wind Speed (250 Year)
106 mph
- 🌿
Storm Surge Potential
Not available
- 🌿
Distance to Coast
0.543 miles

Locations (0) 🗑️ 📄

Location	Coordinates	MatchLevel	Construction	Occupancy
Paste location(s) here				

# Fully Probabilistic, Event-Based, Cyber Risk Modeling in ARC

## Data Compromise

- Phishing/social engineering scams
- Malware and other computer hacks
- Accidental issues
- Unauthorized data disclosures
- GDPR impact assessment

## Cloud Service Provider Downtime

- Business interruption for >100 cloud providers

## Industry Exposure Database Expansion

- 12.4 million records
- 40,000 new international organizations added

## Region-Specific Industry Market Shares

- U.S., Canada, Great Britain, Europe, Japan, Australia, and rest of world (RoW)

# WaterLine Provides a Comprehensive View of Risk

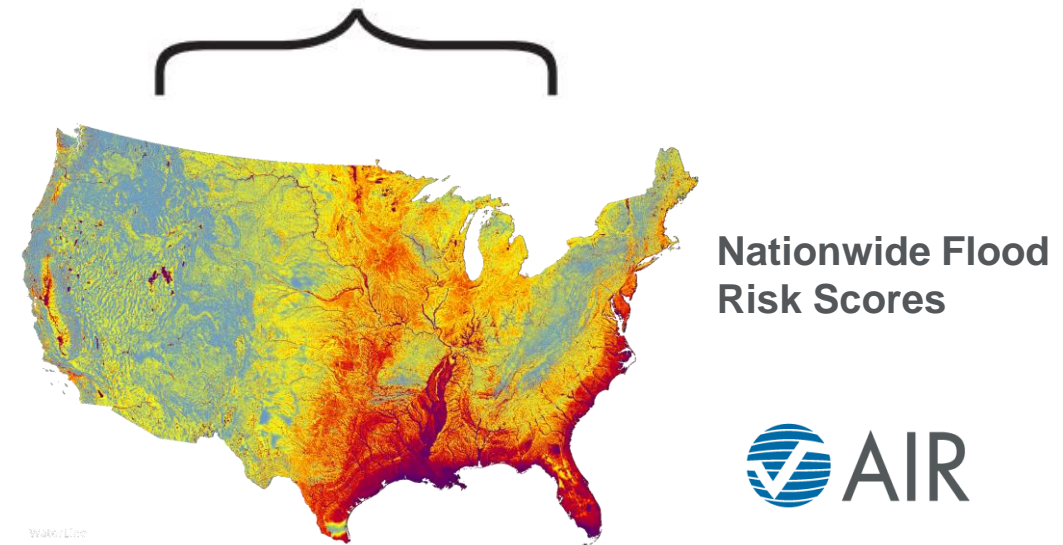
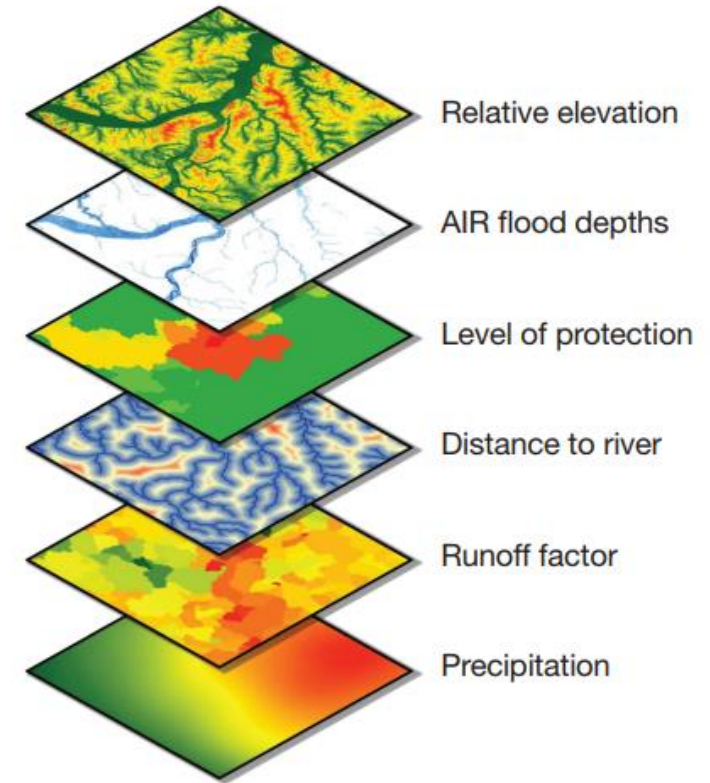
Signifies the expectation of flood hazard severity at any location

