CoreLogic®

EQECAT™

Flood Loss Modeling

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CoreLogic EQECAT: Flood Loss Modeling

- Status / Timeline
  - Current CoreLogic EQECAT Flood Models
  - U.S. Storm Surge / Coastal Methodology
  - Inland Approaches in Asia and Europe
  - U.S. Riverine / Inland Methodology
  - U.S. Flood Model Enhancements Underway
- Included Along the Way:
  - Data sources
  - Loss validation
  - Factors impacting flood risk (coastal and inland)
- Relevant types of expertise
- Flood vs. hurricane wind modeling

Status / Timeline:
Current CoreLogic EQECAT Flood Models

- U.S. Mainland Hurricane
  - Detailed numerical storm surge model
  - Incremental rainfall-induced flooding impact estimated parametrically based on storm parameters
- U.S. Flood (lower 48)
  - Coastal and inland risk
- U.S. CoreLogic Risk Scores
  - Flood, Flash Flood, Storm Surge, Basement Flood, Sewer Backup
- Asia Typhoon
  - Parametric storm surge model
  - Typhoon rainfall model + catchment / routing approach
- Euro Flood
  - Full hydrologic and hydraulic model
- Euro Wind
  - Detailed numerical sea surge model

U.S. Storm Surge / Coastal Methodology

Surge Height
- Storm tide
- Wind driven waves
- Astronomical tide level, independent of the storm

Width of High Velocity Zone
- Storm Intensity

Inundation Depth
- Site Elevation
- Distance to Coast
- Inundation and depths calculated on 30m DEMs

- Modeling methodology
  - Numerical Finite-Element Model solving the equations of motion of the water, considering bathymetry and wind stress from hurricane wind field model
  - Full time history of the event is modeled (critical for events like Katrina)
  - Elements at roughly 2-3km resolution offshore
  - Inundation and damage occur in two zones: Velocity zone and Farther inland
  - The surge hazard is modified to reflect the flood defense improvements in the New Orleans area & Galveston

Inland Approaches (1): Asia Typhoon

Rainfall Event → **Analysis of Event** → **Calculation of Flood Risk** → **Calculation of Flood Footprint** → **Flood Damage**

