Thriving on Change

16th General Insurance Seminar

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Hyatt Regency Coolum

Catastrophes and the Advent of the Use of Cat Models in Ratemaking

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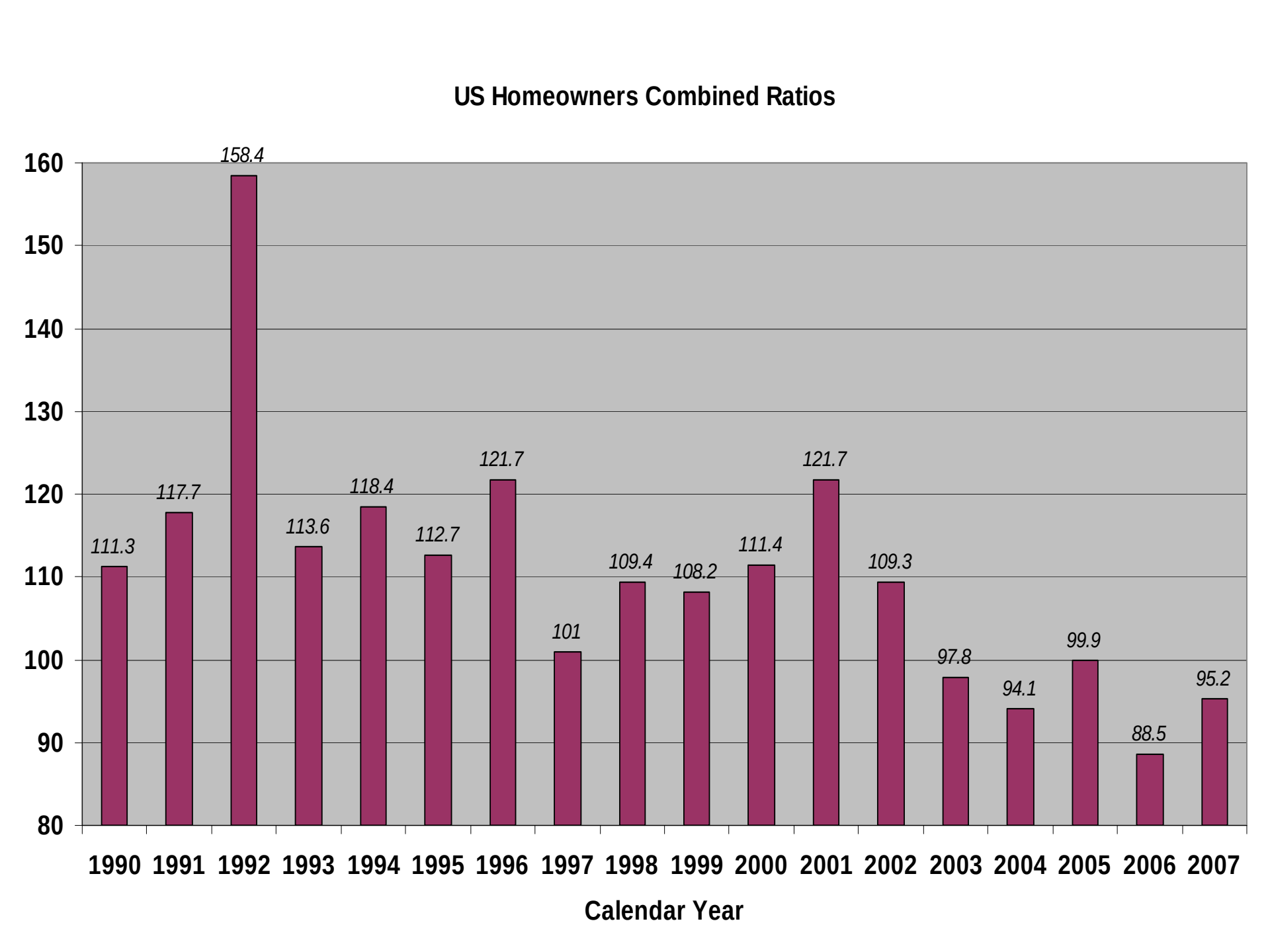
Catastrophes and the Advent of the Use of Cat Models in Ratemaking

