

2008 Natural Catastrophe Review

Thursday, January 15, 2009

Munich Re
Insurance Information Institute



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Munich Re Group



Introduction

Bob Kinsella, Spokesperson, Munich Re Group

U.S. Catastrophe Update

Carl Hedde, Head of Risk Accumulation, Munich Re America

Global Catastrophe Update

Ernst Rauch, Head of Corporate Climate Center, Munich Re

Economic Implications

Dr. Robert Hartwig, President, Insurance Information Institute

Q+As



Carl Hedde
Head of Risk Accumulation
Munich Re America

Responsibilities include oversight of corporate accumulation issues at Munich Re America; including the use of catastrophe risk models, client cat risk consulting services, and portfolio management and optimization. Additionally, he manages a group of scientists that provide seismological and meteorological expertise and research capabilities to Munich Re America and its' clients.

Mr. Hedde received a Bachelor of Science Degree from the State University of New York – Albany, and holds the CPCU Designation. He has 25 years experience at Munich Re America, holding various positions within the company.



Ernst Rauch
Head of Corporate Climate Center
Munich Reinsurance Company

Ernst Rauch joined the staff of Munich Re's Geo Risks Research Department in 1988. His work initially focussed on earthquake risk analysis and the development of an earthquake simulation model. Since the early 1990s his area of responsibility shifted increasingly to the analysis and modelling of meteorological risks. After becoming section leader in 2000, he was appointed head of the Meteorological and Climate Risks Department at Munich Re in April 2004.

In 2007 Ernst Rauch took on the responsibility of coordinating all climate change-related activities in the Munich Re Group together with the function of department head of natural catastrophes research and development projects. Since April 2008 Ernst Rauch heads the recently-founded Munich Re Corporate Climate Center.

Ernst Rauch has a degree in General and Applied Geophysics from the University of Munich. He is a member of the German Geophysical Society, the Wind Engineering Society (WTG, Germany), the Australian Earthquake Engineering Society, and the American Association for Wind Engineering.



Robert P. Hartwig
President
Insurance Information Institute

Since joining the I.I.I. in 1998 as an economist and becoming chief economist in 2000, Dr. Hartwig has focused his work on improving understanding of key insurance issues across all industry stakeholders including media, consumers, insurers, producers, regulators, legislators and investors. Dr. Hartwig previously served as director of economic research and senior economist with the National Council on Compensation Insurance (NCCI) in Boca Raton, Florida. He has also worked as senior economist for the Swiss Reinsurance Group in New York and as senior statistician for the United States Consumer Product Safety Commission in Washington, D.C. He is a member of the American Economic Association, the American Risk and Insurance Association, the National Association of Business Economics and the CPCU Society and serves on the board of directors of the Independent Insurance Agents and Brokers Association of New York. In 2005 and 2006 Dr. Hartwig served on the state of Florida's Task Force for Long-Term Homeowners Insurance Solutions.

Dr. Hartwig received his Ph.D. and Master of Science degrees in economics from the University of Illinois at Urbana-Champaign. He also received a Bachelor of Arts degree in economics cum laude from the University of Massachusetts at Amherst. He has served as an instructor at the University of Illinois and at Florida Atlantic University. Dr. Hartwig also holds the Chartered Property Casualty Underwriter (CPCU) credential.

Dr. Hartwig has authored and co-authored papers that have appeared in numerous publications, including the Journal of Health Economics, the Proceedings of the Casualty Actuarial Society, the John Liner Review (where he also serves on the editorial board), Dossiers et Etudes (Geneva Association), the Journal of Workers' Compensation, Global Reinsurance, Risk & Insurance, Insurance Day, Compensation and Benefits Review. He is also a regular contributor to National Underwriter and many other industry trade publications.

U.S. Natural Catastrophe Update

Carl Hedde

Head of Risk Accumulation

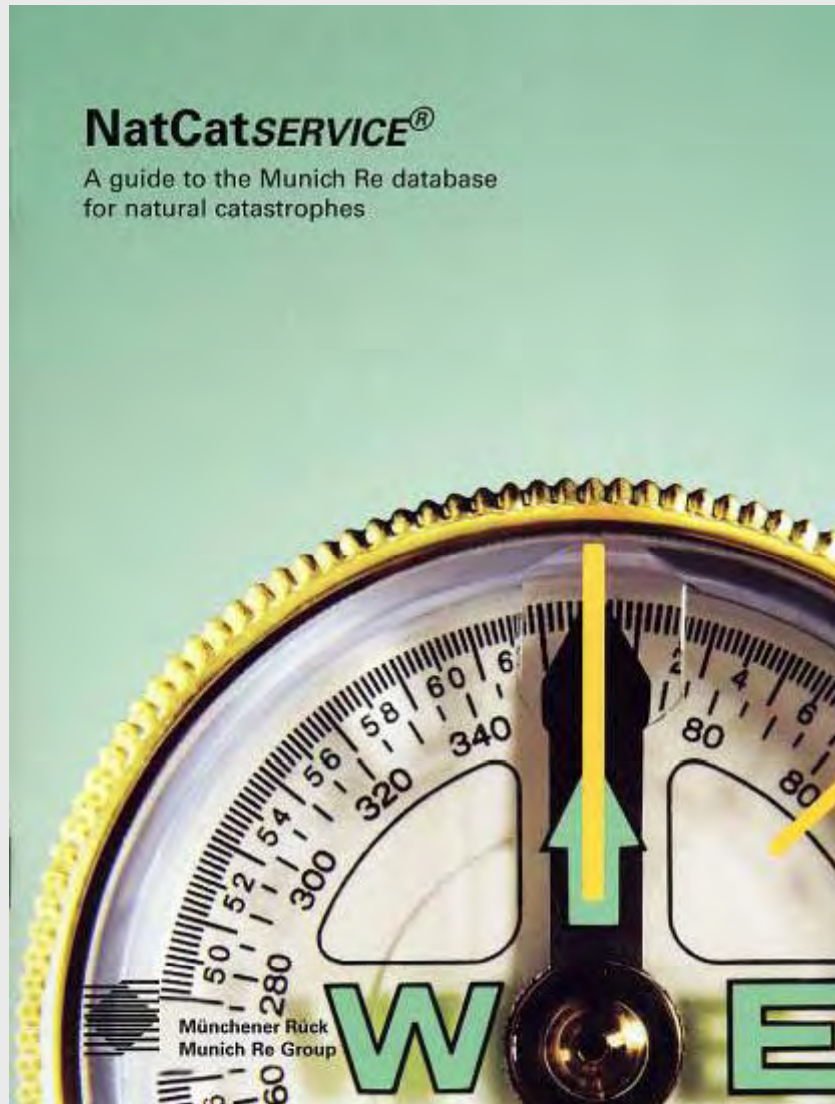
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January 15, 2009



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The database today:

- From 1980 until today all loss events; for the U.S. and selected countries in Europe all loss events since 1970
- Retrospectively all great disasters since 1950
- In addition, all major historical events starting from 79 AD – eruption of Mt. Vesuvio (3,000 historical data sets)

Currently more than 25,000 events

Natural Catastrophes in the U.S. 2008

Headlines

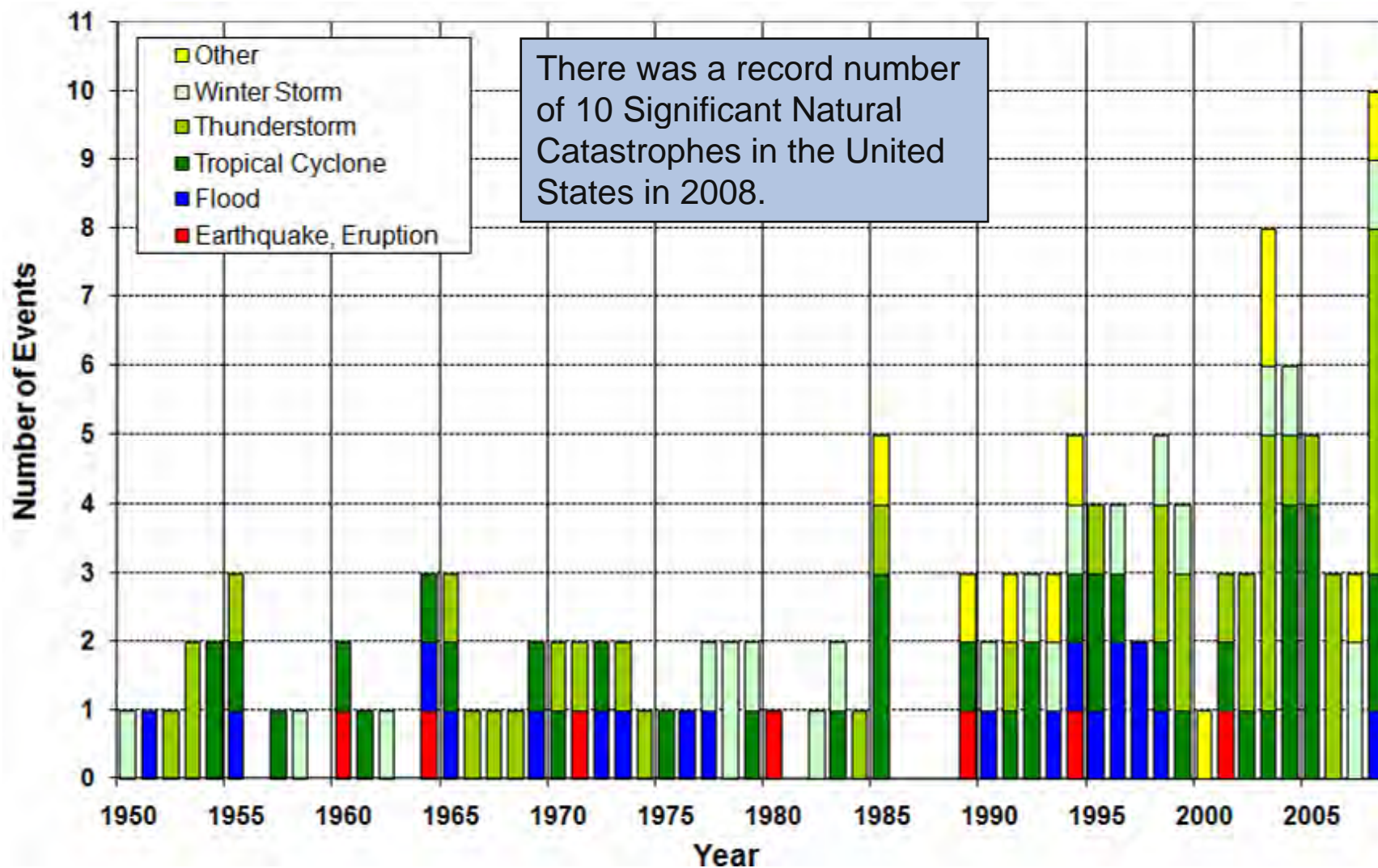
- **Insured losses in the United States in 2008 were above \$30 billion - one of the top five annual totals in U.S. history**
- Six tropical cyclones made landfall in the U.S., three at hurricane intensity: Dolly, Gustav, and Ike
- Record insured losses due to thunderstorms
- Damaging wildfires in Southern California
- Winter storm insured losses below average
- June floods in the Midwest break historical river level records

Natural Catastrophe Losses in the U.S. 2008

| As of January 2009 Records in red | Fatalities | Estimated Overall Losses (US \$m) | Estimated Insured Losses (US \$m) |
|---|------------|---|---|
| | | | |
| Tropical Cyclones | 148 | 38,000 | 19,350 |
| Severe Thunderstorms | 125 | 14,580 | 10,590 |
| Winter Storms | 27 | 1,600 | 1,020 [†] |
| Wildfires | 0 | 2,000 | 630 |
| Floods | 42 | 11,000 | 500 |

