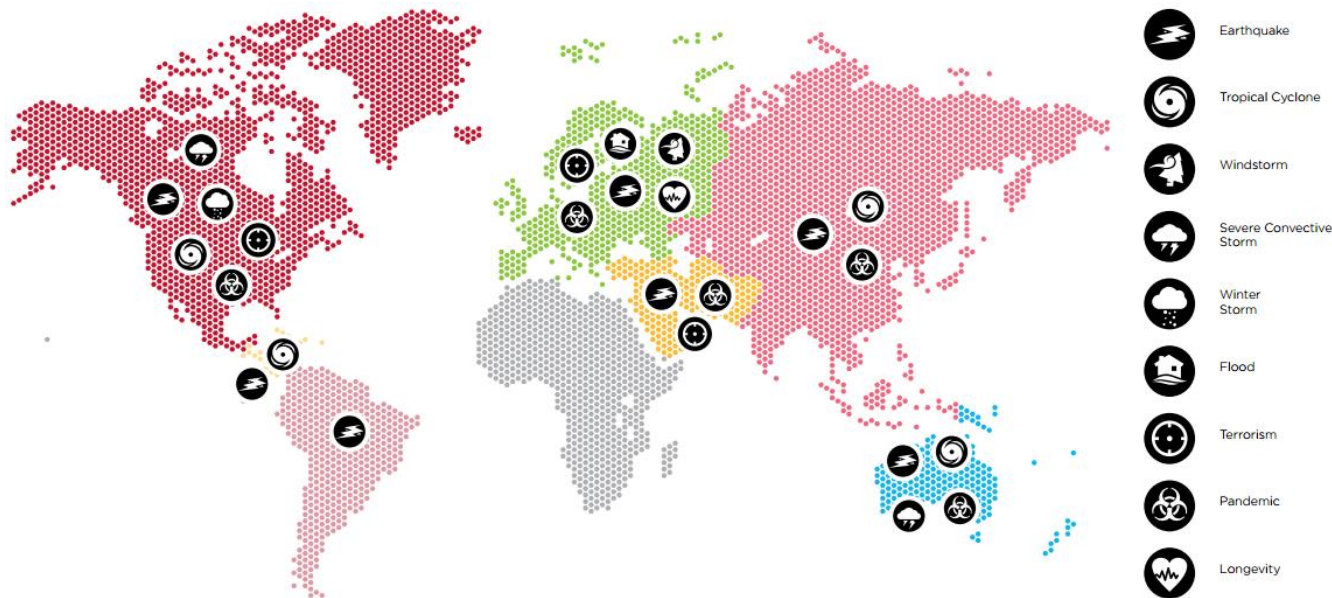




Applications of Catastrophe Loss Modelling methodologies for providing environmental shock stress tests to financial institutions

Robert Muir-Wood
Chief Research Officer
April 4th 2016

ABOUT RMS



- › Work with most major insurance and reinsurance companies across the **globe**
- › Best known for our **catastrophe risk** models for property and human impact of environmental and man-made hazards
- › Trusted by regulators and rating agencies for **over 20 yrs**
- › **\$2 trillion** worth of insurance and capital markets transactions based on RMS Risk Models
- › Contributions to scientific literature and policy around **environmental risk**, including climate change

THE REASON FOR CATASTROPHE MODELLING



History does not contain a sufficient population of catastrophes from which to derive a stable mean loss

Or address questions like - what loss can we expect once in a hundred years (on average)