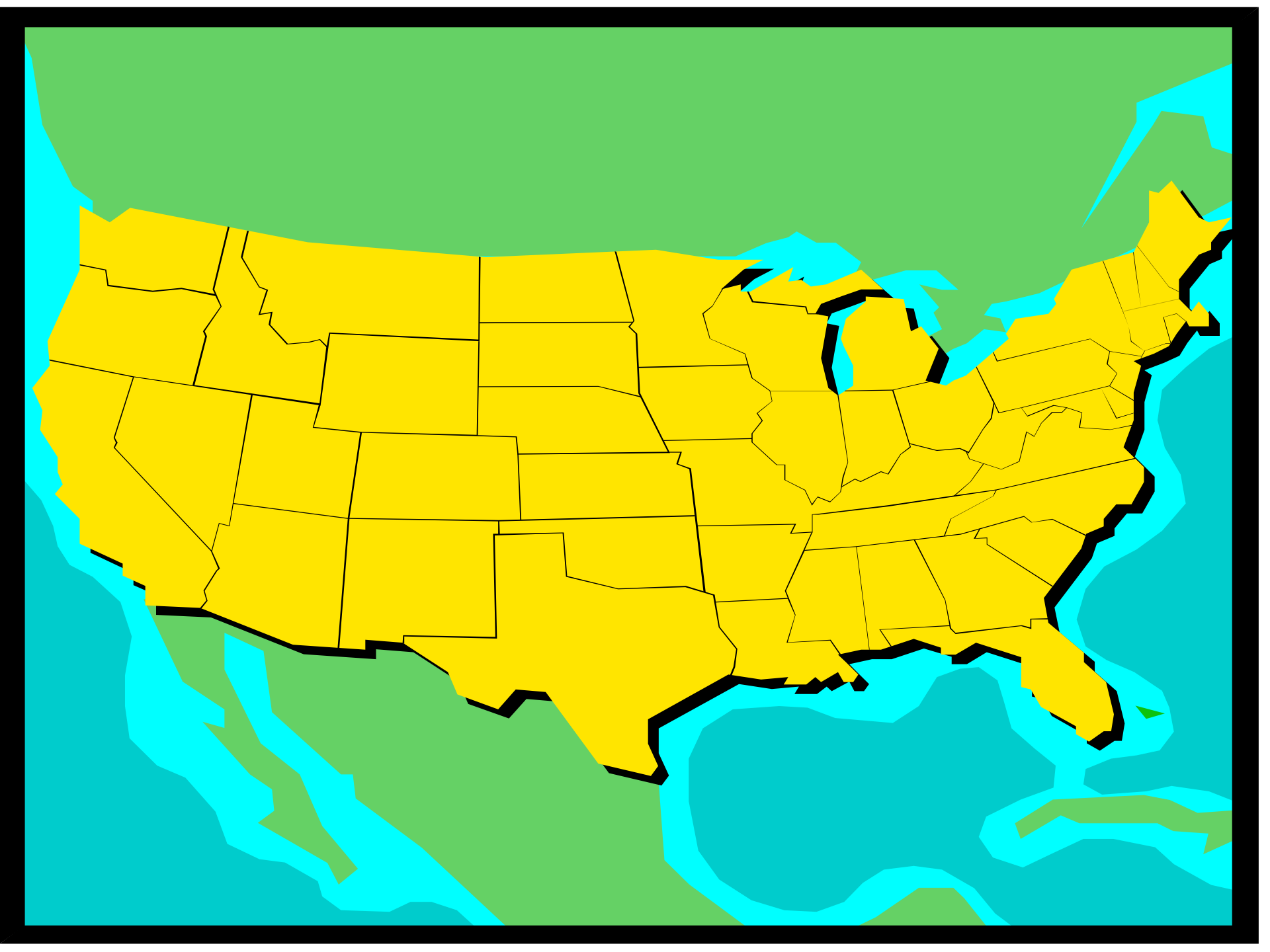
- Why is this an issue?
- Regulation of Rates in the United States
- Property Lines – Catastrophe Exposures
- Practice Standards

Largest Insured Catastrophes		*Date*	*Cost (mill)*
1	Hurricane Katrina (USA)	Aug05	68,515
2	Hurricane Andrew (USA)	Aug92	23,654
3	WTC (USA)	Sep01	21,999
4	Northridge Earthquake (USA)	Jan94	19,593
5	Hurricane Ivan (USA)	Sep04	14,115
6	Hurricane Wilma (USA)	Oct05	13,399
7	Hurricane Rita (USA)	Sep05	10,704
8	Hurricane Charley (USA)	Aug04	8,840
9	Typhoon Mireille (Japan)	Sep91	8,599
10	Hurricane Hugo (USA)	Sep89	7,650
?	Hurricane Ike (USA)	Sep08	15,000 e