Number of U.S. Significant Natural Catastrophes 1950 - 2008

\$1 billion economic loss and/or 50 fatalities

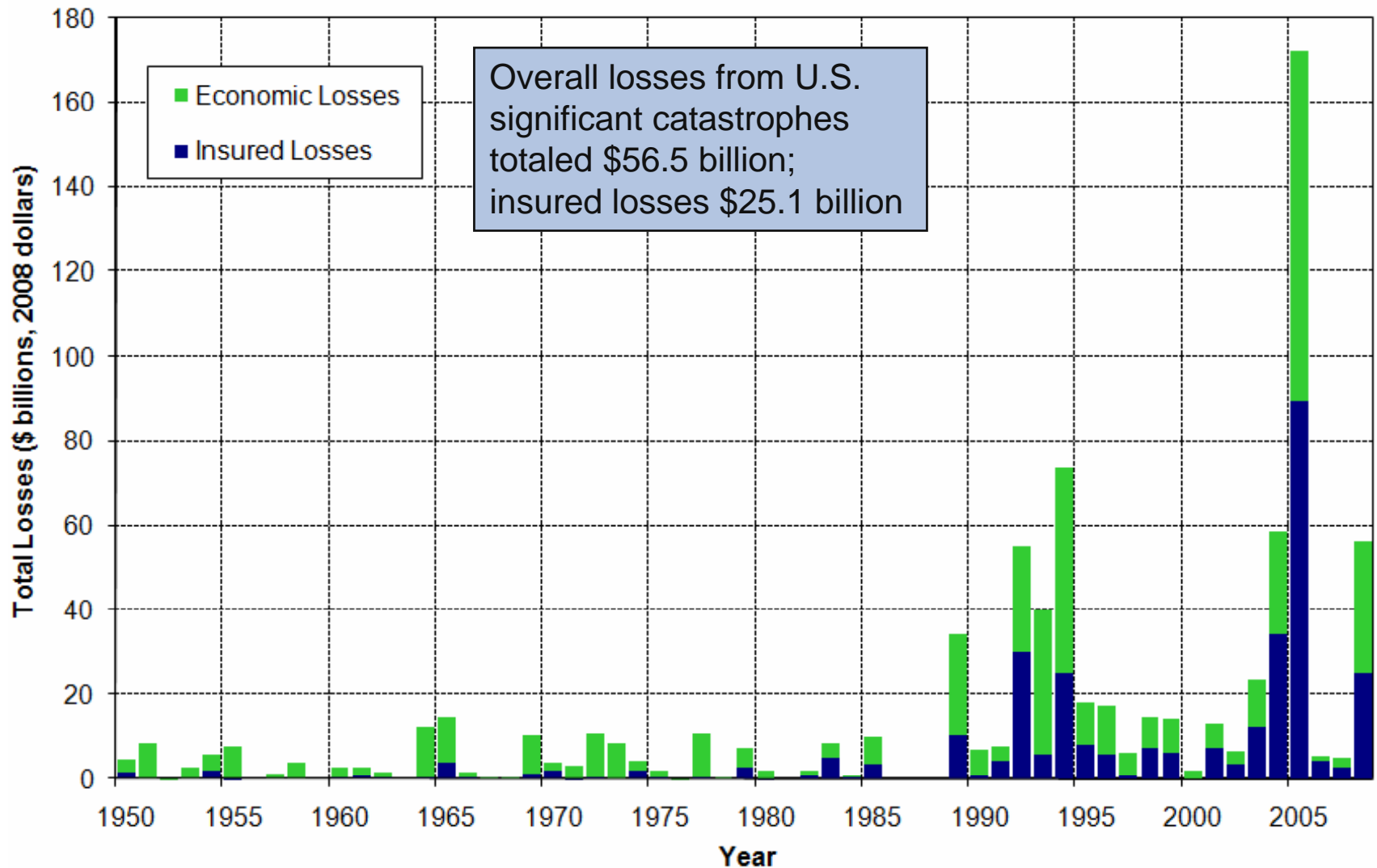


Losses from U.S. Significant Natural Catastrophes 1950 - 2008



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\$1 billion economic loss and/or 50 fatalities

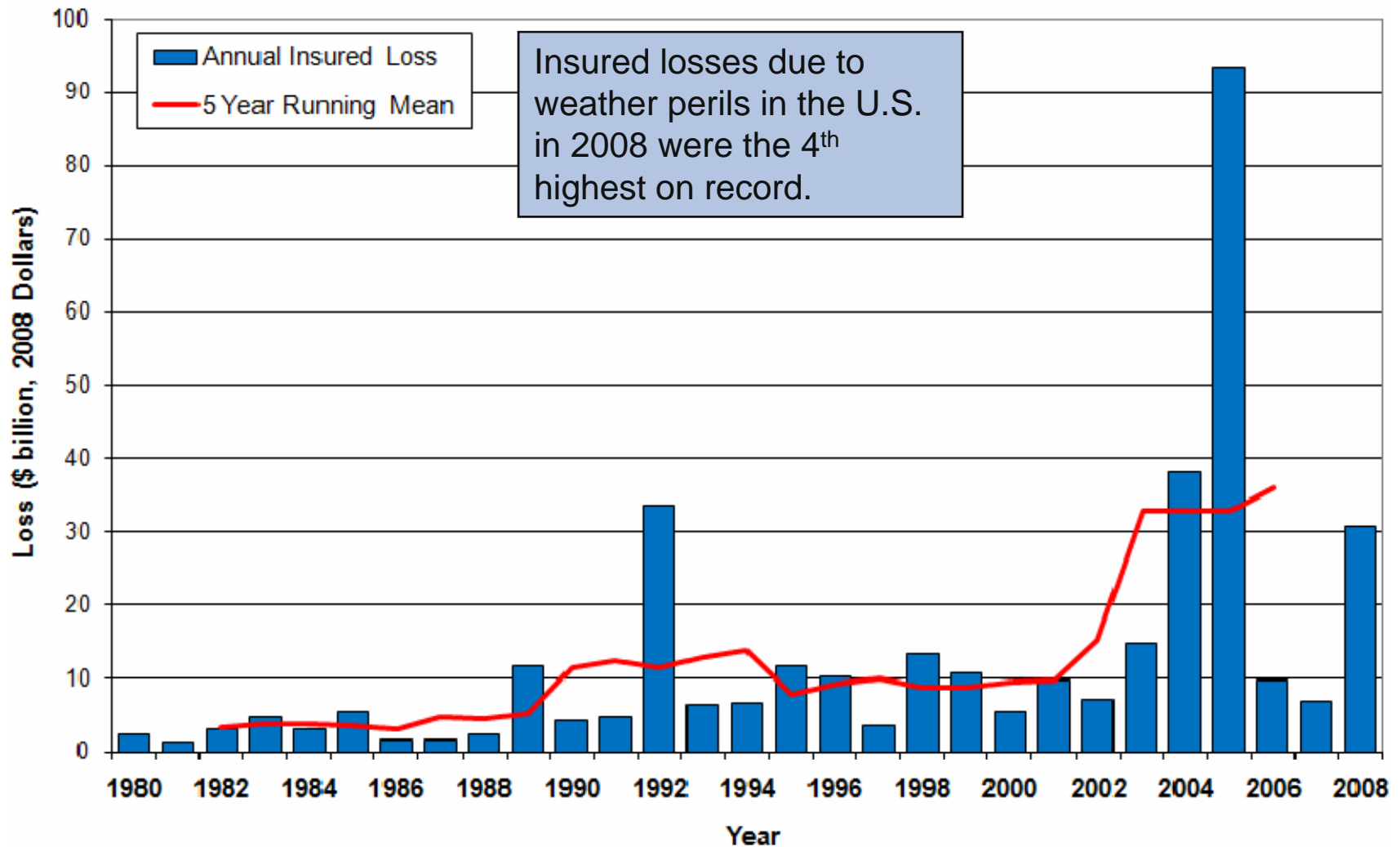


Insured Losses due to Weather Perils in the U.S. 1980 - 2008



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Tropical Cyclone, Thunderstorm, and Winter Storm only



U.S. Significant Natural Catastrophes in 2008

\$1 billion economic loss and/or 50 fatalities

| Date | Event | Est. Economic Losses (US \$m) | Estimated Insured Losses (US \$m) |
|-------------------|------------------|-------------------------------|-----------------------------------|
| January 4 - 9 | Winter Storm | 1,000 | 745 [†] |
| February 5 - 6 | Thunderstorms | 1,300 | 955 [†] |
| April 9 – 11 | Thunderstorms | 1,100 | 800 [†] |
| May 22 – 26 | Thunderstorms | 1,600 | 1,200 [†] |
| May 29 – June 1 | Thunderstorms | 1,500 | 1,100 [†] |
| June | Flood | 10,000 | 500 |
| June 5 – 8 | Thunderstorms | 1,000 | 725 [†] |
| Aug. 31 – Sep. 3 | Hurricane Gustav | 7,000 | 3,500 |
| September 12 – 14 | Hurricane Ike | 30,000 | 15,000 [†] |
| November 14 – 19 | Wildfires | 2,000 | 600 |

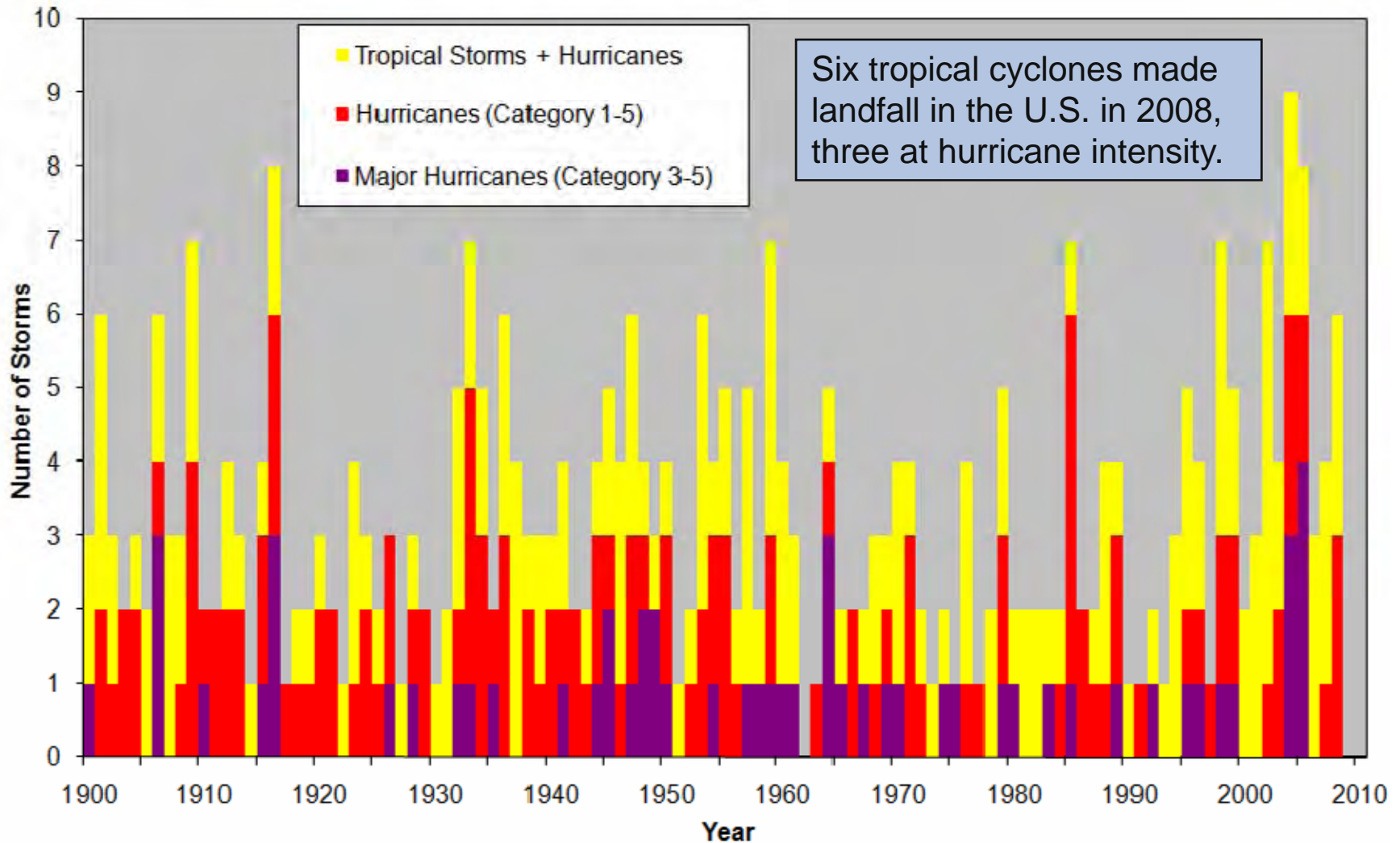
As of January 2009

© 2009 Munich Re Group Sources: (unmarked) - MR NatCatSERVICE, [†] - Property Claims Services (PCS)