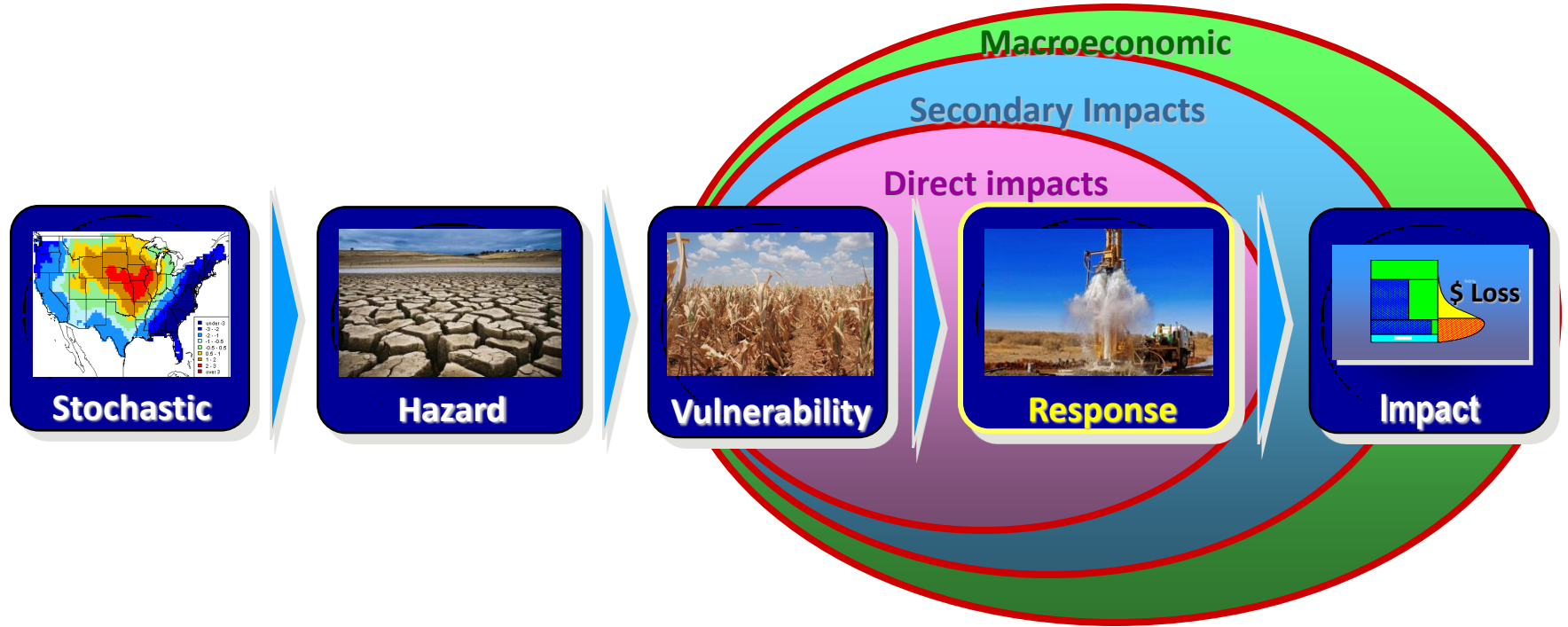
So we have to create a richer ('100,000 year') set - through generating a large population of virtual catastrophes

- Each event must be credible
- Each event has a probability
- And the whole population has to be a complete representation of the 'universe of possible events'

