Marine Insurance – A Global Perspective
Catastrophe Models – Changing Your World
June 21, 2018

GC Global Marine and Energy
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Discussion Topic

- Catastrophe Models
  - Overview
  - Today - Underwriting and Claims
  - Tomorrow’s Possibilities
A catastrophe hazard model is software that simulates thousands of synthetic events to estimate damage and loss for modeled risks:

- Commercially available for over thirty years
- Improved risk identification and quantitative analysis
- Global footprint covering “natural” and “man-made” catastrophic perils

Over 100 countries and 300+ geography/peril combinations
Catastrophe Models - Overview
Marine Lines of Business

- Marine capabilities are relatively new and limited
- Capabilities vary by marine lines of business

Available
- Marine fixed property (marinas, piers / docks)
- Recreational boats / yachts (2006)
- Cargo warehouse Specie / fine art (2016)

Limited
- Builders’ risk
- Contractors’ equipment
- Cargo port accumulation
- Off-shore energy

Requires Alternatives
- In-transit cargo (air, land and sea)
- Commercial hull
- Protection and Indemnity
Catastrophe Models – Today
Underwriting Impact – New Challenges

• Data capture
  – Additional requirements

• Output applications
  – New decision inputs

• Workflow
  – Efficient when integrated

• Holistic perspective
  – Risk decisions impact portfolio performance
Catastrophe Models – Today
Impact on Underwriting Process

• Additional data requirements
  – RMS Marine Module (2016)
    - Cargo Warehouse / Specie
    - 19 occupancies
    - 12 structure types
    - 500 different combinations

• System changes
  – Design and implementation expense to support new requirements in a timely manner

<table>
<thead>
<tr>
<th>Product Type (Occupancy Type)</th>
<th>Storage Configuration (Construction Class)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automobiles</td>
<td>Special Design Facility</td>
</tr>
<tr>
<td>Break Bulk</td>
<td>Silo</td>
</tr>
<tr>
<td>Dry Bulk</td>
<td>Liquid Tank</td>
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<tr>
<td>Liquid Bulk</td>
<td>Gas Tank</td>
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<tr>
<td>Consumables</td>
<td>Inside Warehouse at Port</td>
</tr>
<tr>
<td>Temperature Controlled</td>
<td>Containerized – Inside Whse</td>
</tr>
<tr>
<td>Electronics</td>
<td>Containerized – Stacked Outside</td>
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<tr>
<td>Explosives</td>
<td>At Destination - Warehouse</td>
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<tr>
<td>General Cargo</td>
<td>At Destination - Retail</td>
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<tr>
<td>Heavy Industry</td>
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<td>Petroleum</td>
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<tr>
<td>Pharmaceuticals</td>
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<tr>
<td>Project Cargo</td>
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<tr>
<td>Livestock</td>
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<tr>
<td>Fine Art &amp; Collectables</td>
<td>Museum &amp; Institutions</td>
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<tr>
<td>Fine Art &amp; Collectables</td>
<td>Retail &amp; Private</td>
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<tr>
<td>Cash in Transit</td>
<td></td>
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<tr>
<td>Jewelers Block</td>
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<tr>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Catastrophe Models – Today
*Deeper Insight, Better Decisions*

- Geospatial / Characteristics
  - Distance to major fault or coastline
  - Soil classification
  - Flood or brush fire zone
  - Proximity to “trophy” targets

- Visuals
  - Condition, verification, classification

- Loss Potential
  - Expected annual damage and loss

- Exposure Accumulation
  - Risk concentration
Influences LOB strategies
• Corrupts portfolio results

Coverage and premium booked based on incorrect hazard model analysis

Cargo (Cold Storage Warehouse)
New Orleans, LA - $3m TIV

RMS Mapping
Correct
- Temp Controlled, Destination Warehouse - AAGL $3,600
Incorrect
- General Cargo, Destination Warehouse - AAGL $1,500

Underwriting / Claims Impact
• Geographical caps
• Underwriting guidelines
• Rates
• Budget allocation
• Claims response

Poor Data Quality Can Be Costly
Catastrophe Models – Today
Catastrophic Event Response

• Catastrophe models generate reasonably credible loss estimates for active events considering the circumstances, but …

• Blindly accepting and using “out of the box” loss estimates can send false signals and trigger poor decisions

• Key Message
  – Users need to understand modeling methodology to temper both internal and external communications
Catastrophe Models – Today
Catastrophic Event Response – Understanding Limitations