US Homeowners Combined Ratios
160
150
140
130
120
110
100
90
80
158.4
117.7
111.3
113.6
118.4
112.7
121.7
101
109.4
108.2
111.4
121.7
109.3
97.8
94.1
99.9
88.5
95.2
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Calendar Year

Regulation of Rates in the USA

- Individual State Regulation of Rates
- Four Styles of Regulation
  - Prior Approval
  - File & Use
  - Use & File
  - Open Competition
- National Data Collection Agencies develop advisory loss costs with standard rate plan



American Insurance Market

- Many participants but dominated by few large National Insurers

- Company Groups writing in the US
  - Personal Auto 308
  - Homeowners 286

US MARKET	**Personal Auto**	
Company	*Prem $B*	*%*
State Farm	$28.5	17.7
Allstate	18.1	11.2
Progressive	12.1	7.5
GEICO	10.1	6.3
Farmers	8.0	5.0
Nationwide	7.6	4.7
USAA	5.7	3.5
Liberty	4.3	2.6
All Other	67.1	41.5
Total	$161.5	100.0

US MARKET	**Homeowners**	
Company	*Prem $B*	*%*
State Farm	$12.6	22.0
Allstate	7.1	12.3
Travelers	2.4	4.2
Farmers	4.0	7.0
Nationwide	2.7	4.7
USAA	2.3	4.0
Liberty	1.7	3.0
All Other	24.4	42.8
Total	$57.2	100.0

