



RMS Medium Term Perspective on Hurricane Activity

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Florida Commission on Hurricane Loss
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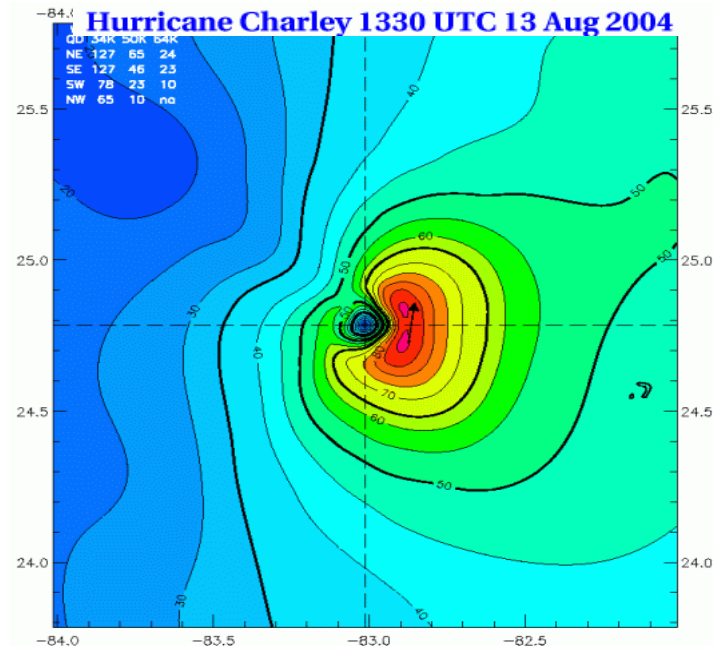
Agenda

- Multiyear autocorrelation of Atlantic, US and FL hurricane activity over the last century
- Appropriate insurance industry time horizon for assessing a forward looking perspective on activity
- RMS medium term perspective methodology
- Summary: future plans

Issues with Atlantic and US Hurricane Datasets

- The datasets used in this analysis are HURDAT and the US list of US Hurricanes, both available at NHC
- The datasets are known to be incomplete
 - ATL basin data likely incomplete prior to 1950 or possibly later regarding the storm intensity
 - The US landfall dataset also has issues, in particular with the max intensity of low Rmax hurricanes before 1900

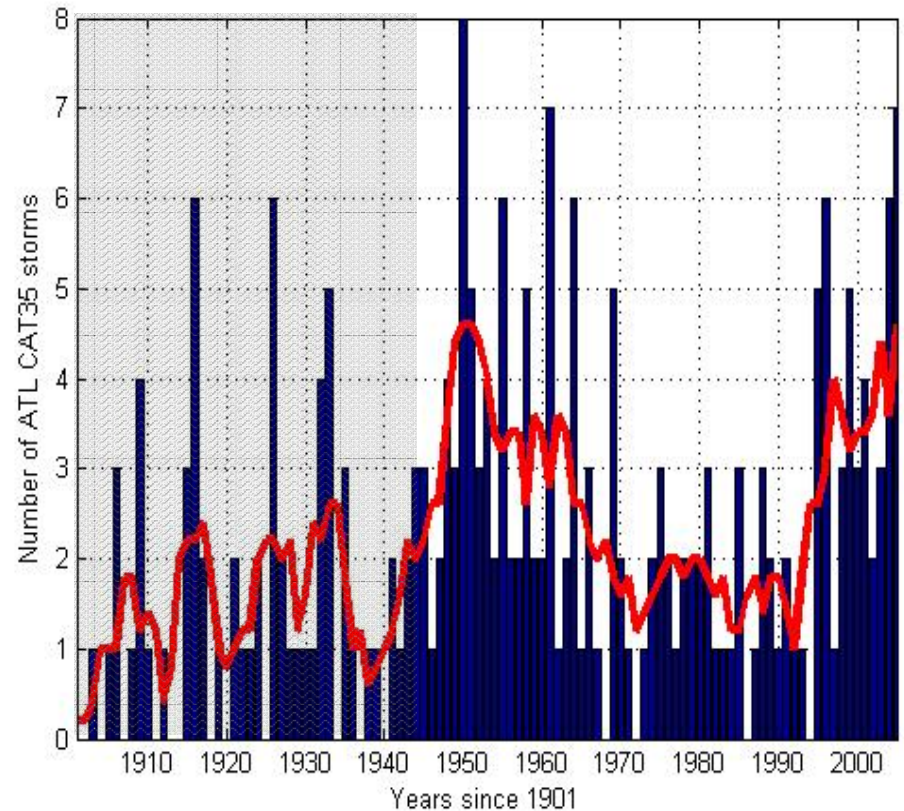
- What is the chance that 'Charley' would have been classified 'Cat 4' in 1860?