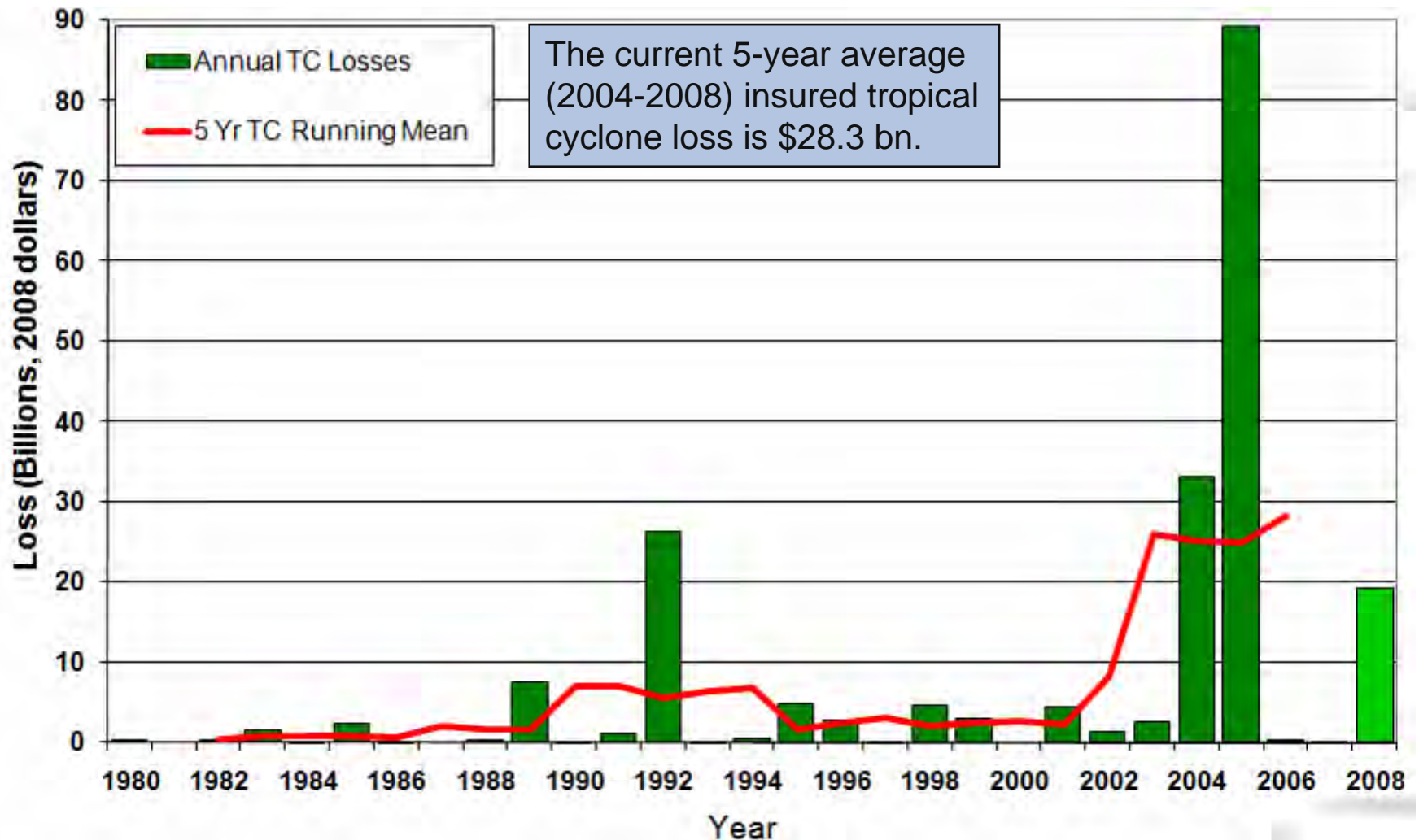
U.S. Tropical Cyclones 2008



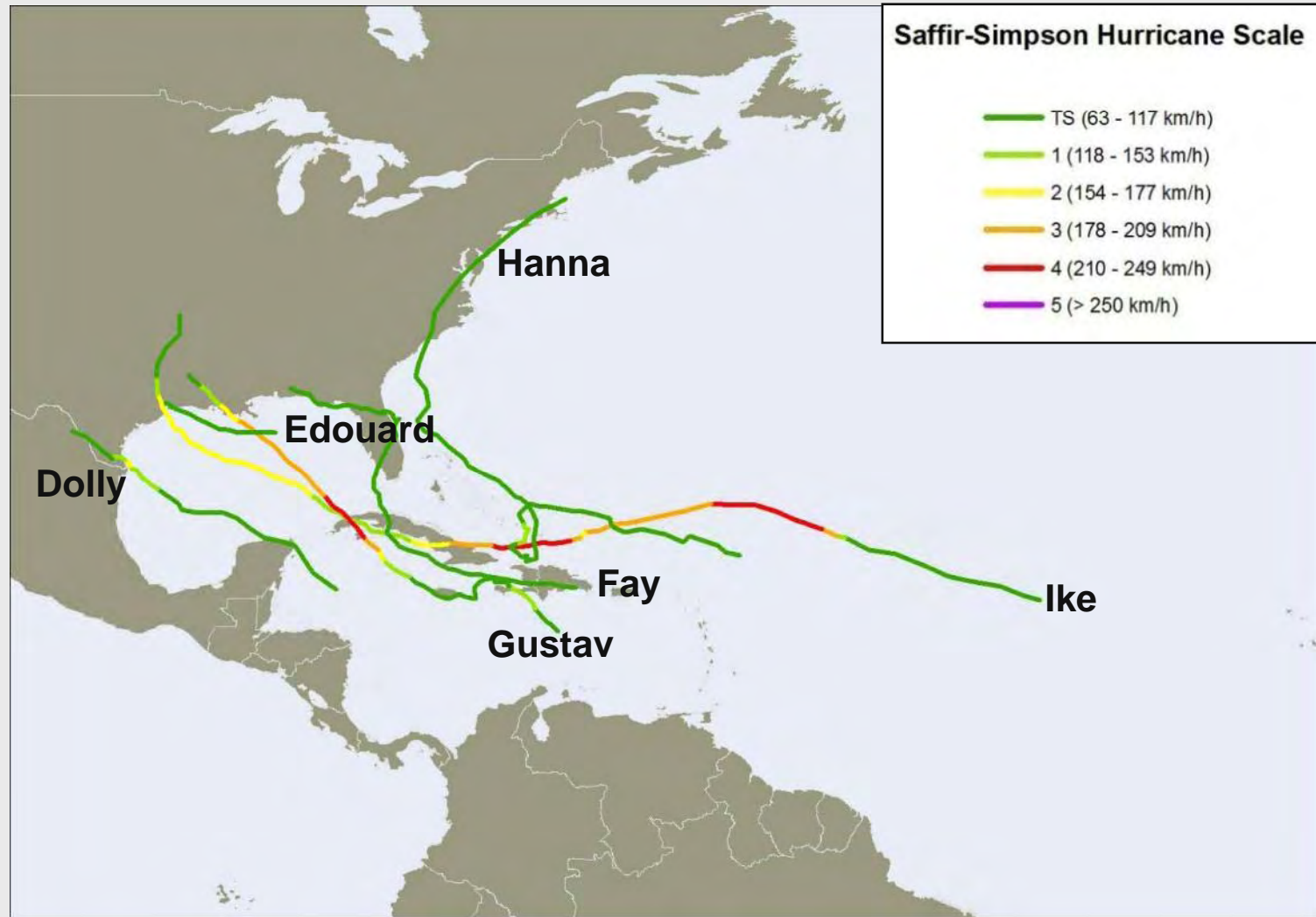
Number of U.S. Landfalling Tropical Cyclones 1900 - 2008



Insured U.S. Tropical Cyclone Losses 1980 - 2008



U.S. Tropical Cyclone Landfalls in 2008



- U.S. insured losses currently estimated at \$15 billion
- In terms of insured losses, 3rd most costly hurricane (in original values) after Katrina'05 and Andrew '92
- At least 82 victims and more than 200 people missing in the US
- Galveston, Texas with sustained winds of 110 mph (Cat. 2)
- Ike had a similar track to the 1900 Galveston hurricane (Category 4), which destroyed the city and killed more than 6000 people
- Strongest storm on record in terms of Integrated Kinetic Energy

Hurricane Ike 2008: Unique Aspects

➤ Extremely large wind field

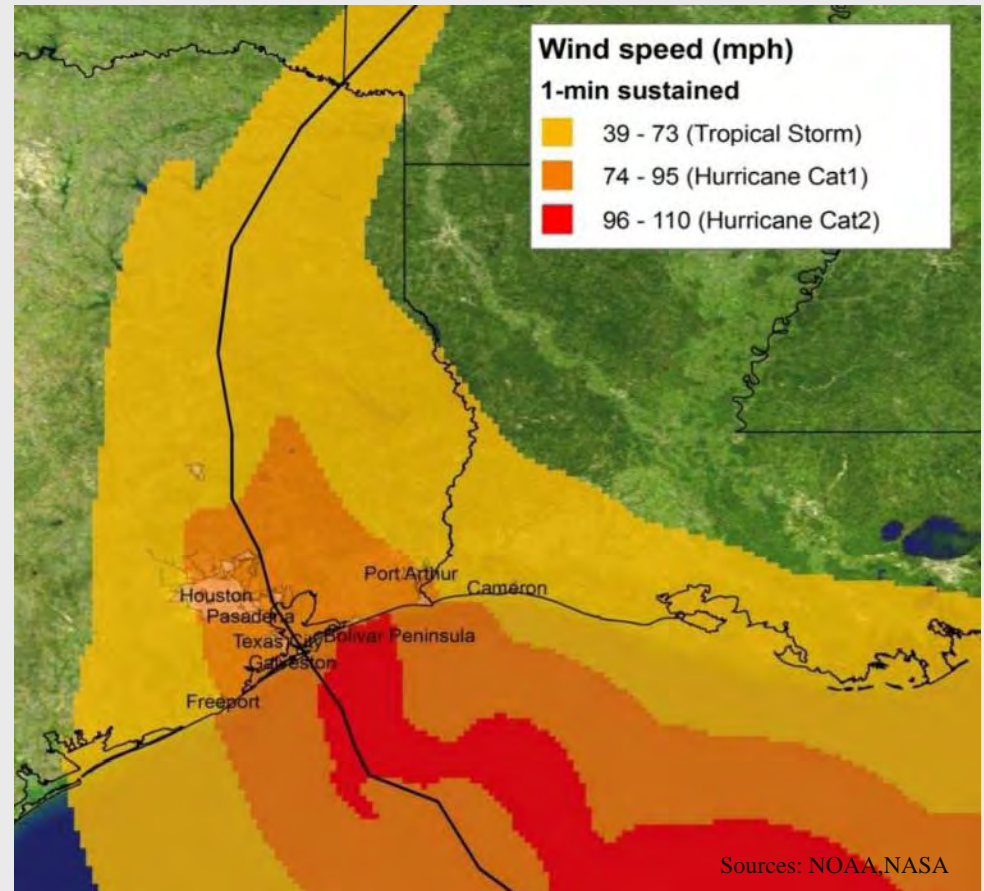
Diameter of hurricane and tropical force winds were 240 miles and 550 miles, respectively. The corresponding values for Katrina'05 were 175 and 440 miles

➤ Extreme storm surge

Due to its large size and slow movement Ike produced a storm surge corresponding to a Cat 4 hurricane affecting a 300 miles wide area of the Gulf coast from Louisiana to Texas. In addition large swell and extreme waves were generated in the Gulf of Mexico

➤ Storms and Flooding in the Midwest

After landfall Ike merged into an existing cold front, which strengthened due to Ike's warm and moist air. The resulting system caused storms and flooding in the Midwest



- **Better building codes especially for potential storm surge areas**
 - In many cases poor building quality contributed to loss of life and property
 - Buildings constructed according to the IBHS code survived the extreme storm surge and wind forces even on the hardest-struck Bolivar Peninsula

- **Post event loss estimations of Ike from catastrophe models alone proved difficult**
 - Post event estimations from catastrophe models had a wide range partly due to Ike's special features mentioned before and factors, such as the large number of claims (more than 1,000,000), difficult to assess impacts on the oil industry and potential loss seepage from Gustav
 - In addition to catastrophe models expert judgment is necessary to get a complete picture of an event of Ike's magnitude

