MANAGING EXTREMES WILLIS RE CONVECTIVE STORM RISK FROM AN INSURANCE MARKET PERSPECTIVE

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OUTLINE

1.SCS - The Broker Perspective2.SCS Risk - What is known?3.SCS Risk Modelling

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1. SCS -THE BROKER PERSPECTIVE

Top SCS losses world-wide

- Severe Convective Storms cause significant losses around the globe
 - US\$ 15.5bn (April outbreak 2011)
 - US\$ 7bn (Joplin May 2011)
 - EUR 1.25bn (Wolfgang 2009)
 - EUR 1.5bn (Munich 1984)
 - A\$ 2.3bn (Sydney 1999)





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My clients want to know...

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What can I do when no off-the-shelf model is suitable?



How can I improve my business profitability?



What's the best strategy for handling volatility?

The SCS world our clients see...



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Tornado Risk view in Re-/Insurance

- Activity over the past has varied in frequency and intensity
- Strong/weak early season no indication of summer/late season
- No increasing trend in tornado normalised losses (Geneva Association, 2012)



Source: Storm Prediction Center

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Source: tornado damage data from K. Simmons, Austin College, presentation 12 July 2011, Geneva Association; GDP data from US BEA; graph prepared by R. Pielke, Jr., 13 July 2011

2. SCS RISK -WHAT IS KNOWN?

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Historical Tornadoes

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1950-2010 SVRGIS Data Base for Tornado Activity (Storm Prediction Center)



How can we create a SCS Climatology?

- Willis Re MANAGING EXTREMES
- High vertical windshear and strong convection necessary main indicators for SCS occurrence

Reanalysis Proximity Soundings (1997-9)



Global Climatologies

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How does Tornado Risk outside US look like?

Confirmed Tornado observations 2011



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Tornado Severity Distributions in US and DE very similar!

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Kunz 2011, KIT

No clear trend in total TO activity BUT: smaller proportion of F2+

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Brooks 2011, NOAA

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 Increase in the number of annual hail days based on insurance claims with an underlying variability



4. SCS Risk Modelling

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Physical-based modelling of NatCat Risk

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Return Period [years] ^{'n}

150

100

50

17,50

200

Modelling Tornado-Hail Risk

Hazard

Climatologies on high resolution

- Spatial frequency of SCS
- Define relationship between tornadoes and hail events
- Spatial information on tornado and hail severity distributions
- Identifying event proxies
- Information on severity distribution within footprint
- Time-Spatial Clustering
- Intra-seasonal Activity

OT Detections 2004-2011. Bedka 2011/KIT



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Modelling Tornado-Hail Risk

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Vulnerability

- Understand damage potential due to different intensities
- Understand differences of vulnerability for different Lines of Business and secondary modifyers
- Translate engineering assumptions to model resolution

Exposure

- High Resolution of Total Sums Insured per Line of Business
- Historical losses per claim and LoB



Lots of challenges in SCS modelling remain

- Very sparse observational data
- Event definition: time/regional extension
- High dependency on large-scale climatology: Events tend to cluster over a period of days-weeks
- Very localised impacts of events
 Very large amount of events necessary (millions)
- High dependency on local effects
- Little information on vulnerabilities
- Not much localised and detailed loss information for model calibration

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Little acceptance of SCS models in market!!!

- Few models available outside of US
- Computational resources restricted
 - Simulate fewer events (exposure-driven high-loss events missing)
 - Fewer years simulated (less stable EP curves, few tail events)
 - Coarser resolution (assumptions on affected exposure)

Statistical low resolution tools have often been much more reliable than detailed models

Large demand for more reliable models/tools

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Willis Pan-European Hail Model Willis eQUIP

Unique Hail Model for Europe

- 40 countries explicitly modelled
- First model for the insurance market to cover such a variety and number of countries
- ~ 630,000 stochastic events
- Country-specific vulnerability curves for residential, commercial, industrial and agricultural buildings and contents, motor and 7 agricultural lines



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