Reflects the whole spectrum of frequency and severity of hazard

Leverages AIR U.S. inland and storm surge models

Validated using data from ISO, USGS, and Claims from Development Partners

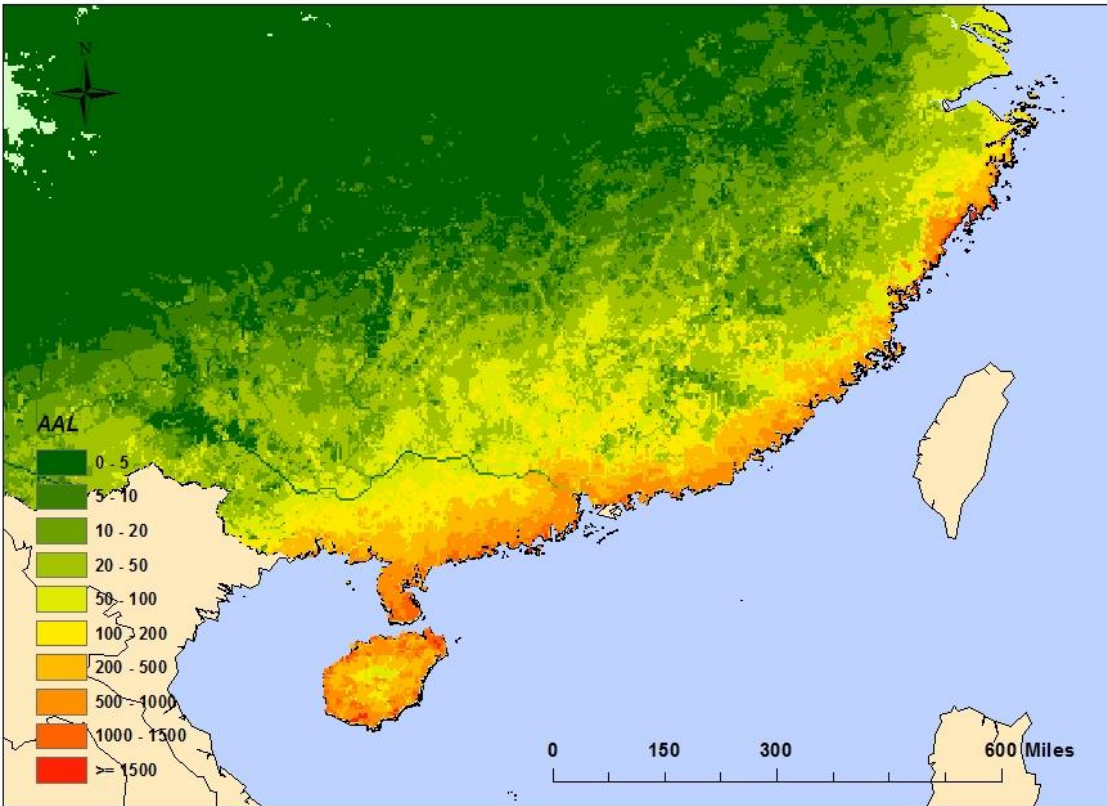
WaterLine components:



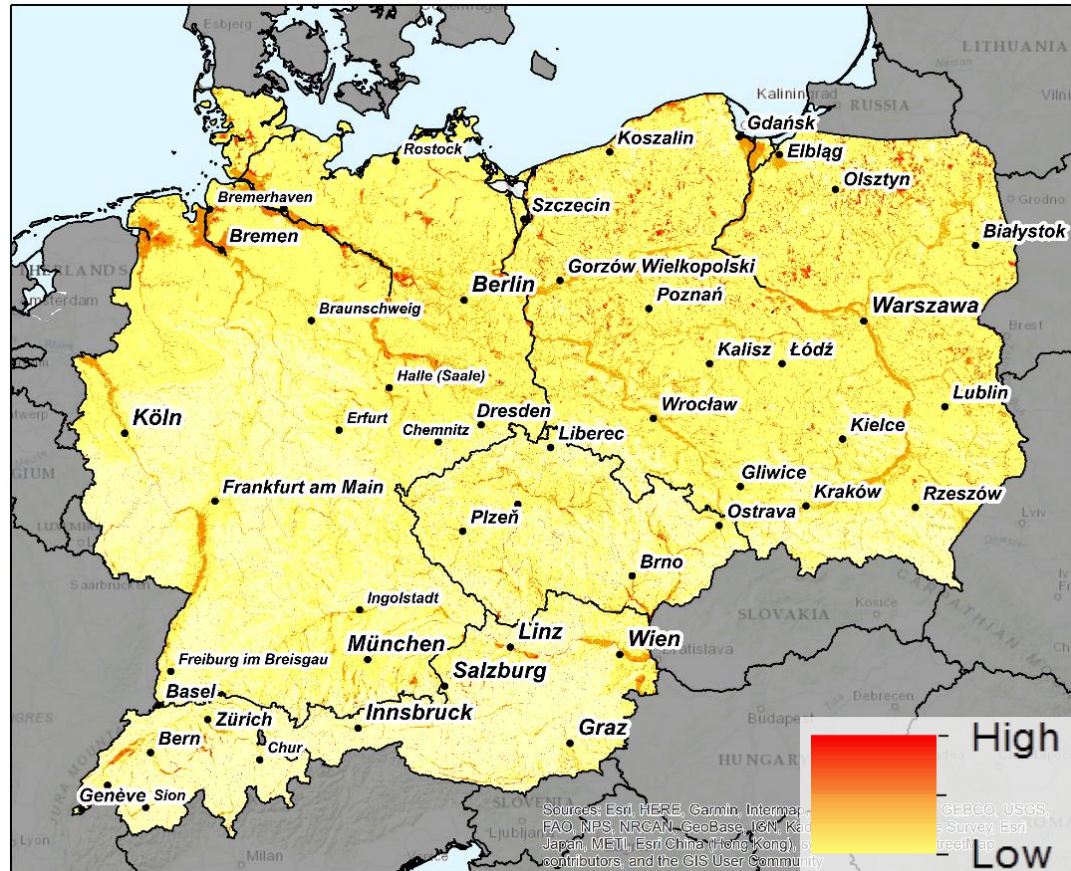
# 2019 Model Releases

# AIR's Updated Typhoon Model for China

- Hazard
  - Adjusted the wind and flood intensity based on the reanalysis of the historical data and considering the soil saturation
  - Recalibrated the existing historical events and added eight new historical events
- Vulnerability and Modeled Losses
  - Added more LOBs
  - Differentiated vulnerability between commercial and industrial
  - Updated model validates well at both the company and industry levels



# AIR's Updated Inland Flood Model for Europe

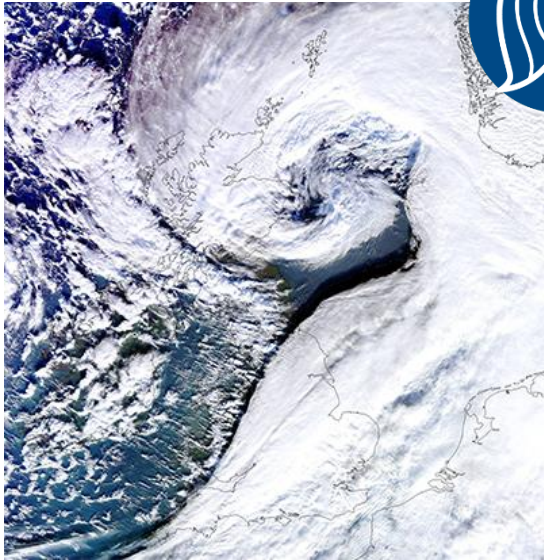


- New industry exposures modeled at 90-meter resolution
- Adding Poland and additional historical events
- Enhanced precipitation catalogue
- Latest data updates standard of protection (SOP)
- Vulnerability updates will leverage a unified framework across models in Europe
- Support for new secondary risk characteristics

# The Addition of Great Britain Storm Surge to AIR's Extratropical Cyclone Model for Europe

2019 Update:

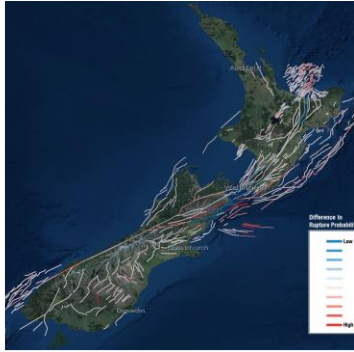
Storm Surge sub-peril in AIR  
Extratropical Cyclone Model  
for Europe