Source: <http://www.aoml.noaa.gov/hrd>

Atlantic Basin Hurricane Activity has shown a Marked Increase Since 1995

- Since 1995 # CAT 3-5 storms x 2 the 1970-1995 average
- Principal driver: low latitude sea surface temperatures (SSTs)
- Competing theories as to the cause of the current high levels of activity: multidecadal oscillation vs. climate trend
- However statistically and climatologically there is no doubt that we are currently in a persistent period of higher than average activity



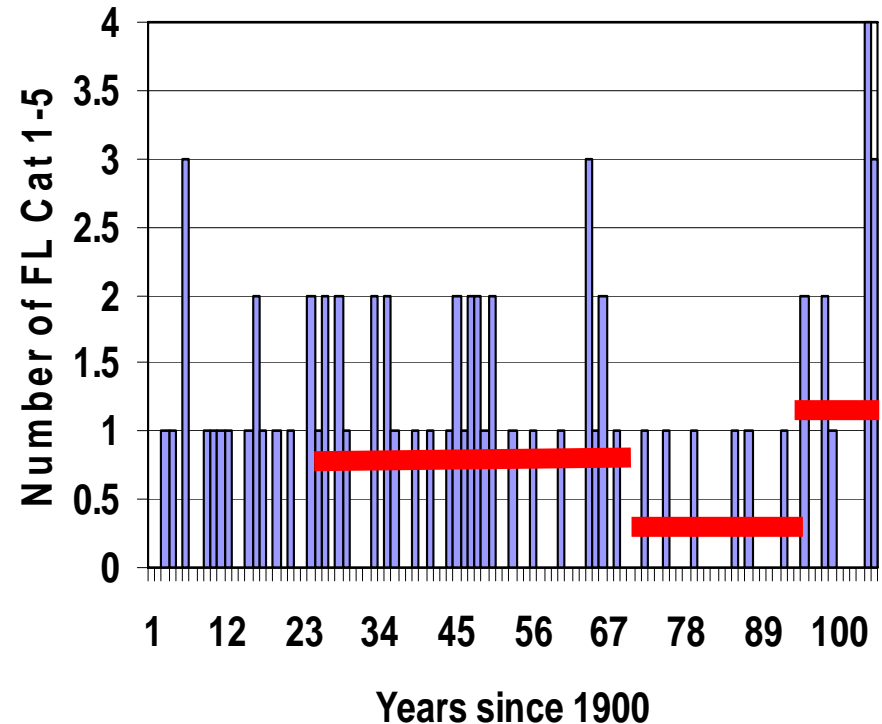
Annual number of Category 3-5 hurricanes in the Atlantic basin between 1900-2005 and 5 year running mean

NOAA's Perspective (May 2006)

- 'Atlantic hurricane seasons exhibit prolonged periods lasting decades of generally above-normal or below-normal activity.'
 - 'Hurricane seasons during 1995-2005 have averaged 15 named storms, 8.5 hurricanes, and 4 major hurricanes, with an average ACE index of 179% of the median'.
 - 'NOAA classifies nine of the last eleven hurricane seasons as above normal, and seven as hyperactive'.
 - 'In contrast, during the preceding 1971-1994 period, hurricane seasons averaged 8.5 named storms, 5 hurricanes, and 1.5 major hurricanes, with an average ACE index of only 75% of the median. One-half of these seasons were below normal, only three were above normal (1980, 1988, 1989), and none were hyperactive.'