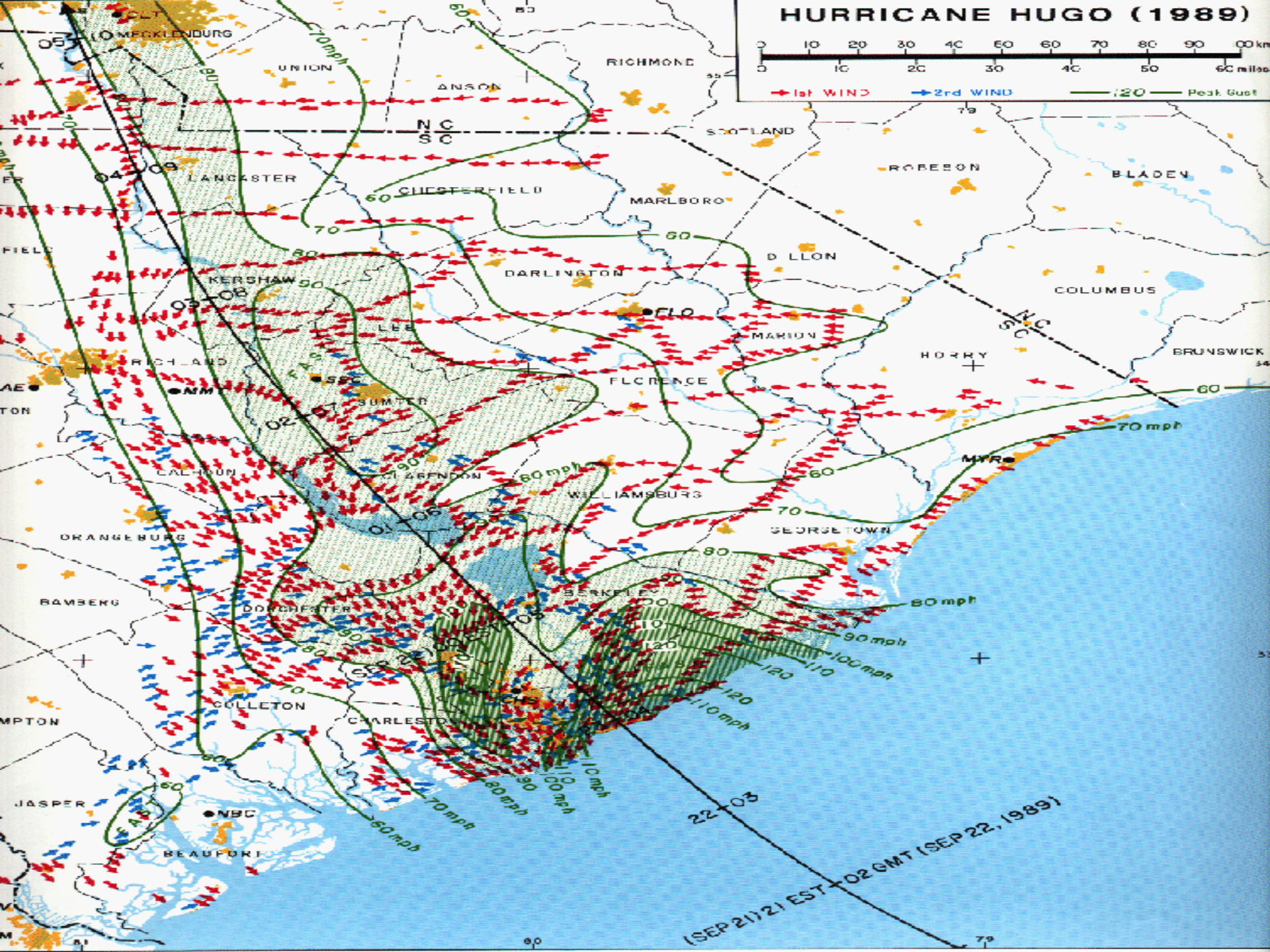
Various US Catastrophe Exposures

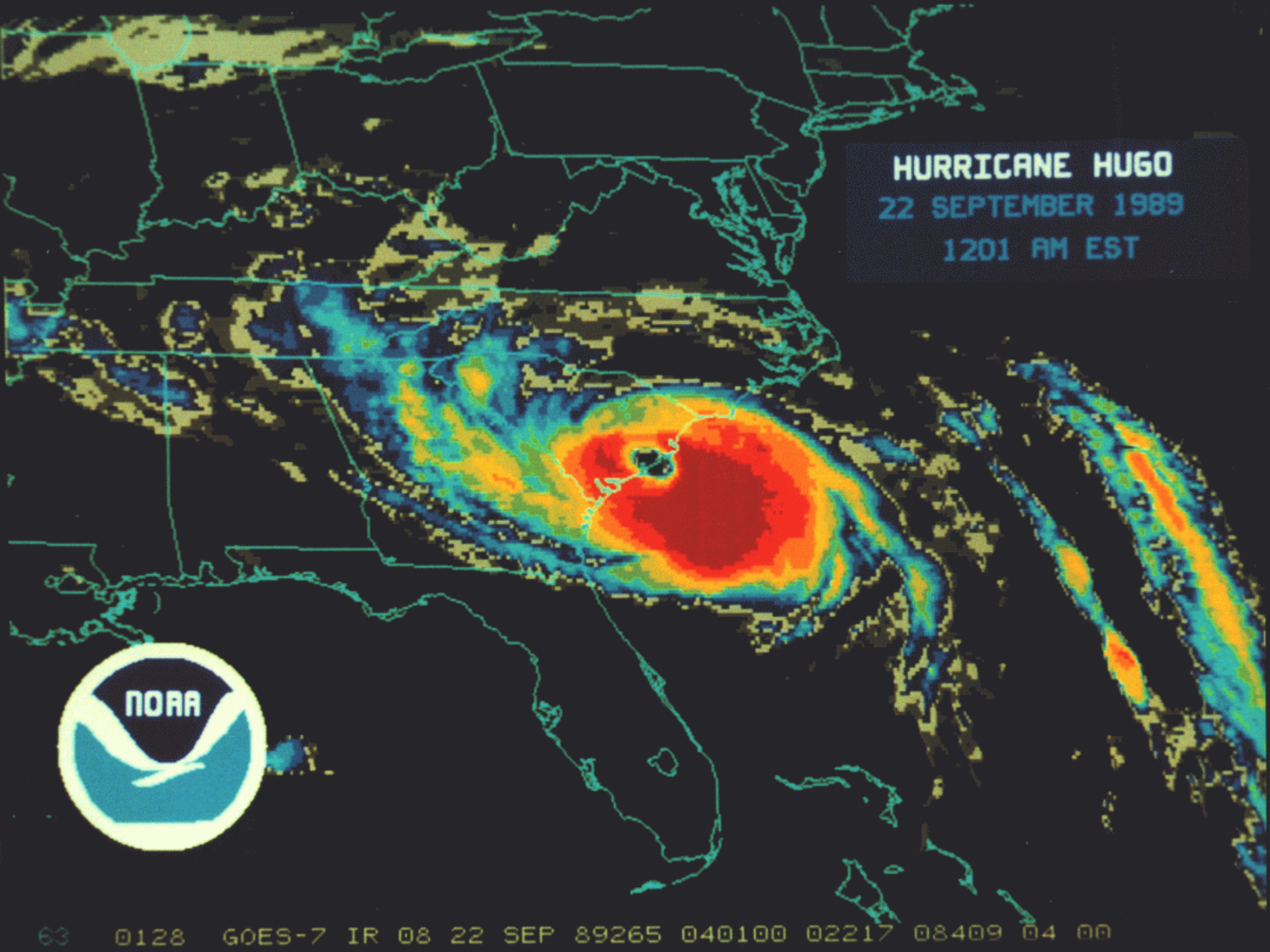
- Hurricane
- Tornado
- Hail Storm
- Earthquake *
- Winter Storm
- Terrorist Attack *
- Riot *
- Mold
- Flood *
- Sinkhole - Florida