Bolivar Peninsula after Hurricane Ike



Institute for Business and Home Safety Fortified Homes

Bolivar Peninsula, Texas, after Hurricane Ike

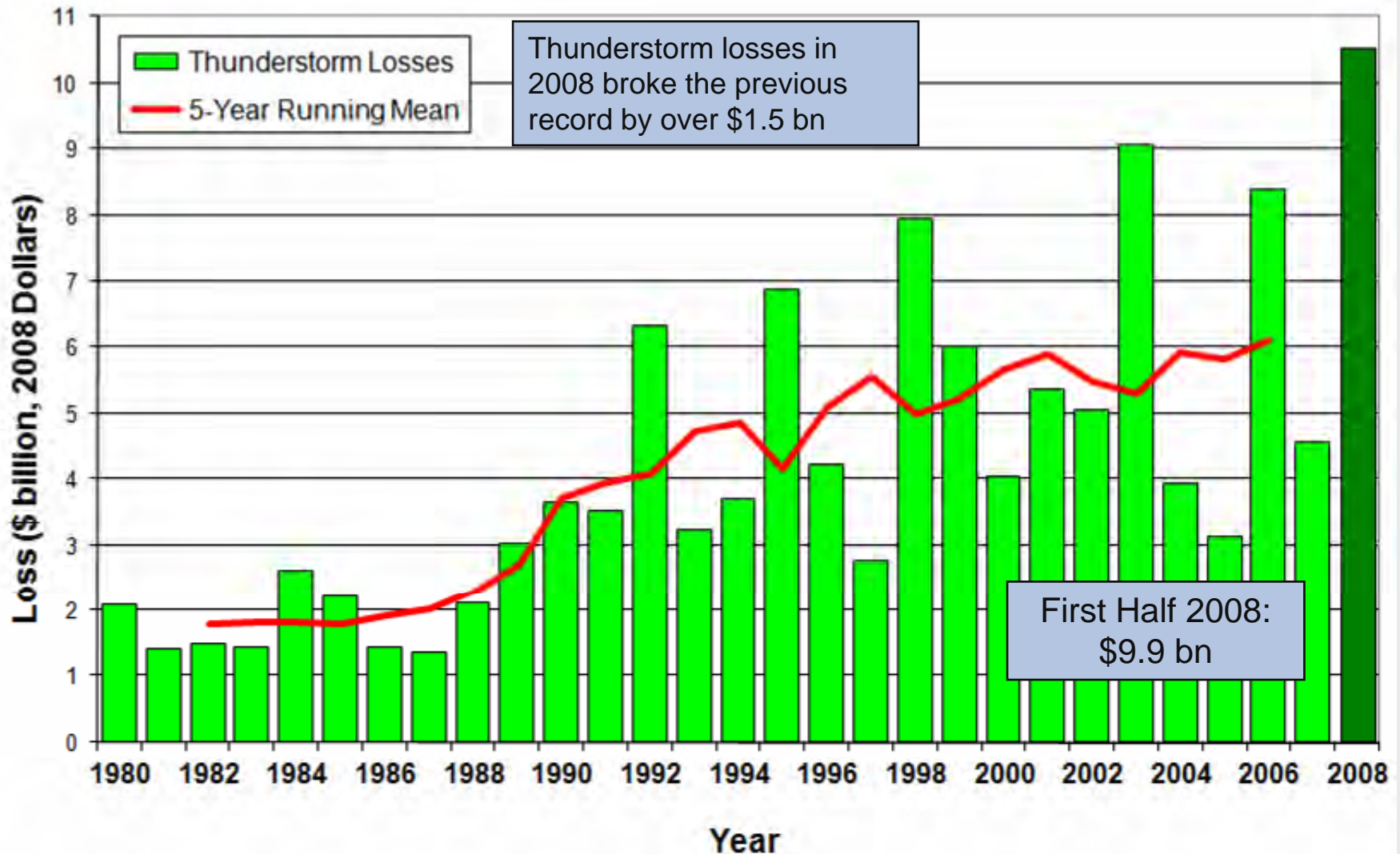


Other U.S. Natural Catastrophes in 2008



Source: FEMA

Insured U.S. Thunderstorm Losses 1980 – 2008



U.S. Tornado Count

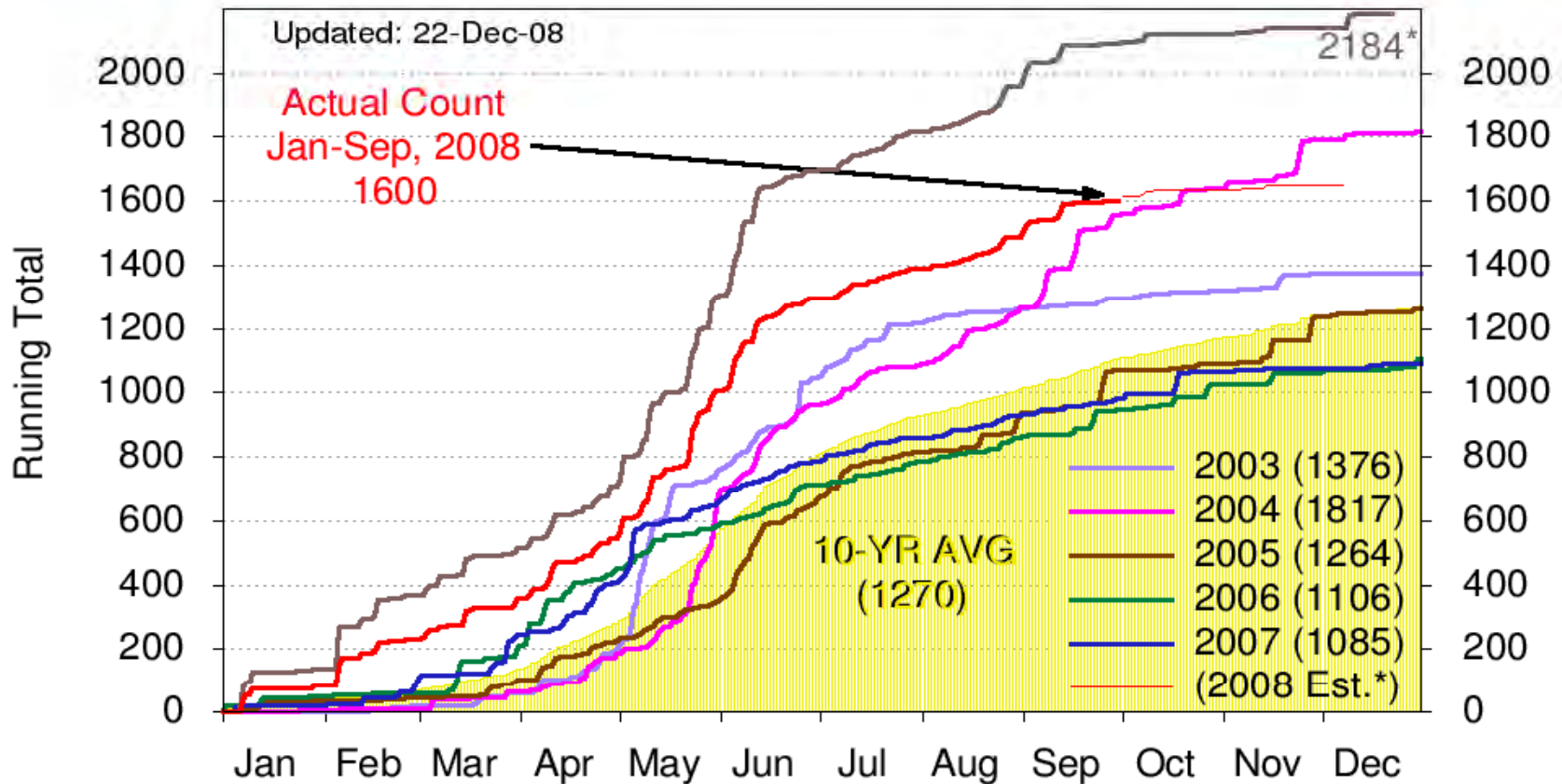
2008 compared to 2003 - 2007



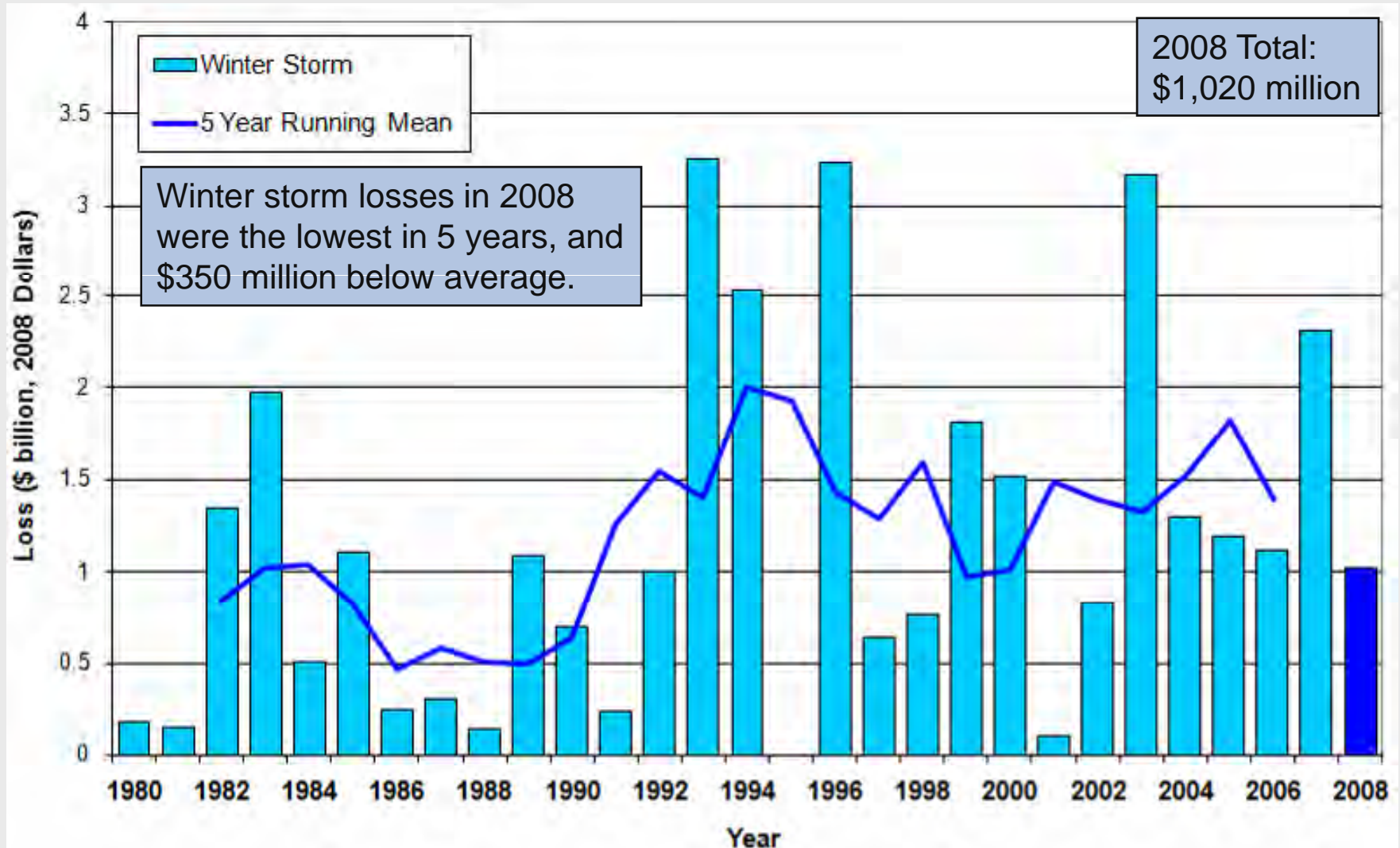
U.S. Annual Tornado Trends



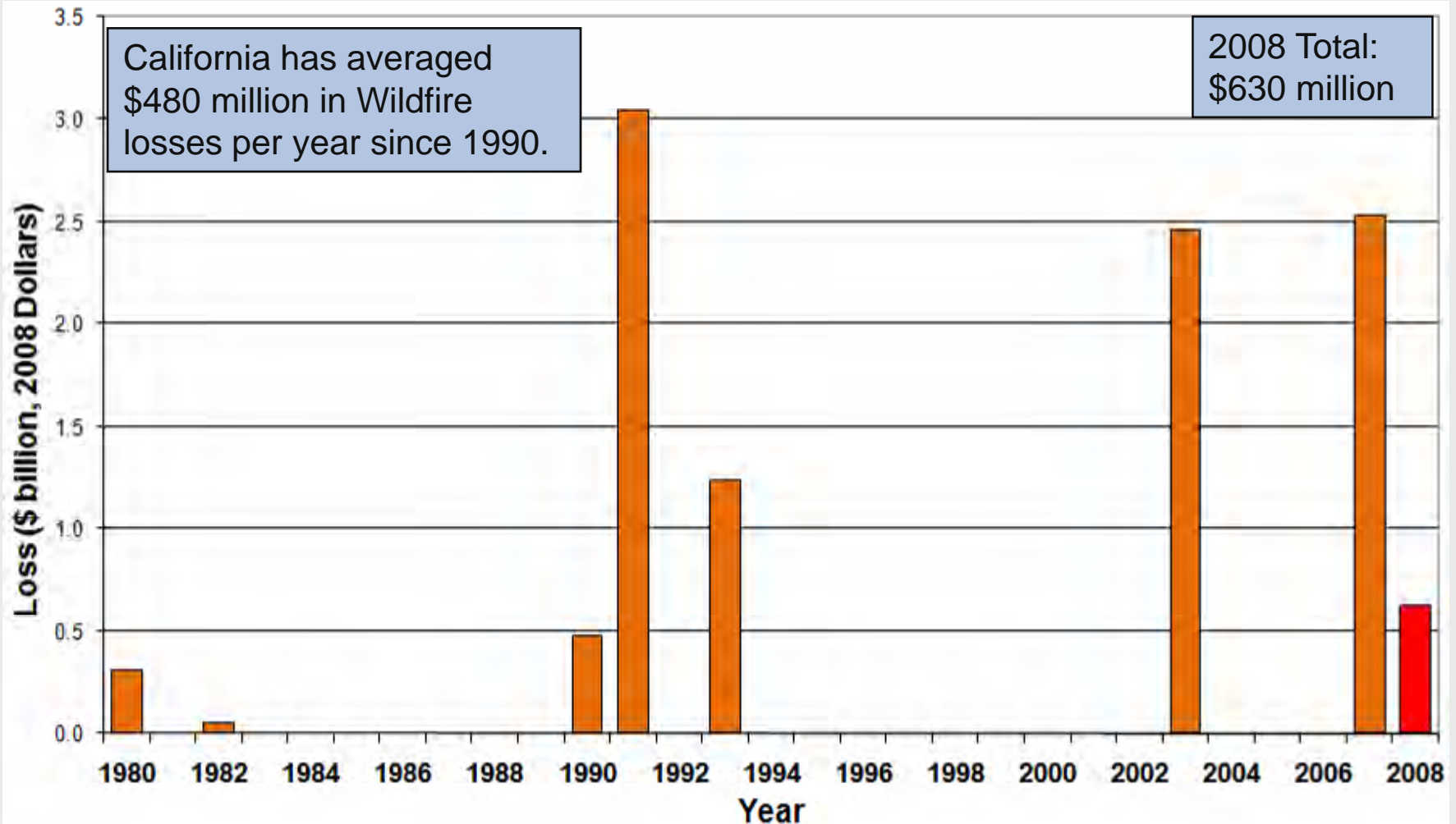
* 2008 preliminary count includes duplicate reports for some tornadoes.
Actual counts (thru Sep and prior years) have duplicate reports removed.