Hurricane activity in Florida

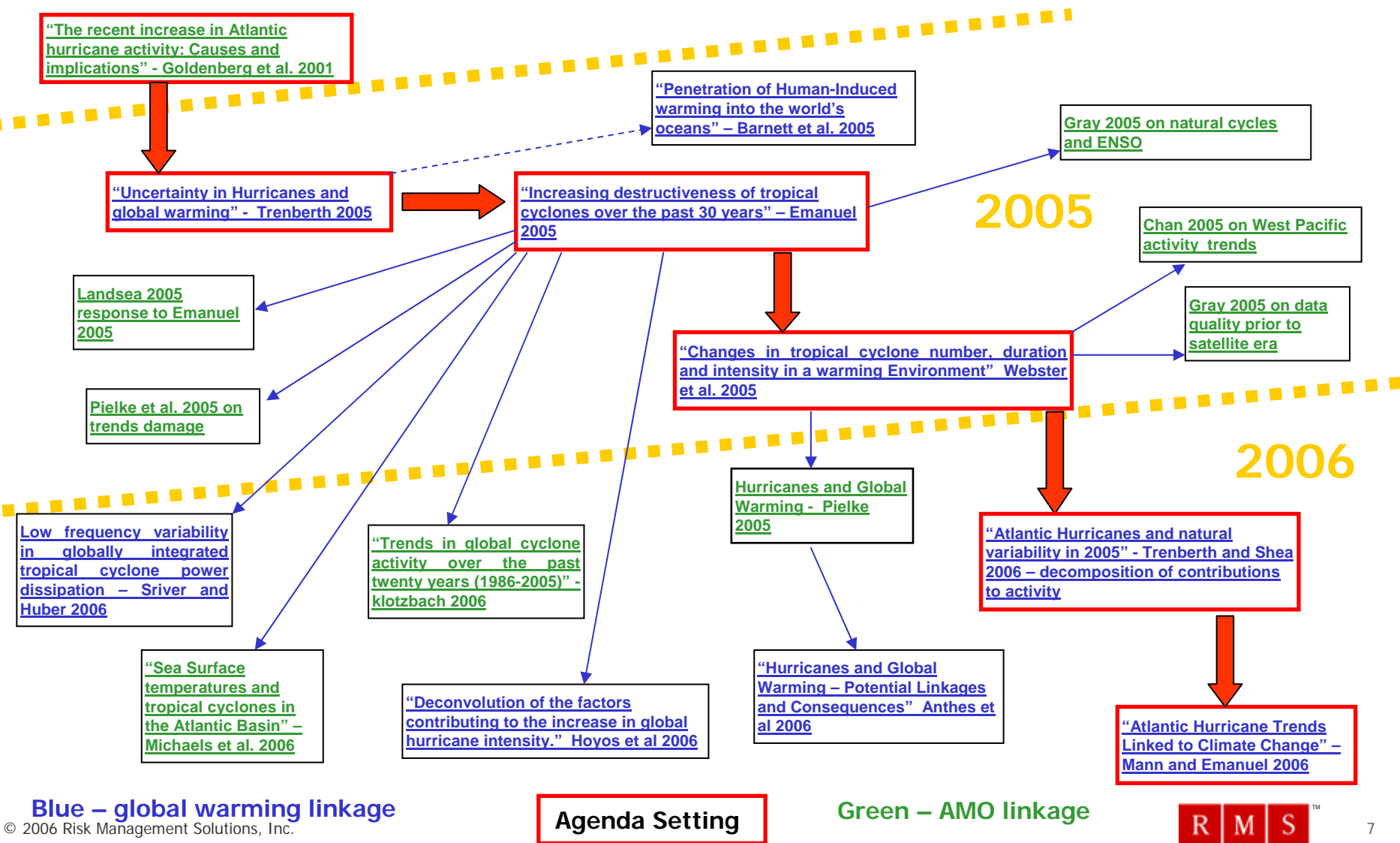
- Cat 1-5 in FL have gone through phases of high and low activity
- The frequency of Cat 1-5 from 1970 to 1994 was significantly lower than that of the long term.
- Frequencies of Cat 1-2 and Cat 3-5 have both been above the long term over the last 11 years
- Since 1995, 7 Cat 1-2 have impacted Florida, giving rise to an annual rate similar to that prior to 1970



Annual number of Category 1-5 hurricanes in Florida between 1900-2005

Climate and Hurricanes - Science timeline

Pre 2005



What is the appropriate time horizon for assessing hurricane risk for the insurance industry?