* Some Government involvement

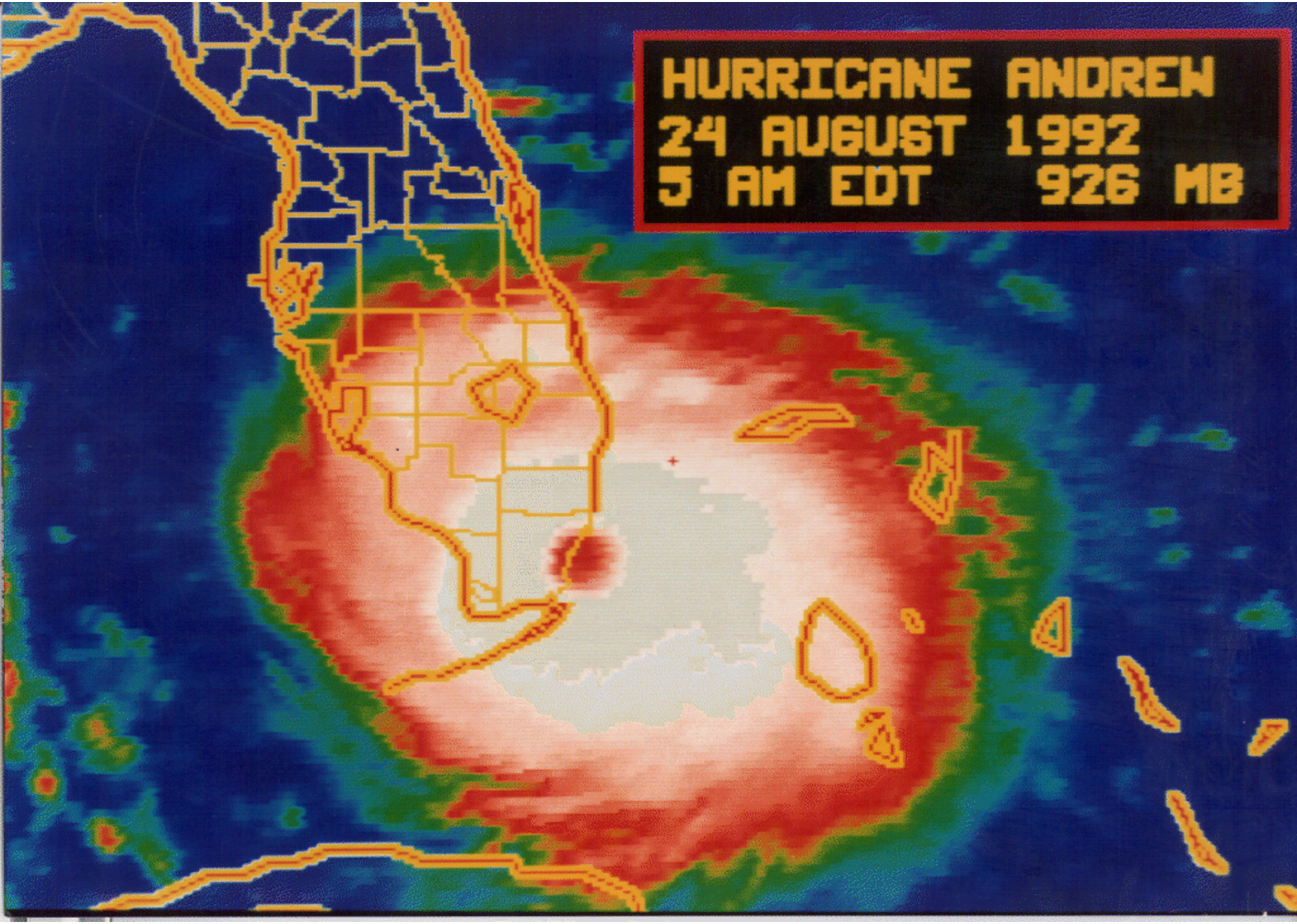
Property Lines Catastrophe Exposures

- Wake Up Call
  - **1989** – Hurricane Hugo & Loma Prieta EQ
  - **1992** – Hurricane Andrew
  - **1994** – Northridge Earthquake
- More Recent Enlightenments
  - **2004** – 4 Major Hurricanes
  - **2005** – Hurricane Katrina – Wind and Water
    Hurricane Wilma – late big storm
  - **2008** – Hurricane Ike