- Expanded model coverage to include all of England and Wales
- Updated with modern-day levee information to improve surge footprints
- Utilized the Delft3D Flexible Mesh hydrodynamic model
- Used wind and pressure from EU ETC model catalog to drive surge

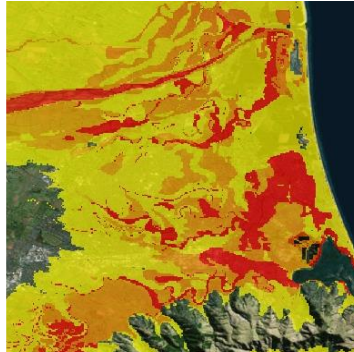


# AIR's Updated Earthquake Model for New Zealand



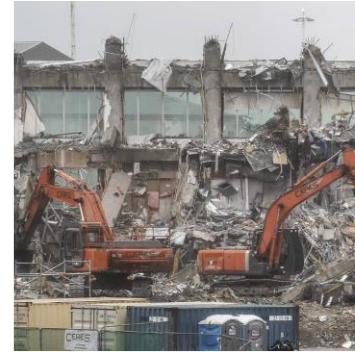
## Seismicity/Catalogues

- Stochastic 10k and 100k Year Catalogue
- Time-Independent
- Time-Dependent
  - Transient Elevated Localized Seismicity
- 29 Historical Scenarios
- 16 EDS Scenarios



## Sub-Perils

- Liquefaction
- Landslide
- Tsunami
- Fire Following



## Vulnerability

- Conventional Buildings
  - Engineered
  - Non-Engineered
- Industrial Facilities
- Infrastructure
- Marine Cargo
- Builder's Risk
- Land Damage



## Software Features

- Fully Separable Sub-Perils
- New Occupancy Code for Modelling Land Value
- Geospatial Layers
  - Hazard Return Periods
  - Scenario Footprints
  - Physical Properties
- Updated Exposure-Based Disaggregation
- Added Support for Territorial Areas