• Early estimates are subject to different opinions, unknowns and model methodologies
  – Modelers can differ on evolving event parameters
  – Methodology assumes “ensemble” (events with similar characteristics from catalogue) reflects actual event characteristics
  – Wide loss band that limits value

• Loss estimates can be subject to post–event differences
Catastrophe Modeling – Claims Response
Super Storm Sandy (October, 2012) - Pre Landfall

• James Waller, PhD – GC Meteorologist
  – Potentially a deadly, historic storm relative to scope, severity, storm track and landfall angle
  – Primarily a flood event with battering wave impacts along NJ, NY, RI
  – Wind impacts light but widespread with most severe in northern NJ, Long Island and RI

• GC Global Marine Analytics
  – Concerned actual event was not well represented in hazard model event catalogues
  – GC Marine decided “not” to release any pre-landfall cat model loss estimates
Catastrophe Modeling – Claims Response
Super Storm Sandy - Post Landfall

• James Waller, PhD
  – Prior to landfall winds extended to 485 miles from center as storm transitioned from tropical to extratropical
  – Significant storm surge and flooding driven by both wind and area affected
  – Estimated return period for wind 20 -30 years, 100 to 120 years for surge and 700+ years for track

• GC Global Marine Analytics
  – Confirmed Sandy characteristics were not well represented
  – Maintained a position “not” to release any loss projections but…
  – Provided clients with reports noting exposed risks by hazard bands

Satellite estimated wind field
Early October 29
Source: Indian Space Research Centre

July 30, 2018
Catastrophe Models – Tomorrow
Changing Client Needs and Industry Environment

• InsurTechs – Innovators using data, analytics and digital technology to increase efficiency in current insurance model and enhance customer experience

• Industry InsurTech Conference, October, 2018
  – Estimated 6,000 attendees from 50 countries
  – Participants
    - AIG, Allstate, Chubb, Progressive, Travelers, USAA, etc.
    - Microsoft, Oracle, SalesForce
    - Accelerators such as Blue Owl, Dacadoo, Hippo, Lemonade, Roost, SevenCorners, Simplify, Zesty…….

• InsurTechs are moving the insurance business model forward by “disrupting” as well as “transforming”

• In addition to artificial intelligence (AI), intelligent analytics (IA) will be a key pillar supporting our changing environment
### Catastrophe Models – Tomorrow

**Technology Is Driving Industry Changes – Looking Forward**

<table>
<thead>
<tr>
<th>Consumer</th>
<th>Carrier</th>
<th>Consumer</th>
</tr>
</thead>
<tbody>
<tr>
<td>“ Applicant” completes limited personal and risk (boat) information on-line</td>
<td>Carrier links to proprietary data bases to evaluate and classify “applicant”</td>
<td>Applicant receives either decline or offer with coverage summary</td>
</tr>
<tr>
<td>3 minutes</td>
<td>2 minutes</td>
<td>5 - 8 minutes</td>
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<td></td>
<td>1 - 2 minutes</td>
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<tr>
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<td>1 minute</td>
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</tbody>
</table>

Applicant is actively engaged during the visually transparent process.

**Catastrophe Models – Tomorrow**

**Technology Is Driving Industry Changes – Looking Forward**
Catastrophe Models – Tomorrow Today (Non-Marine)

Intelligent Analytics

- Need - A “dynamically” develop hazard loss cost and reinsurance charge combined with other loss (attritional) and expense factors

- Benefits – More accurately reflects the risk, more effectively manages the portfolio and opens new opportunities

Applicant for Homeowners Insurance

- Applicant information
- Property description
- Coverage information
- Loss history

Prospect receives decline / offer with coverage summary

Technology Platform

- Applicant metrics
- Predictive inputs
  - Gross AAL
  - Net AAL
  - Standard deviation
  - Risk Managed Layer
- Reinsurance cost
- Cost of capital

Non-cat L/R Expenses

Proprietary Tables
Catastrophe Models – Wrap-up

1. Is data quality a core element emphasized and monitored (scorecard) in the marine underwriting process / organization’s culture?
   – Above average data quality can be positively leveraged

2. Is catastrophe modeling output integrated into a holistic, well-defined analysis process?
   – Fragmented, poorly defined approach is likely inefficient and ineffective

3. Are the benefits and limitations of catastrophe models well communicated throughout the process?
   – Understanding facilitates support and effective implementation

4. Is leadership challenging the traditional marine business model in response to changing customer needs and new opportunities?
   – Challenging legacy and leading with innovation, analytics and technology
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