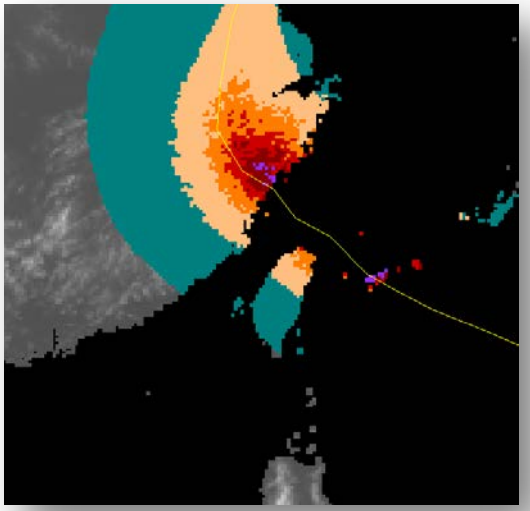
Typhoon Rainfall Model

Rainfall is accumulated over each catchment

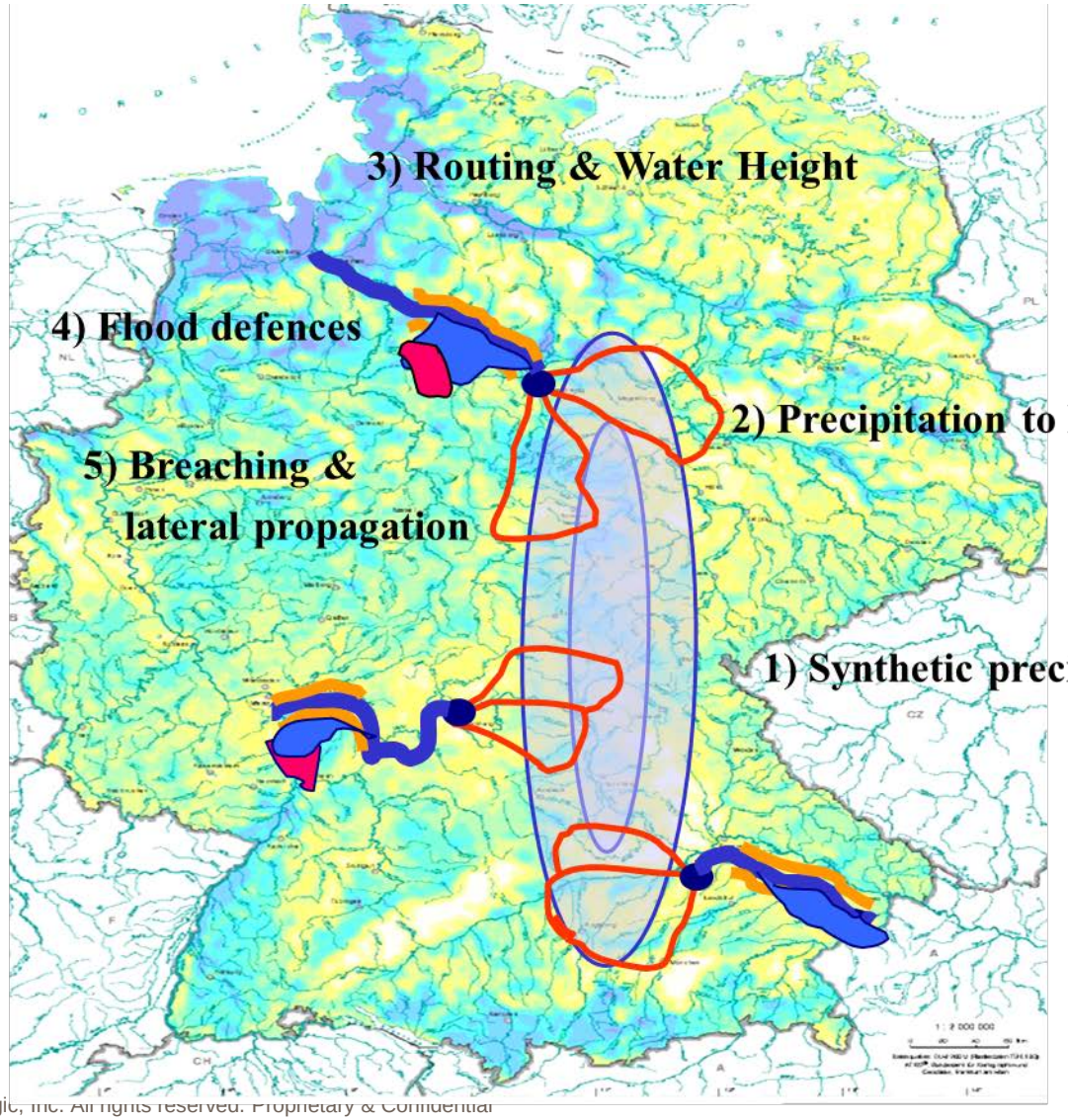
Summary statistics describing the event are calculated for each catchment

Routing analysis on DTM is used to quantify relative flood risk within each catchment, on the DTM grid

Differentiation by general structure and occupancy classes, with building height taken into account