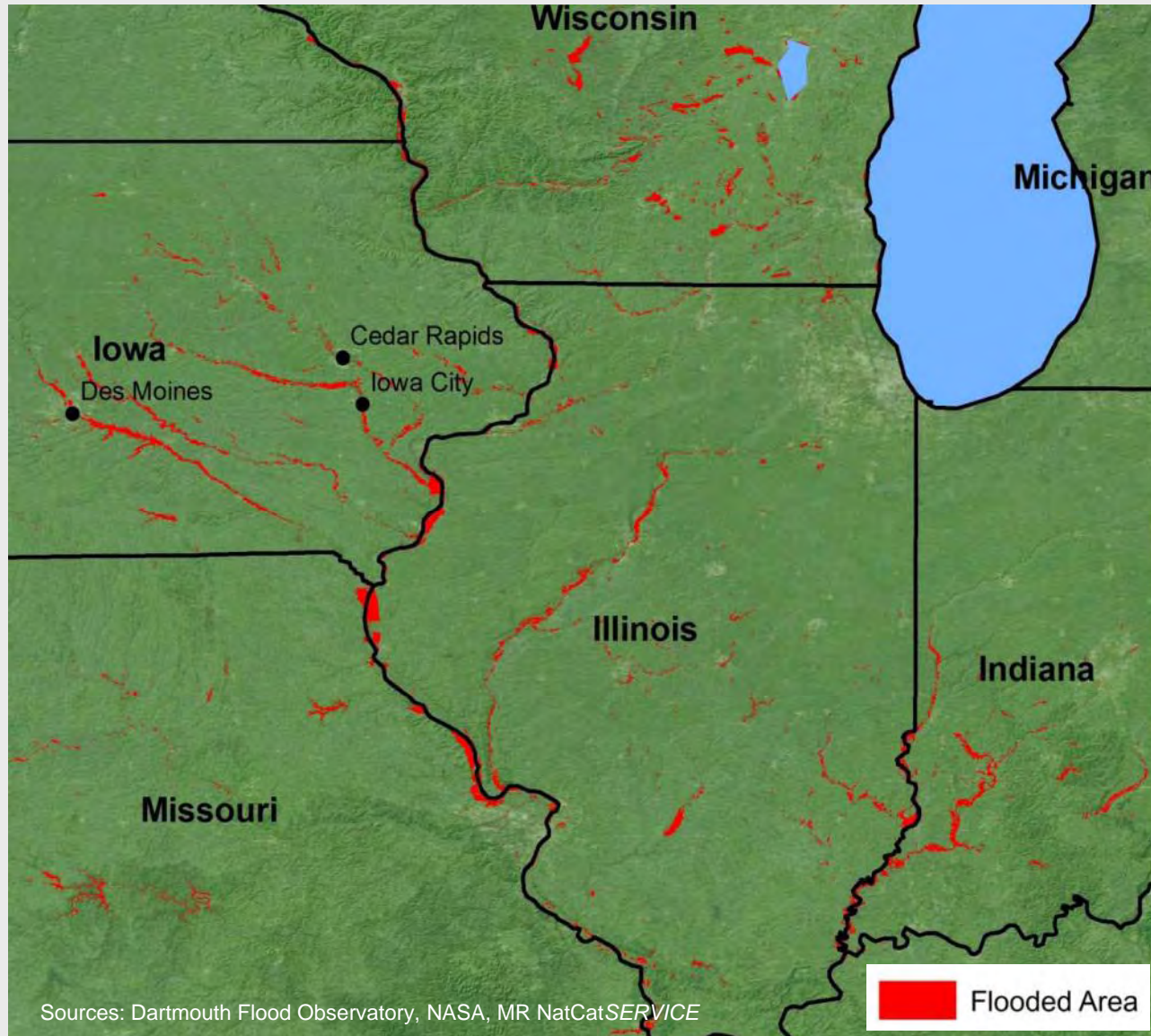
Insured U.S. Winter Storm Losses 1980 - 2008



Insured California Wildfire Losses 1980 - 2008



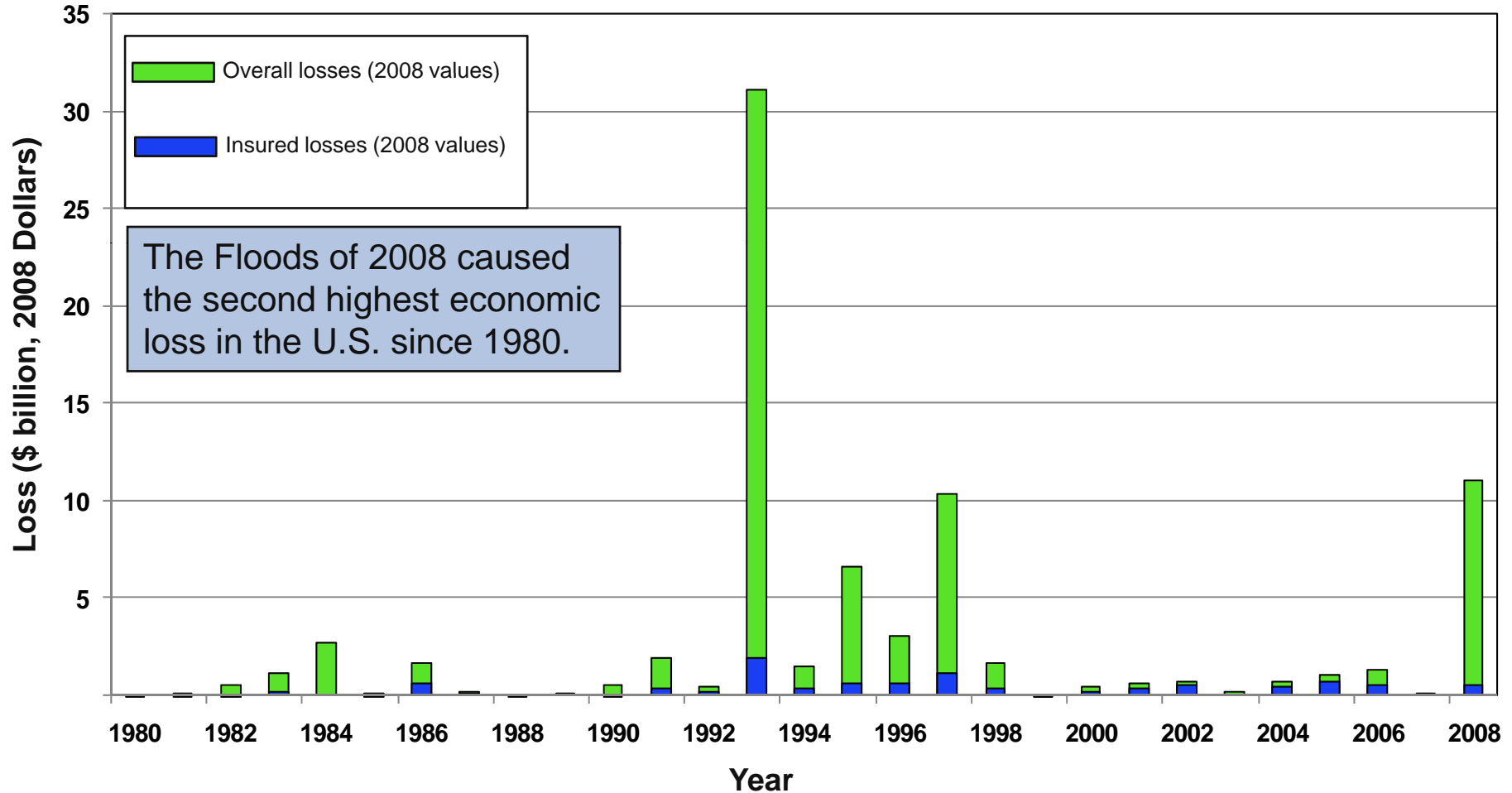
The Midwest Floods of June 2008



Sources: Dartmouth Flood Observatory, NASA, MR NatCatSERVICE

- 24 fatalities - 150 people injured
- 40,000 properties flooded
- 5,000,000 acres of agricultural land flooded
- Estimated economic and insured losses of \$10 billion and \$500 million respectively
- Affected States: Iowa, Illinois, Indiana, Minnesota, Missouri, Wisconsin, and Michigan
- Cities of Cedar Rapids, Iowa City and Des Moines experienced record water levels and floods beyond the 500 year floodplain

U.S. Flood Losses 1980 – 2008



Global Catastrophe Update

Ernst Rauch

Head of Corporate Climate Center

Munich Re Group

January 15, 2009



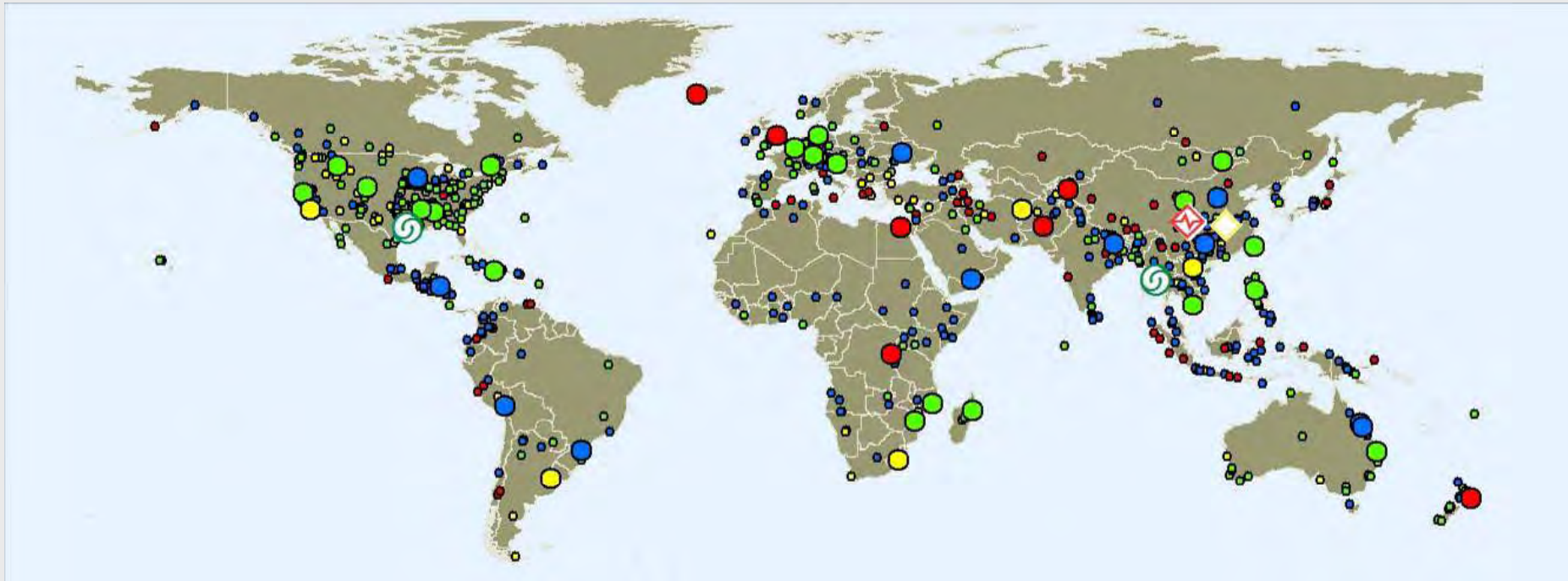
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- Driven by high losses from weather related natural catastrophes and the earthquake of Sichuan/China, 2008 was the third most expensive year on record (economic and insured losses)
- Throughout the world, more than 220,000 people died or are still missing
- Overall losses totaled about US\$ 200bn (2007: US\$ 82bn)
- Insured losses in 2008 rose to US\$ 45bn, about 50% higher than in the previous year
- 2008 continues the long-term loss trend Munich Re has been observing

Natural Catastrophes 2008


World map




○ 750 natural hazard losses events

○ Significant loss events

Great natural catastrophes

 Hurricane Ike (Sept. 6-14, 2008) Caribbean, USA
Cyclone Nargis (May 2-5, 2008) Myanmar

 Earthquake (May 12, 2008) China

 Winter damage (Jan 10–Feb 13, 2008) China

● Geophysical (earthquake, tsunami, volcanic)

● Meteorological (storm)

● Hydrological (flood, mass movement)