CATASTROPHE MODELS DRIVE THE BUSINESS OF CATASTROPHE INSURANCE

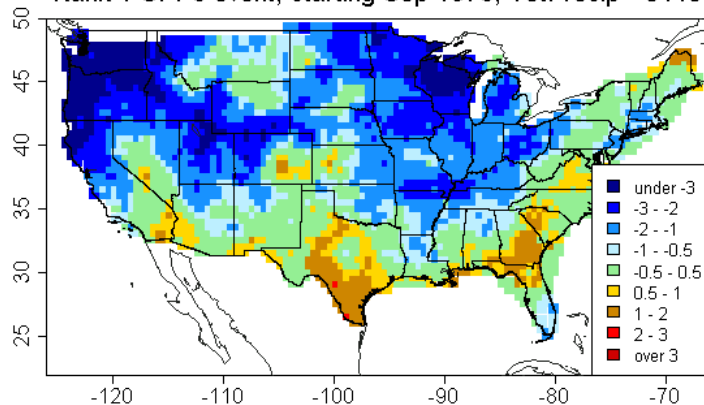


Holistic modeling of drought impacts

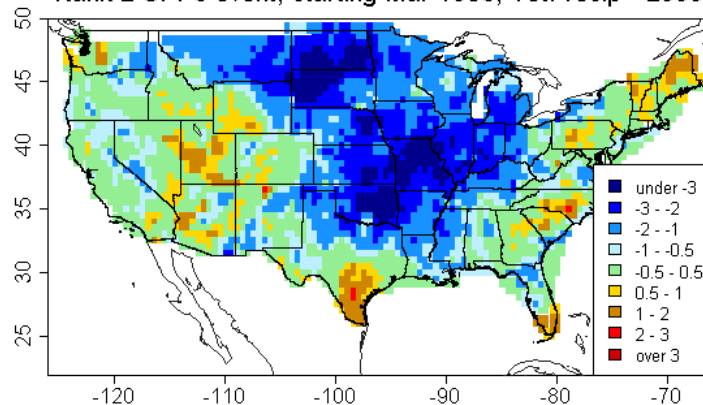


Top four historical droughts, SPI-12

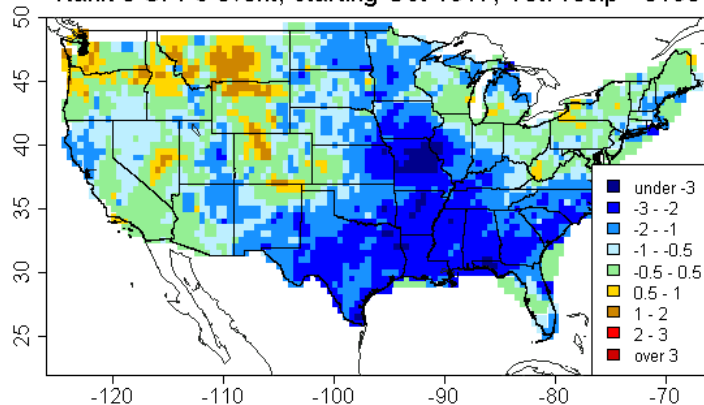
Rank 1 SPI-6 event, starting Sep 1976, TotPrecip=-3443



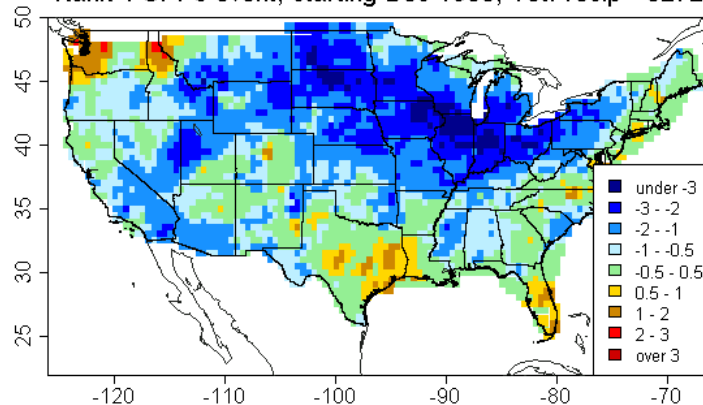
Rank 2 SPI-6 event, starting Mar 1936, TotPrecip=-2999