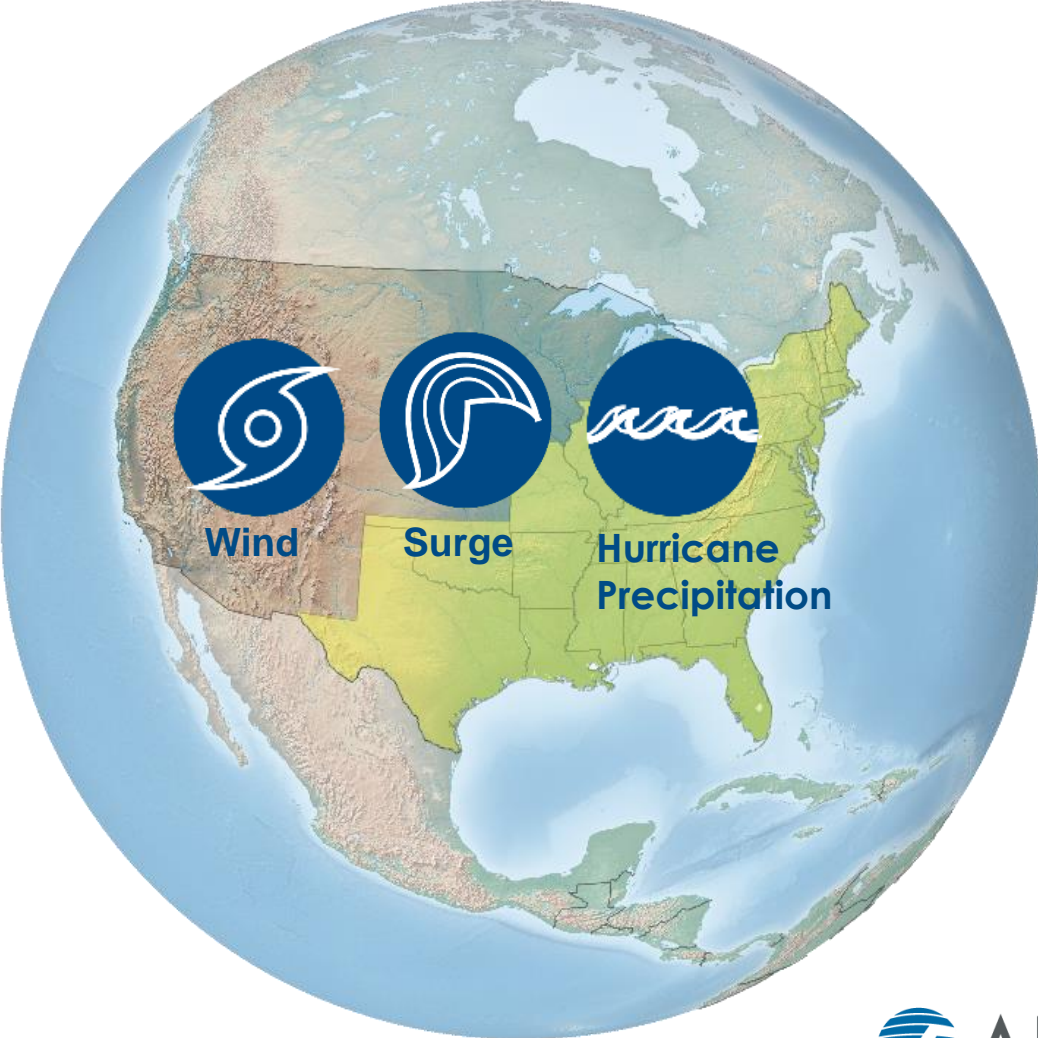
# 2020 Plans

# Updates to the U.S. Hurricane and Inland Flood Models

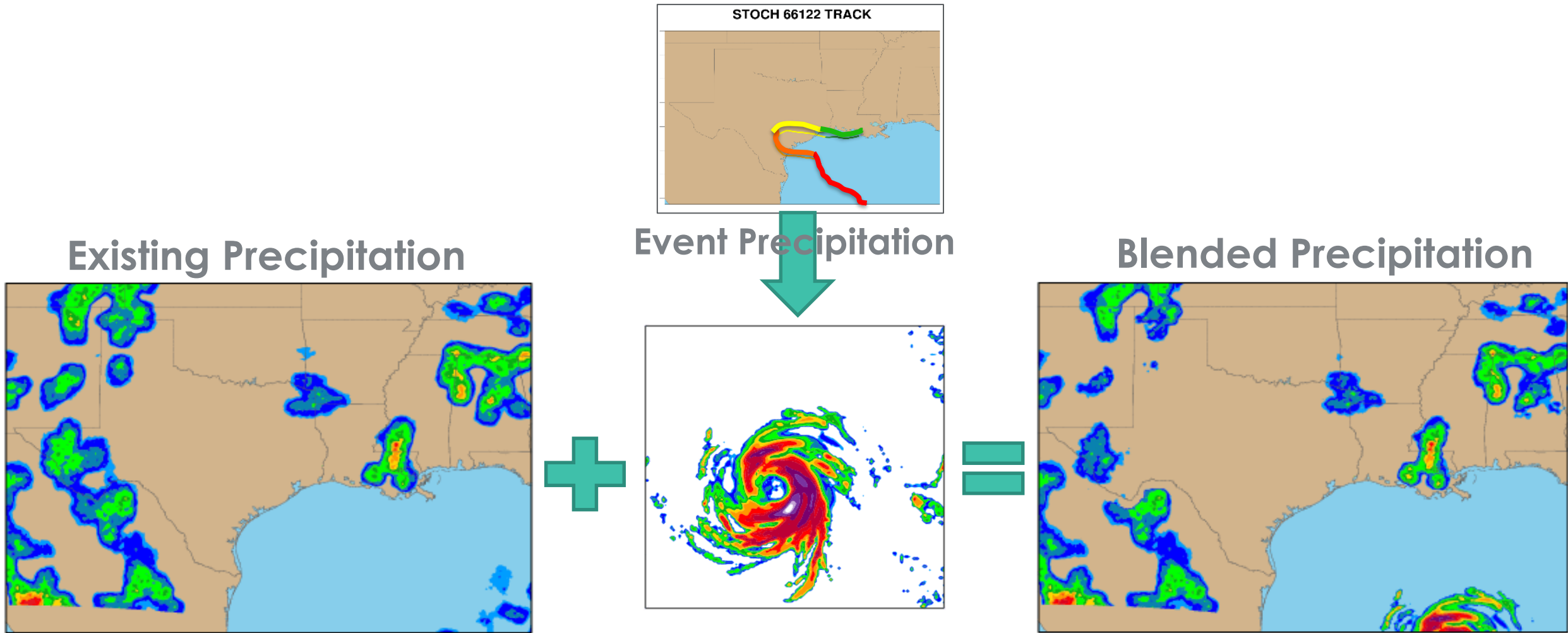
## Inland Flood Model



## Hurricane Model



# Precipitation from All Sources Is Blended





# Caribbean Models

## Significant Updates to Industry Exposures

## Tropical Cyclone Model

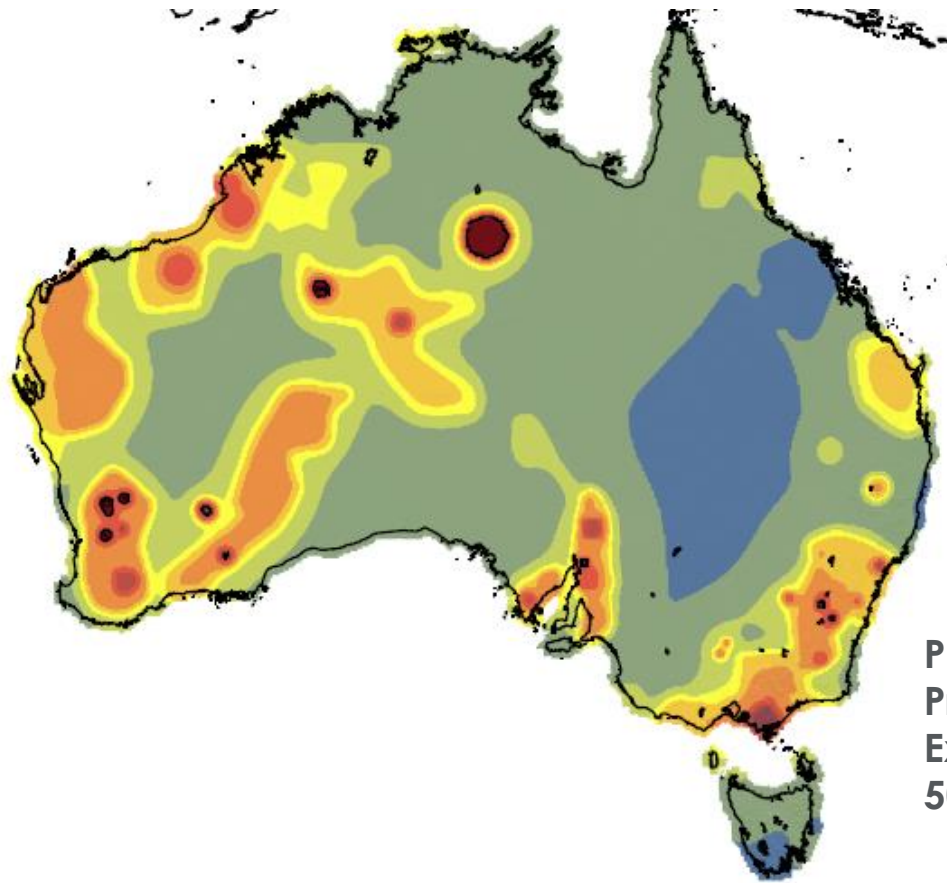
- Incorporate data and lessons learned from recent hurricane seasons
- Update and enhance vulnerability module
- Stochastic event set will remain the same, parameter (intensity/size) adjustments will be made as necessary

## Earthquake Model

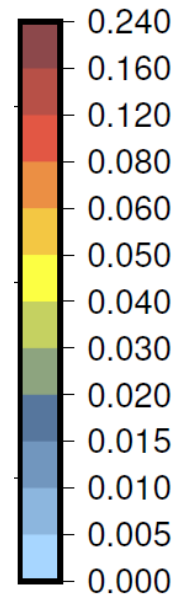
- Expansion of model domain and lines of business
- New event catalog, intensity calculation, and soil maps
- Inclusion of new sub-perils
- Updates to the vulnerability component

# Geoscience Australia Update Significantly Reduces Hazard Across Australia

2012



PGA (g) 10%  
Probability of  
Exceedance in  
50 Years



2018

