NEEDS AND CHALLENGES IN CATASTROPHE MODELLING

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WHAT IS REINSURANCE?

- Insurance of insurance companies.
- Usually globally operating.
- Most catastrophe reinsurance contracts last for a year, they are renegotiated every year.
 Most insurance contracts last for 1-10 years.
- Most catastrophe contracts cover event losses, some cover the sum of all annual losses (aggregate contracts).
- Typically, reinsurance companies care about intense, strong, and rare events causing significant damage.

✓ REINSURANCE REQUIREMENTS

- Expected annual average loss
- Expected losses at certain return periods, e.g. 100, 250, 500, 1'000 years.
- Pricing:
 - The above for the portfolio of an insurance company
- Risk Management:
 - The above for the entire reinsurance portfolio
 - Depending on the requirements of Rating Agencies and Regulators



- Hazard
 - Includes intensity and frequency
 - E.g. wind, earthquake, flood, hail, etc.
- Vulnerability functions
 - Calculate financial loss to buildings, contents, and business interruption, depending on hazard intensity
- Financial model
 - Calculate loss to the entire portfolio



DO WE NEED STOCHASTIC MODELS? AREN'T HISTORIC DATA ENOUGH?

All Atlantic storms from HURDAT since 1851.



AHL: NYSE

ARE HISTORIC HURRICANE DATA ENOUGH?

150 years of data is not enough for certain regions!



ISSUES AND CHALLENGES OF HAZARD MODELLING

WHAT IS 'CURRENT' HAZARD?

- The industry doesn't have a clear definition.
- The next 5 years? The last 5 years?
- How can we define this?
- Climate is NOT stationary!
- River runoff is changed as river beds are modified.
- Reducing historic data to anything close to 'current' reduces limited data even further!

ISSUES AND CHALLENGES OF HAZARD MODELLING

LIMITED HISTORIC DATA

- Old historic data is sometimes of poor quality
- Limited data to develop stochastic models
- Limited data to evaluate / validate stochastic models
- Limitations apply for time and space

• We need methods to use data from non-stationary climate to develop stochastic models for 'current' hazard.

SUMMARY – REINSURANCE NEEDS

- Historic data that is:
 - of high quality
 - consistent
 - covers a long period of time
- Knowledge about the driving factors of non-stationarity
- Knowledge about the uncertainty of the above.