The “Appropriate” Risk Horizon for CAT Models

- The long term historical activity rate is inconsistent with the current level of activity
- For capital management and insurance regulatory purposes, shifting to a ‘short term’ seasonal risk horizon (i.e. less than 12 months) would prove far too volatile
 - Would imply significant changes in Florida insurance rates year on year (and month on month?)

The “Appropriate Risk Horizon” for CAT Models

- In September 2005 RMS determined that in future model upgrades the expected activity rates would be for a rolling five year forward looking period
 - More stable than seasonal forecasts
 - Appropriate time interval for scientific forecasting relative to multidecadal variability
 - To be updated annually

RMS Medium Term Perspective Methodology

Expert Elicitations

- RMS methodology uses a range of statistical analyses and an elicitation of leading experts in the field
- Elicitations have been widely used across fields where the length of the record is too short or the return periods too long to use traditional statistical methods:
 - Eg. Assessment of return periods of earthquake fault rupture in California
- For hurricanes, this approach is relevant because
 - Different theories exist regarding the causes of current high levels of activity, yielding different perspective on the future
 - Issues with the data reduce the confidence in employing long term statistics

1st Expert Elicitation – Bermuda, October 15, 2005

- The elicitation was organized to obtain a consensus over the activity of the next 5 years (2006-2010)
- US and Caribbean
- Formal process (following rules of elicitation)
- The following questions were asked:
 - Expected annual mean activity rate of Cat 1-5/Cat 3-5 hurricanes in the Atlantic Basin for the period 2006-2010
 - Expected annual mean activity rate of Cat 1-5/Cat 3-5 hurricanes making one or more landfalls along the US coast in the period 2006-2010
 - How long will the current period of higher activity last, and how low will hurricane activity then fall?