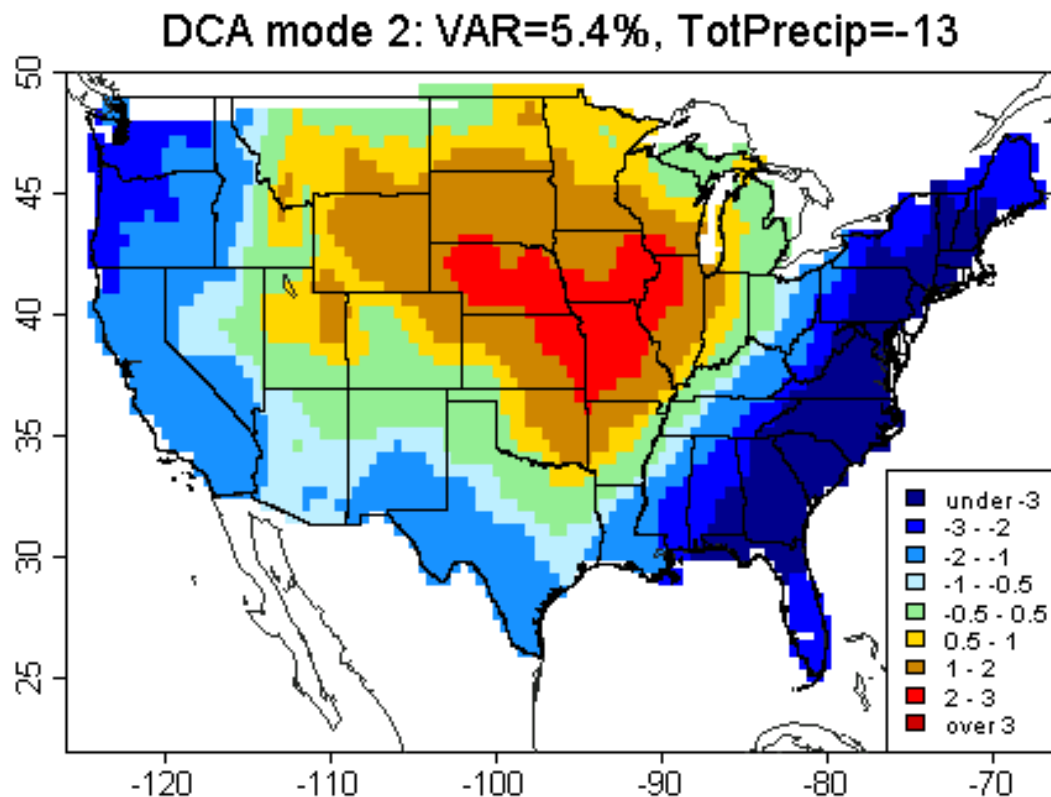
Rank 3 SPI-6 event, starting Oct 1917, TotPrecip=-3150



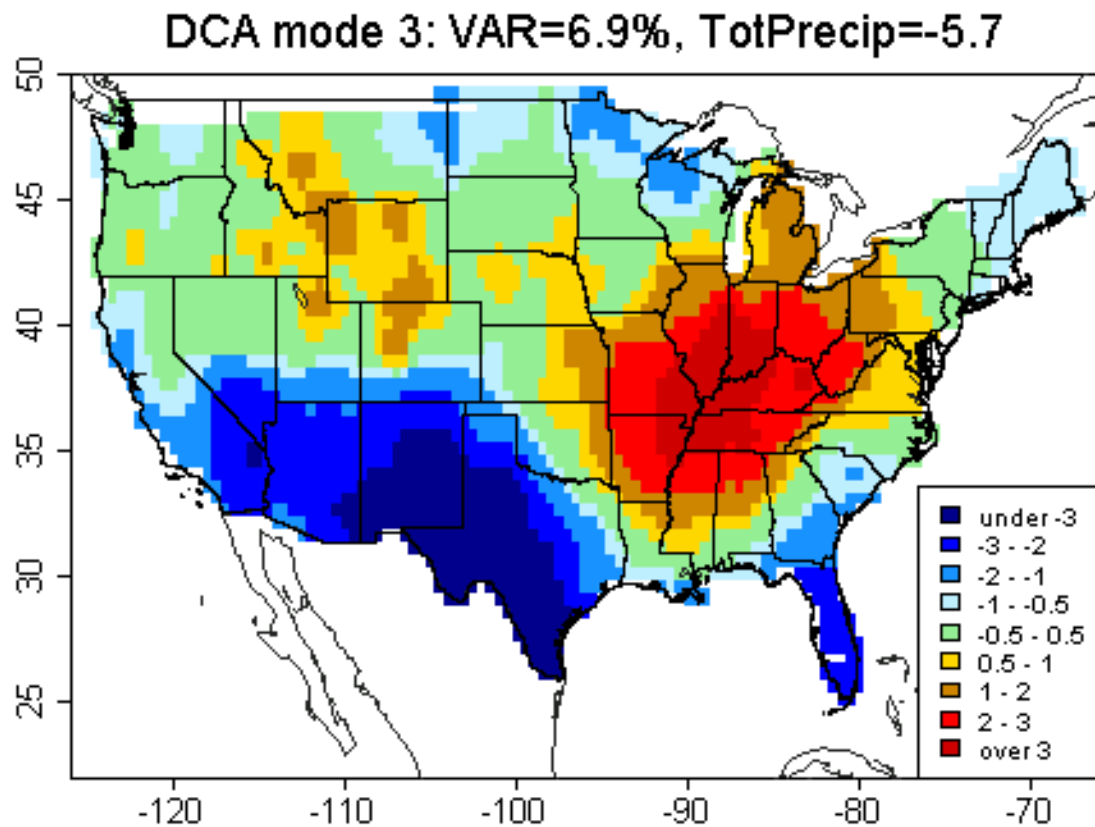
Rank 4 SPI-6 event, starting Dec 1933, TotPrecip=-3272