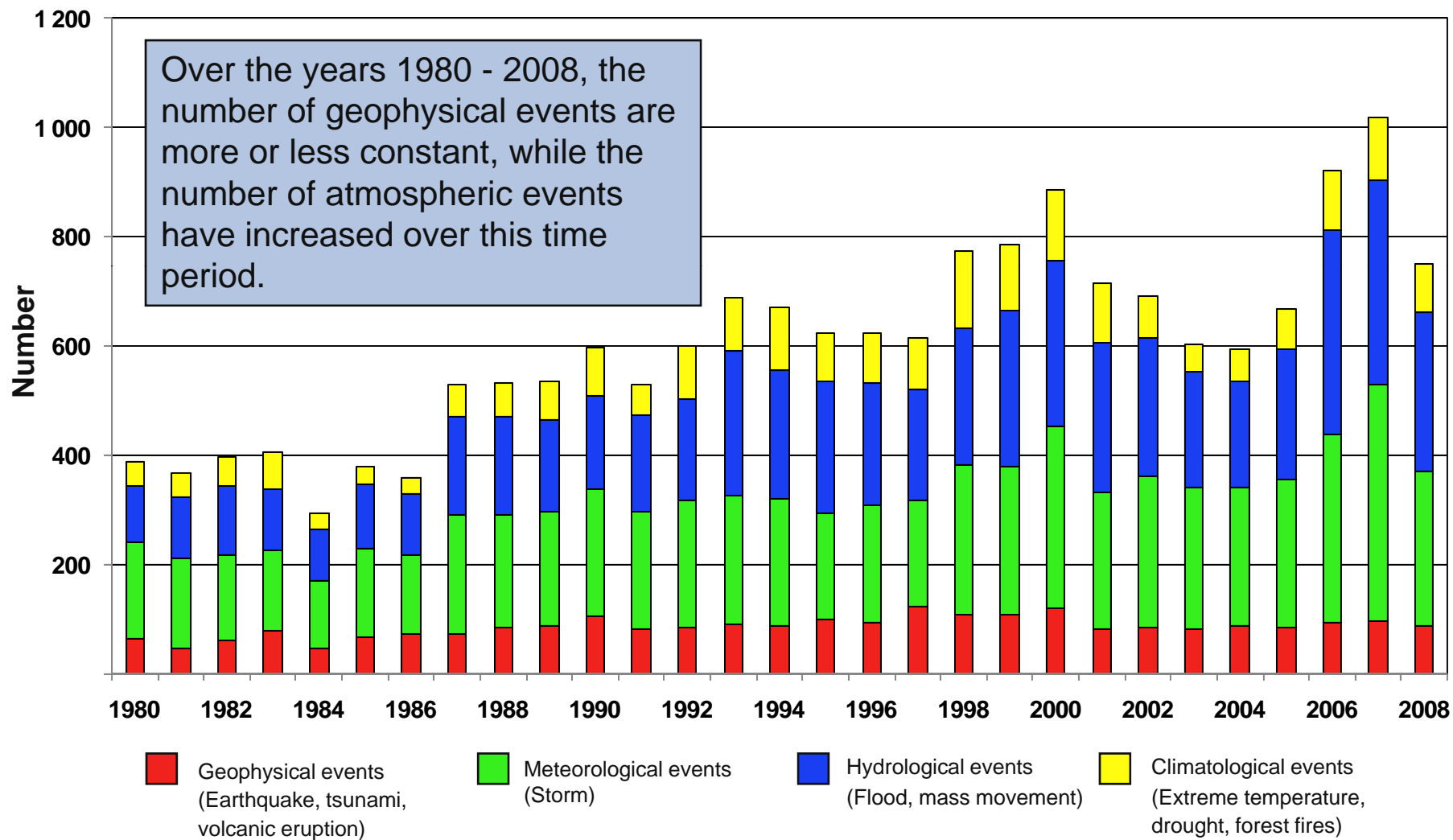
● Climatological (extreme temperature, drought, wildfire)

Deadliest / Costliest Natural Catastrophes 2008

| Deadliest catastrophes | | | |
|---|-------------------|-------------------------------------|--------|
| Date | Event | Area | Deaths |
| May | Cyclone Nargis | Myanmar | 84,500 |
| May | Earthquake | China | 70,000 |
| January | Cold wave | Afghanistan, Kyrgyzstan, Tajikistan | 1,000 |
| August/September | Floods | India, Nepal, Bangladesh | 635 |
| Costliest catastrophes (overall losses) | | | US\$m |
| May | Earthquake | China | 85,000 |
| September | Hurricane Ike | Caribbean, USA | 30,000 |
| January/February | Winter damage | China | 21,100 |
| August/September | Hurricane Gustav | Caribbean, USA | 10,000 |
| Costliest catastrophes (insured losses) | | | US\$m |
| September | Hurricane Ike | Caribbean, USA | 15,000 |
| August/September | Hurricane Gustav | Caribbean, USA | 5,000 |
| January/February | Winter damage | China | 1,600 |
| March | Winter storm Emma | Europe | 1,500 |

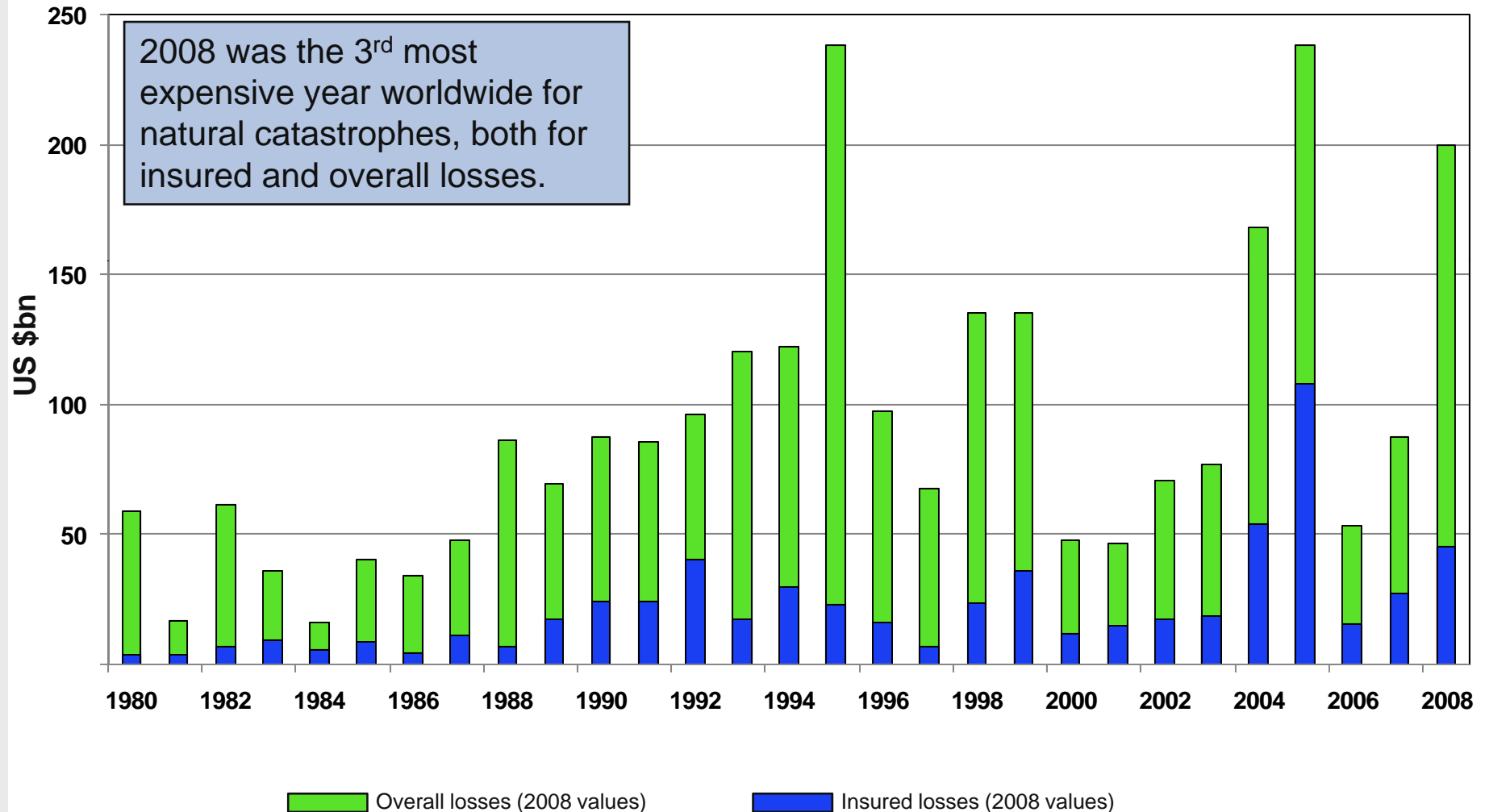
Natural Catastrophes Worldwide 1980 - 2008

Number of events



Natural Catastrophes Worldwide 1980 - 2008

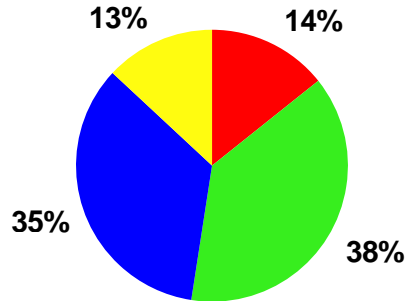
Overall and insured losses



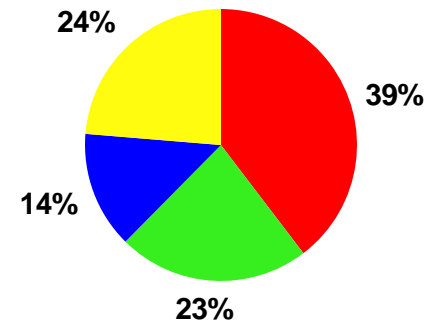
Natural Catastrophes 1980 - 2008

Worldwide distribution

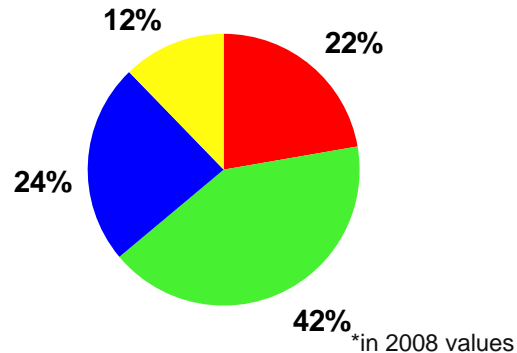
18,000 loss events



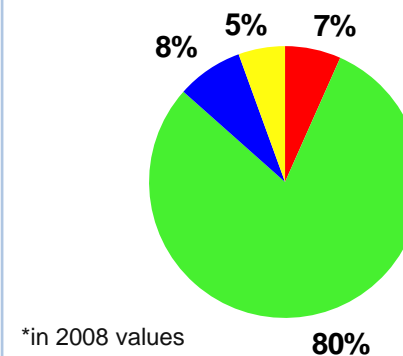
1,600,000 fatalities




Overall losses* US\$ 2,600bn





Insured losses* US\$ 630bn




From 1980 - 2008, over 90% of the insured losses are from weather related catastrophes.

 Geophysical events (Earthquake, tsunami, volcanic eruption)

 Meteorological events (Storm)

 Hydrological events (Flood, mass movement)

 Climatological events (Extreme temperature, drought, forest fires)

Natural Catastrophes Worldwide 2008

10-year comparison

| Comparison | 2008 | 10-year-average 1998 - 2007 |
|----------------------------|------|--------------------------------|
| Events | 750 | 765 |
| Overall losses* in US\$ bn | 200 | 106 |
| Insured losses* in US\$ bn | 45 | 33 |

** In 2008 values*

- 2008 was – on the basis of figures adjusted for inflation – the third most expensive natural catastrophe year on record for the insurance industry. This continues the long-term trend we have been observing.
- Climate change has already started and is very probably contributing to increasingly frequent weather extremes and ensuing natural catastrophes. These, in turn, generate greater and greater losses because the concentration of values in exposed areas, like regions on the coast, is also increasing further throughout the world.
- 2008 has again shown how important it is for us to analyze risks like climate change, in all its facets, and to manage the business accordingly.

- For Munich Re, as a leading reinsurer, the natural catastrophe trends of recent years have resulted in three action strategies:
 - We accept risks in our core business only at risk-adequate prices so that if the exposure situation changes, we adjust the pricing structure.
 - With our expertise, we develop new business opportunities in the context of climate protection and adaptation measures.
 - In the international debate, we – as a company – press for effective and binding rules on CO₂ emissions, so that climate change is curbed and future generations do not have to live with weather scenarios that are difficult to control.