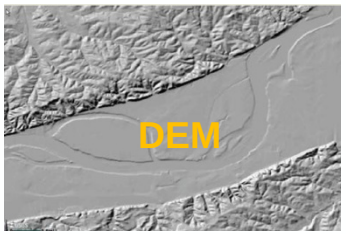


Inland Approaches (2): Euro Flood

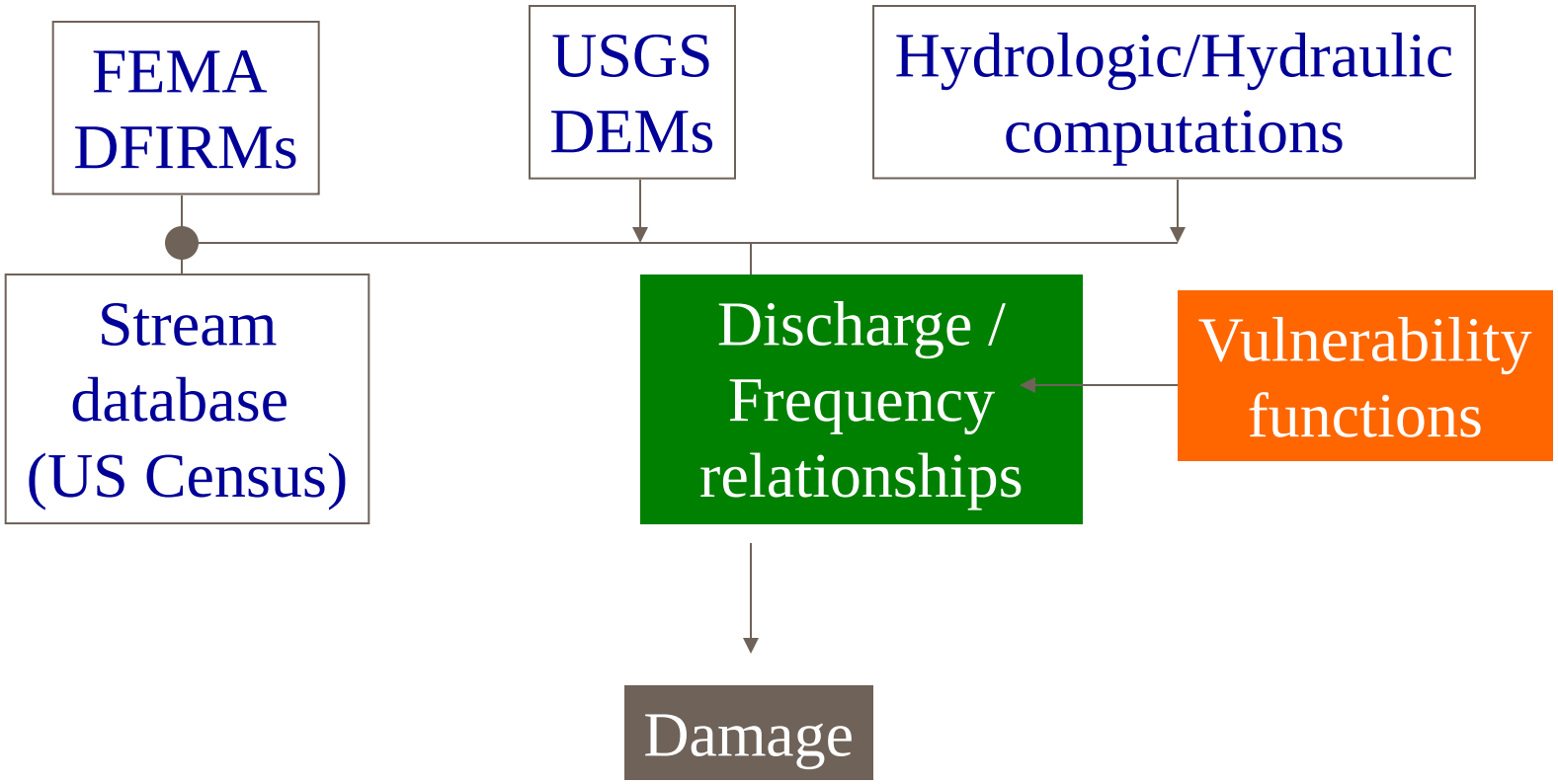


10 Meter National Hydraulic Profiles

- 10 Meter Grid Resolution
- 269 Million Flood Elevation Features



U.S. Riverine / Inland Methodology



Flood Damage Estimation

- Drivers of damage
  - Water depth, hydrodynamic effects
- EQECAT's experience
  - HAZUS Flood model compiled by ABS Consulting and EQECAT
  - Published vulnerability curves from FIA, USACE, IWR

Status / timeline:
U.S. Flood Model Enhancements Underway

- Update to latest DFIRM data
- Updated hydrologic/hydraulic computations
- Updated stream database
- 10m elevation data
- Parcel geocoding
- Vulnerability enhanced through CoreLogic property characteristics and replacement values
- Residential loss validation through NFIP and private insurance loss data (e.g. excess policies)

- Updated model will be released in June 2015

Relevant types of expertise

- Meteorologists (e.g. including expertise in tropical cyclones for storm surge and tropical cyclone precipitation, and in mid-latitude systems for other precipitation events)
- Hydrologists
- Hydraulic engineers
- Structural engineers
- Coastal engineers
- Statisticians
- Actuaries
- Computer Scientists

Flood vs. Hurricane Wind Modeling

	Hurricane (wind)	Flood (inland)
Source	Storm Tracks	Rivers & Streams
Event Size	SSI	Discharge
Frequency vs. Severity	Landfall Frequencies	Discharge – Frequency Curve
Propagation	Wind Field and Inland Decay	Hydrologic and Hydraulic Models
Site Conditions	Terrain	Elevation

For flood, elevation and precise position relative to flood sources are critical !

- Spatial gradients in hazard are much steeper than for wind
- Modeling is much more data intensive

Thank You.

Questions?