HURRICANE HUGO (1989)
1st WIND
2nd WIND
Peak Gust
CLT
MECKLENBURG
UNION
ANSON
RICHMOND
NC
SC
LANCASTER
CHESTERFIELD
MARLBORO
SCOTLAND
ROBESON
BLADEN
DARLINGTON
DILLON
COLUMBUS
KERSHAW
LEE
FLO
MARION
HORRY
BRUNSWICK
FLORENCE
SUMTER
CLARENDON
WILLIAMSBURG
GEORGETOWN
MYR
CALHOUN
ORANGEBURG
BAMBERG
DORCHESTER
BERKELEY
COLLETON
CHARLESTON
CHS
JASPER
NBC
BEAUFORT
(SEP 21) 21 EST
02 GMT (SEP 22, 1989)


HURRICANE HUGO
22 SEPTEMBER 1989
1201 AM EST
NOAA
63 0128 GOES-7 IR 08 22 SEP 89265 040100 02217 08409 04 00

Loma Prieta Earthquake Damage in San Francisco Area


HURRICANE ANDREW
24 AUGUST 1992
5 AM EDT 926 MB

Hurricane Andrew levels complete neighborhoods


ANDREW
WAS
HERE

Property Lines - Catastrophe Exposures

- Early 1990s
  - Introduction of output from Hurricane Catastrophe Models to replace very limited historic hurricane experience in rate development
  - More attention to exposure accumulation
  - Use of Earthquake model in California State EQ Program rates
- Restriction of coverage - mold

Wind and Water Damage from Hurricane Katrina

Mississippi Rescue from Storm Surge

Mississippi Homes after Katrina Damage Caused by Wind or Water?

Property Lines - Catastrophe Exposures

- More recently (2004 and beyond)
  - Increased scrutiny of model input – output
  - Greater attention to exposure accumulation and the risk of ruin
  - Use of severe thunderstorm (tornado/hail) and winter storm models in rate development
  - Greater appreciation of storm surge
    - especially since flood is not a covered cause of loss in the Homeowners policy
    - Limited Flood Insurance sold by Government

Catastrophe Models

- Brings the expertise from a number of disciplines such as:
  - Meteorology (weather)
  - Structural Engineers (building)
  - Oceanographers (storm surge)
  - Seismologists (earth movement)
  - Statistical modelers (Monte Carlo simulation and other simulation techniques)
- Actuaries required to understand modeling process rather than blindly adopt output

Applicable Actuarial Standards of Practice in the US

- Data Quality (ASOP #23)
- Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking (ASOP #39)
- Using Models Outside the Actuary's Area of Expertise (ASOP #38)

Can be found in the website - www.actuarialstandardsboard.org/asops.asp

Data Quality
US ASOP #23

- Selection of Data
- Reliance on Data Supplied by Others
- Reliance on Other Information Relevant to the Use of Data
- Review of Data
- Limitation of the Actuary's Responsibility
- Use of Data

Treatment of Catastrophe Losses
US ASOP #39

- Identification of Catastrophe Perils or Events
  - Identification of Catastrophe Losses
  - The Use of Data in Determining a Provision for Catastrophe Losses
    - Use of Historical Insurance Data
    - Use of Non-insurance Data and Models
  - Using a Provision for Catastrophe Losses
- Loss Adjustment Expenses

Using Models Outside the Actuary's Area of Expertise
US ASOP #38

- Appropriate Reliance on Experts
- Understanding of the Model
  - Model Components
  - User Input
  - Model Output
- Appropriateness of the Model for the Intended Application
- Appropriate Validation
  - User Input
  - Model Output
- Appropriate Use of the Model
- Reliance on Model Evaluation by Another Actuary

The power of additional computing applications in assessing risk potential can be tremendous.

Understanding the workings of the computer model (black box) is necessary if not required.

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