2008 Catastrophe Review

Financing Catastrophic Losses in the Midst of Financial Catastrophe

Natural Catastrophe Webinar

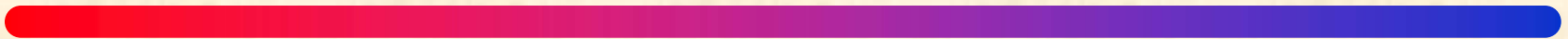


January 15, 2009

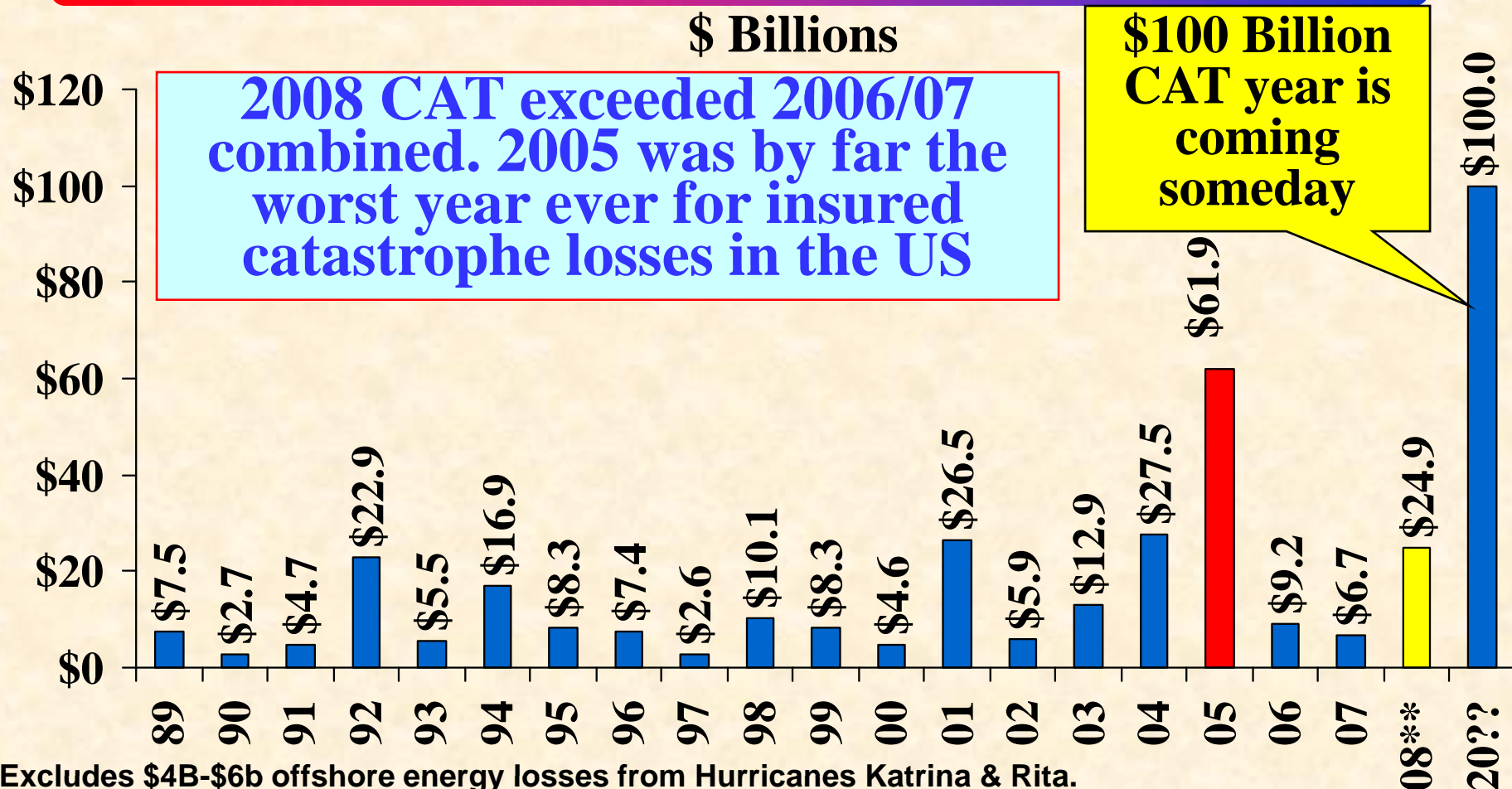
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CATASTROPHIC LOSS

**2008 Losses Exceed 2007
and 2006 Combined**



*U.S. Insured Catastrophe Losses**



*Excludes \$4B-\$6b offshore energy losses from Hurricanes Katrina & Rita.

**Based on PCS data through Sept. 30. PCS \$2.1B loss of for Gustav. \$10.655B for Ike of 12/05/08.

Note: 2001 figure includes \$20.3B for 9/11 losses reported through 12/31/01. Includes only business and personal property claims, business interruption and auto claims. Non-prop/BI losses = \$12.2B.

Source: Property Claims Service/ISO; Insurance Information Institute



Top 12 Most Costly Disasters in US History, (Insured Losses, \$2007)

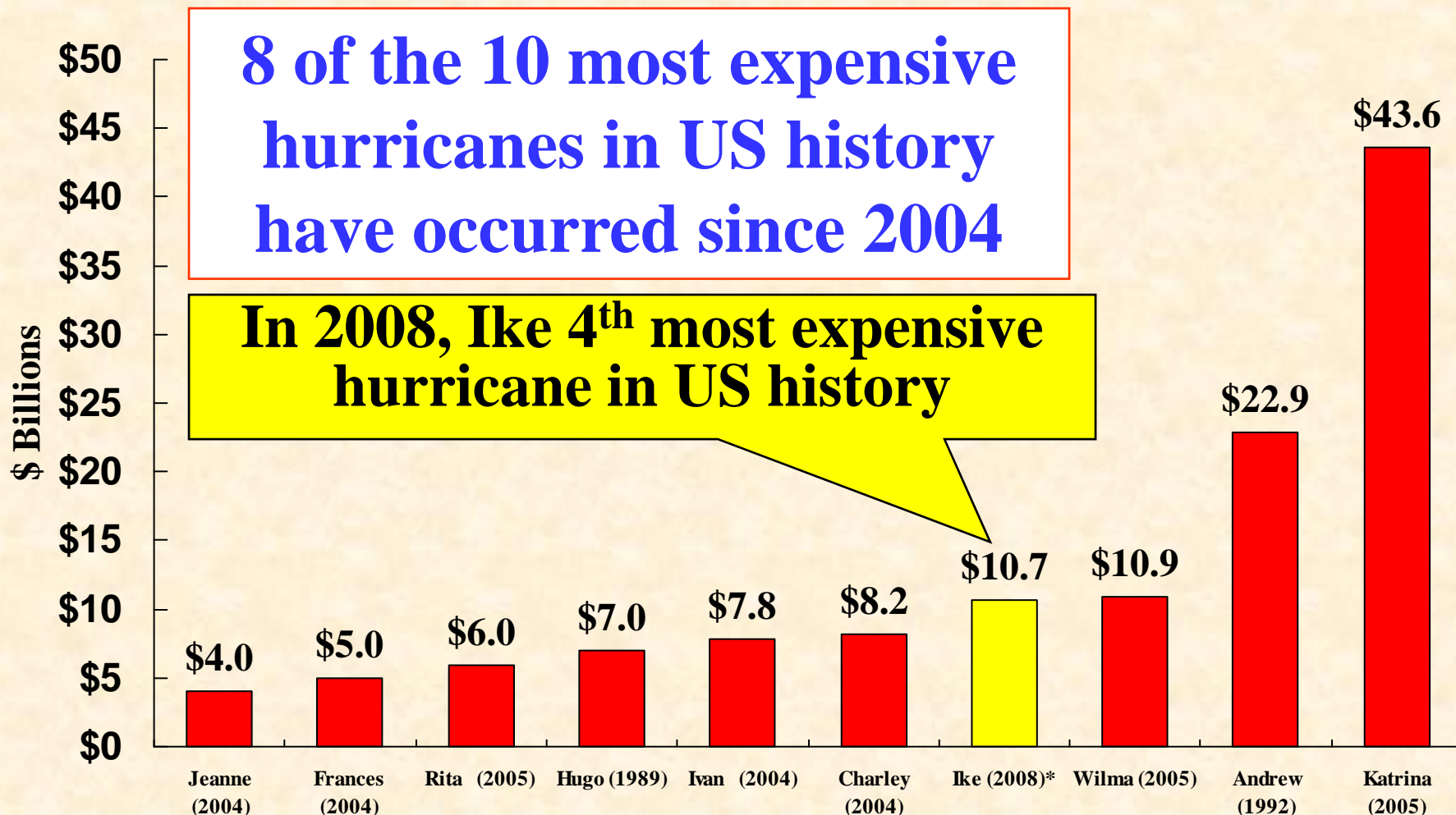


*PCS estimate as of 12/15/08.

Sources: ISO/PCS; AIR Worldwide, RMS, Egecat; Insurance Information Institute inflation adjustments.



Top 10 Most Costly Hurricanes in US History, (Insured Losses, \$2007)

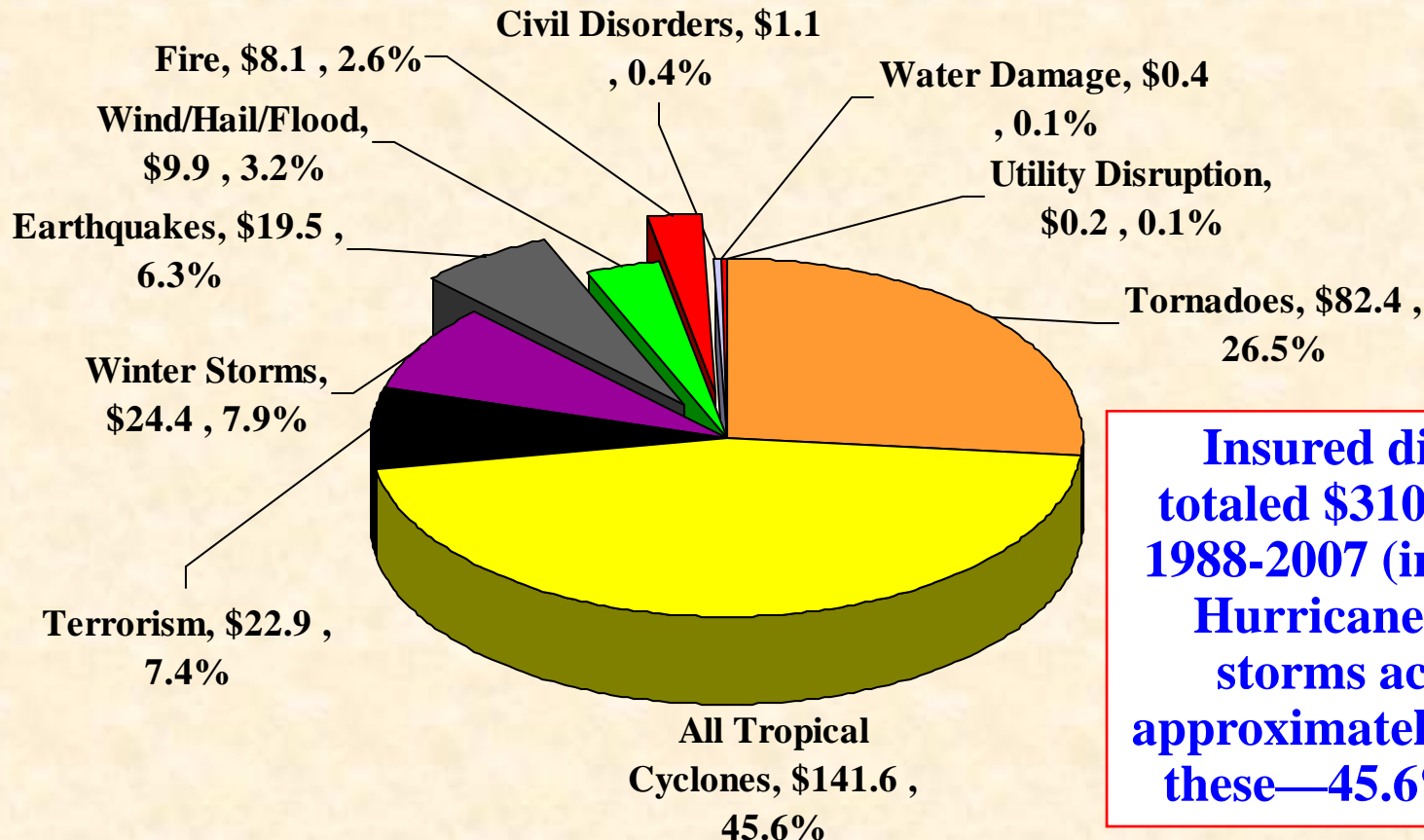


*PCS estimate as of 12/15/08 (in 2008 dollars).

Sources: ISO/PCS; Insurance Information Institute inflation adjustments.



Inflation-Adjusted U.S. Insured Catastrophe Losses By Cause of Loss, 1988-2007¹



Insured disaster losses totaled \$310.7 billion from 1988-2007 (in 2007 dollars). Hurricane and tropical storms accounted for approximately \$6.6 billion of these—45.6% of the total.

¹ Catastrophes are all events causing direct insured losses to property of \$25 million or more in 2007 dollars.