Simulated 6 month drought (1% annual probability for SPI hazard metric)



Simulated 12 month drought (1% annual probability for SPI hazard metric)



Drought Impacted Businesses

Hydropower



River transport



Drinks Manufacturer



Mining



Crops



Forestry



Water supply



Recreation

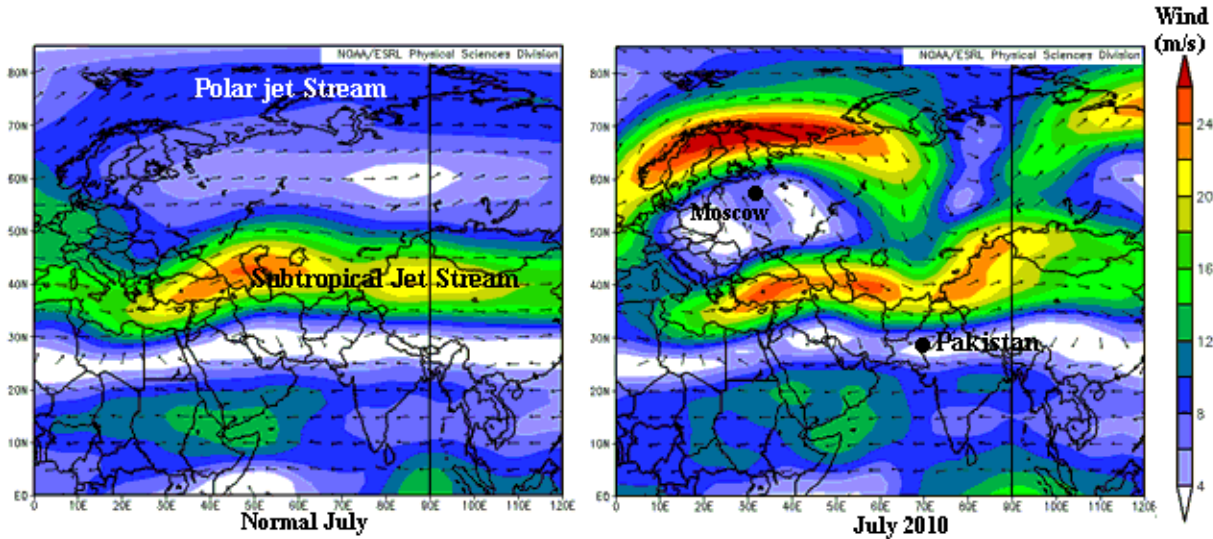


CLIMATE CHANGE AND RMS CATASTROPHE MODELLING

- Lead Authorship on IPCC 4th Assessment Report and IPCC Special Report on Extremes
- In 2014 RMS performed analysis of future costs (until 2100) of US hurricane and storm surge losses for <http://riskybusiness.org/>
- Since 2005 annual assessment and updates of 'medium term hurricane rates' (ie average of the next five years) to determine best perspective on 'current' hurricane activities
- Review of evidence to introduce MTRs for other climate perils
- Identification of trends around regional Droughts



DROUGHTS INVOLVE PERSISTENT ABNORMAL CIRCULATIONS, AND ACCOMPANY PERSISTENT PRECIPITATION ANOMALIES



Summer 2010



ENVIRONMENTAL STRESS TESTS FOR BANKS



ENSO Drought/Flood multiple countries

Accelerated sea level rise impacting future coastal property values

Global food crisis

Compounded with other catastrophes (?).

- Pandemic,
- Major Tokyo or Silicon Valley earthquake
- Cat 5 hurricane wind and surge strike on Miami
- Dirty Bomb: major urban centre