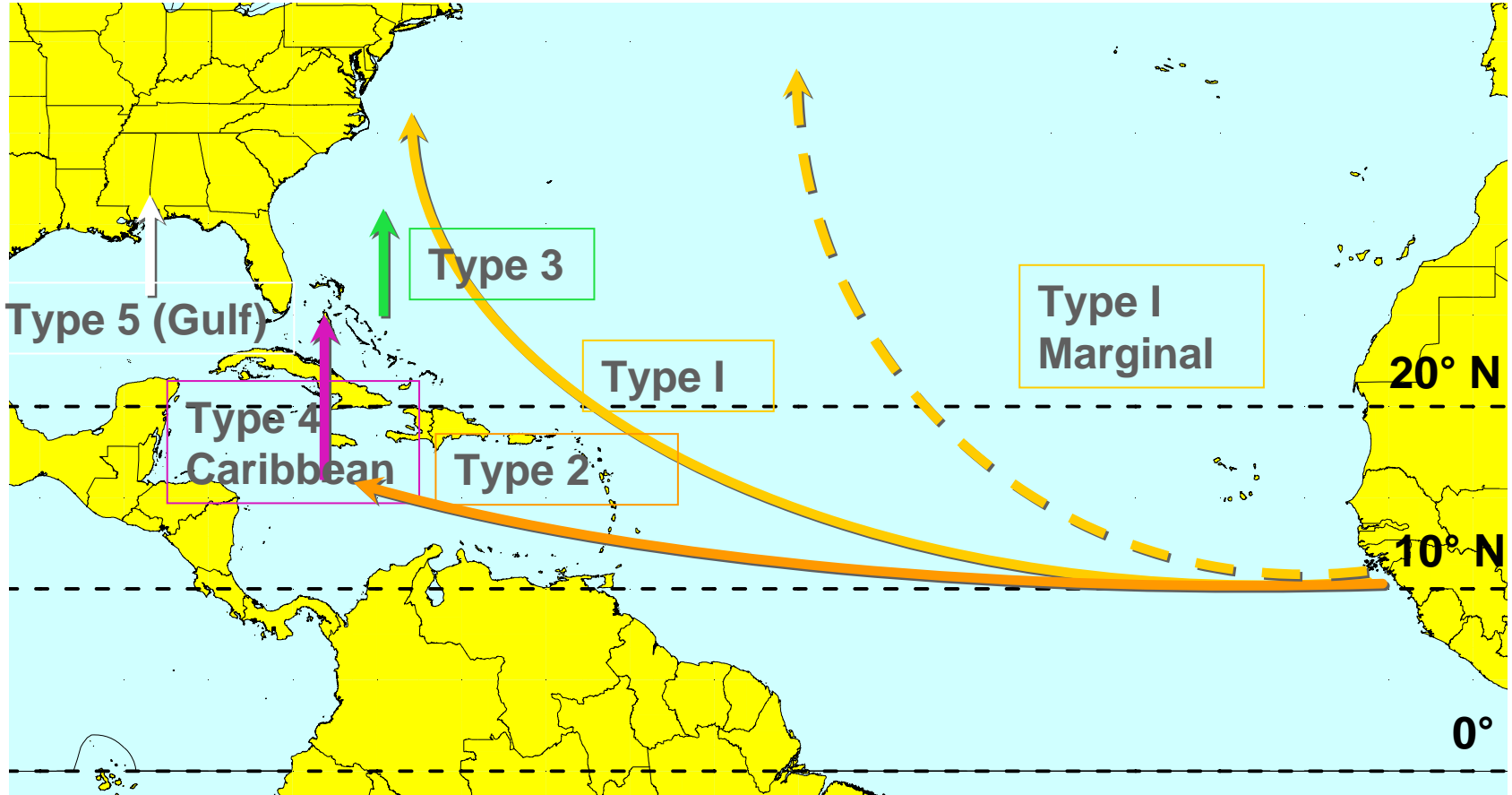
Expert Elicitation of Medium Term Caribbean and U.S. Rates

- Experts present at the meeting were: Prof. Jim Elsner (FSU), Prof. Kerry Emanuel (MIT), Tom Knutson (NOAA/GFDL) and Prof. Mark Saunders (UCL), reflecting a broad cross section of expertise
- Experts were provided with detailed data and US (NHC) landfall statistics
- Range of statistics derived from the time series were also provided, along with description of the way that activity rates are considered in the RMS model
- A RMS analyst was present at the meeting to perform calculations on the data as requested by the experts

Expert Elicitation of US Medium Term Activity Rates

- Experts activity increment targets were obtained by assessing probabilities of exceedance of key historical activity rates, under the assumption of a Poisson distribution
- The range of answers was 2.12 - 2.32 for CAT15 and 0.88 – 0.94 for CAT35
- Two approaches were used for calculating the mean rates across the experts
 - A simple average
 - A weighted average (weights for each expert inversely proportional to the range of their answers)
 - The results from the 2 methods are within 2% or less from each other
- Experts targets for the next 5-year activity at US landfall are:
 - 21% increase in the activity of CAT12,
 - 36% increase in the activity of major hurricanes (CAT35) compared to the long term mean (1900-2005)
- Experts all agreed high period of activity likely to last for at least next decade

Implementation of activity rate increases



- Activity rate increases predominately in Type 1 and Type 2 – Atlantic origin hurricanes

RMS Climate Hazard Models

- From May 2006 in all RMS models the default activity is that of the medium term 5 year perspective
- Recommended to be used for all standard applications of the model as used by insurers, reinsurers, rating agencies, Cat bond issuers & investors, regulators etc

Summary: Future Plans on developing Medium Term Hurricane Activity Rates

- Medium Term 5 year activities will be updated annually
- Procedures for end 2006 (2007-2011) update well underway
 - to include increased component of multiple statistical and climatological inputs as well as expert elicitation
- Procedures and outcomes will be submitted for peer-review publication