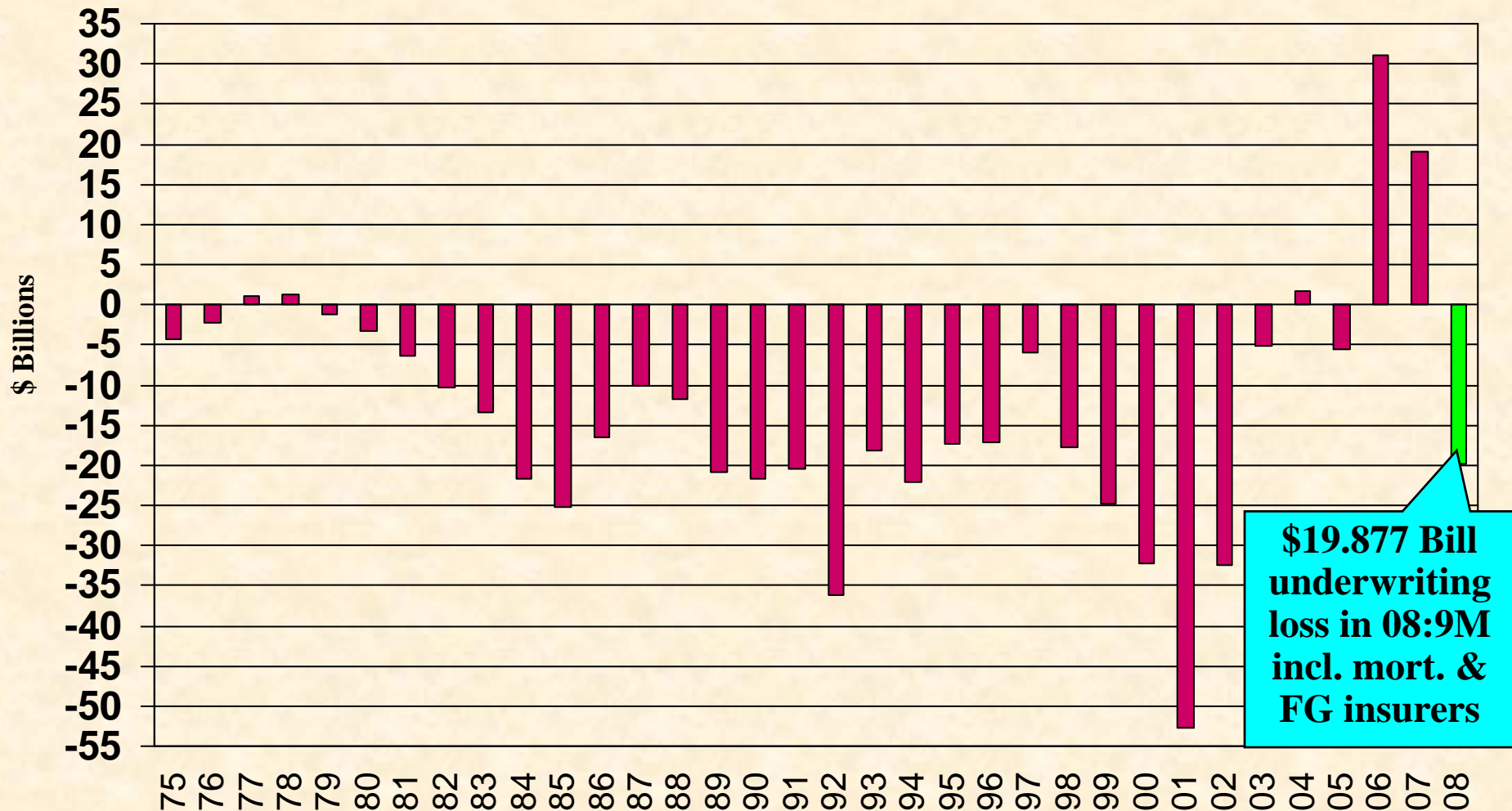
Catastrophe threshold changed from \$5 million to \$25 million beginning in 1997. Adjusted for inflation by the III.

² Excludes snow. ³ Includes hurricanes and tropical storms. ⁴ Includes other geologic events such as volcanic eruptions and other earth movement. ⁵ Does not include flood damage covered by the federally administered National Flood Insurance Program. ⁶ Includes wildland fires.



Underwriting Gain (Loss)

*1975-2008:Q3**

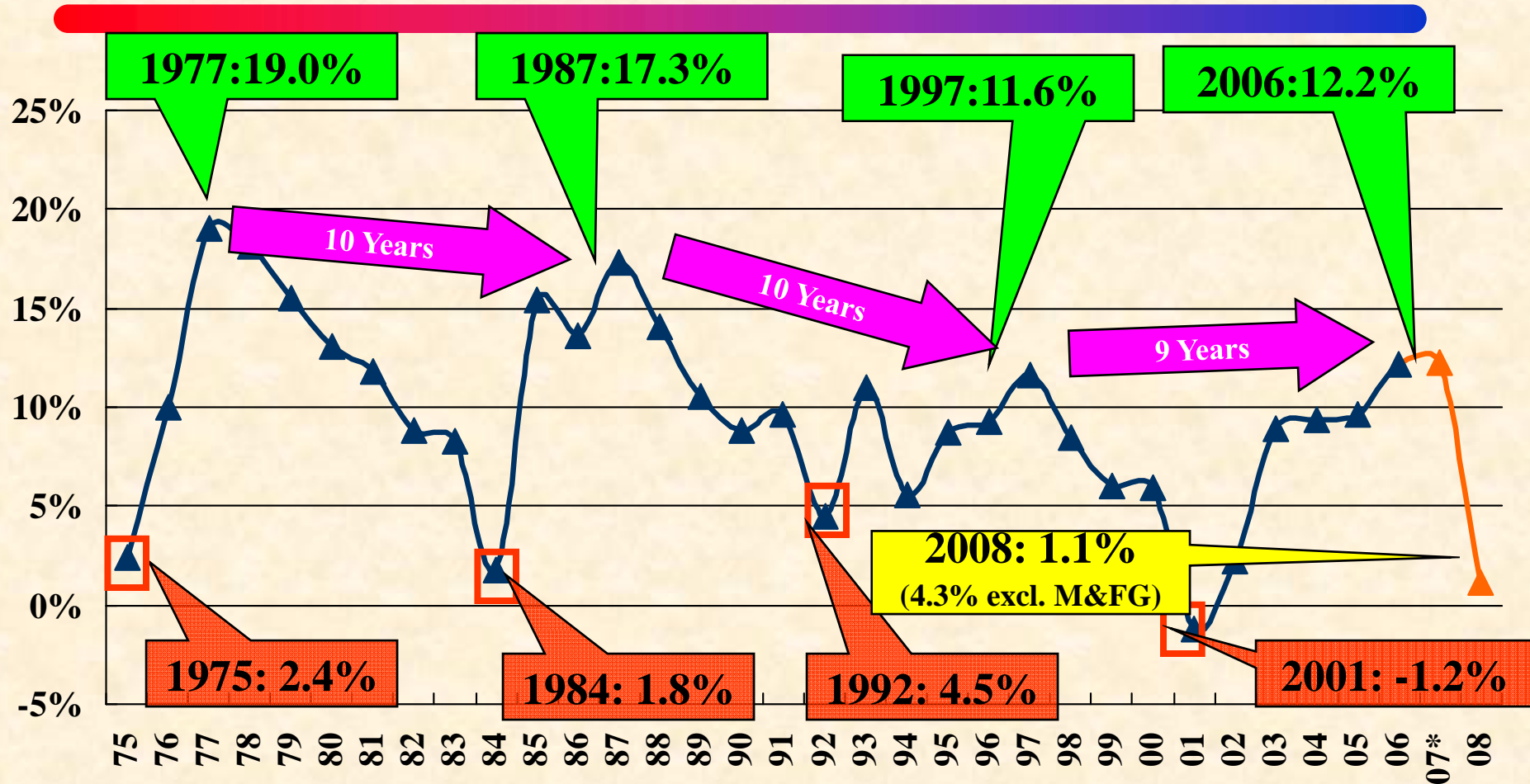


Source: A.M. Best, ISO; Insurance Information Institute

* Includes mortgage & finl. guarantee insurers



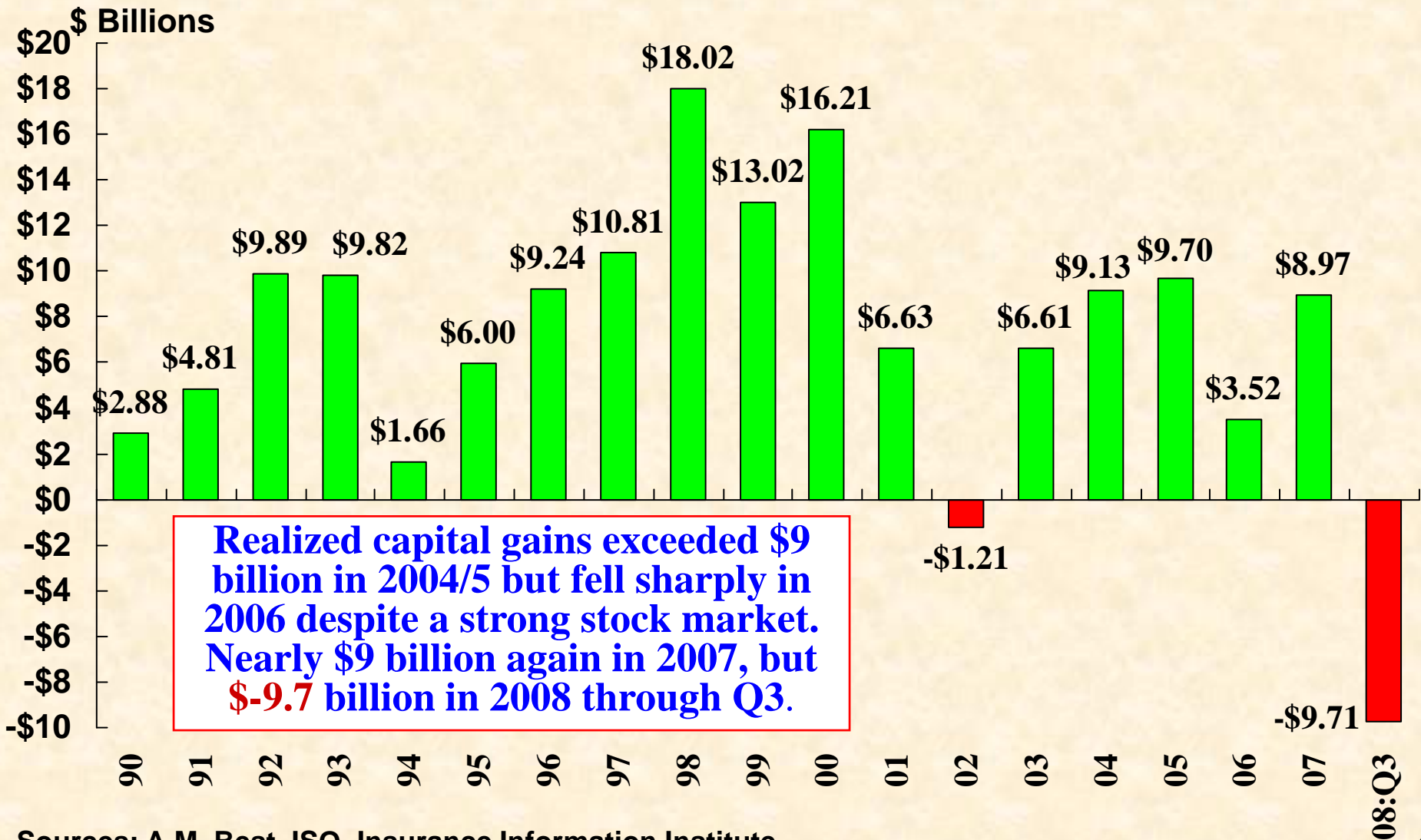
*P/C Insurance Industry ROEs, 1975 – 2008E**



*GAAP ROE for all years except 2007 and 2008 which are ROAS (statutory Return on Average Surplus). 2008 ROAS is annualized based on 9M 2008. Excluding mortgage and financial guarantee insurers = 4.3%
Sources: ISO; Insurance Information Institute.

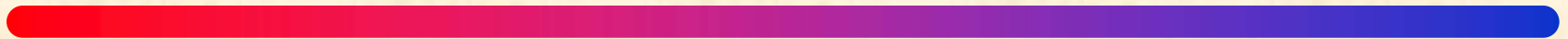


P/C Insurer Net Realized Capital Gains, 1990-2008:Q3



Meeting the Challenge, Keeping the Promise

**Insurers Keep their Promise to
Pay Catastrophe Losses Amid
the Financial Crisis
and Recession**





How Insurance Industry Stability, Resilience Benefits Consumers

BOTTOM LINE:

- **Insurance Markets—Unlike Banking—Are Operating *Normally*.** This includes global reinsurance markets.
- **The Basic Function of Insurance—the Orderly Transfer of Risk from Client to Insurer—Continues *Uninterrupted***
- **This Means that Insurers Continue to:**
 - **Pay claims (whereas 25 banks have gone under)**
 - **Renew existing policies (banks are reducing and eliminating lines of credit)**
 - **Write new policies (banks are turning away people who want or need to borrow)**
 - **Develop new products (banks are scaling back the products they offer)**



Reasons Why P/C Insurers Have Fewer Problems Than Banks

- **Superior Risk Management Model**
 - Insurers overall approach to risk focuses on underwriting discipline: implies pricing accuracy and management of potential loss exposure
 - Banks eventually sought to maximize volume, disregarded risk
- **Low Leverage**
 - Insurers do not rely on borrowed money to underwrite insurance or pay claims
- **Conservative Investment Philosophy**
 - High quality portfolio that is relatively less volatile and more liquid
- **Strong Relationship Between Underwriting and Risk Bearing**
 - **Insurers always maintain a stake in the business they underwrite, keeping “skin in the game” at all times**
 - Banks and investment banks package up and securitize, severing the link between risk underwriting and risk bearing, with (predictably) disastrous consequences
- **Tight Regulation**
 - Insurers are more stringently regulated than banks, investment banks & hedge funds
- **Greater Transparency**
 - Insurer companies are an open book to regulators and the public

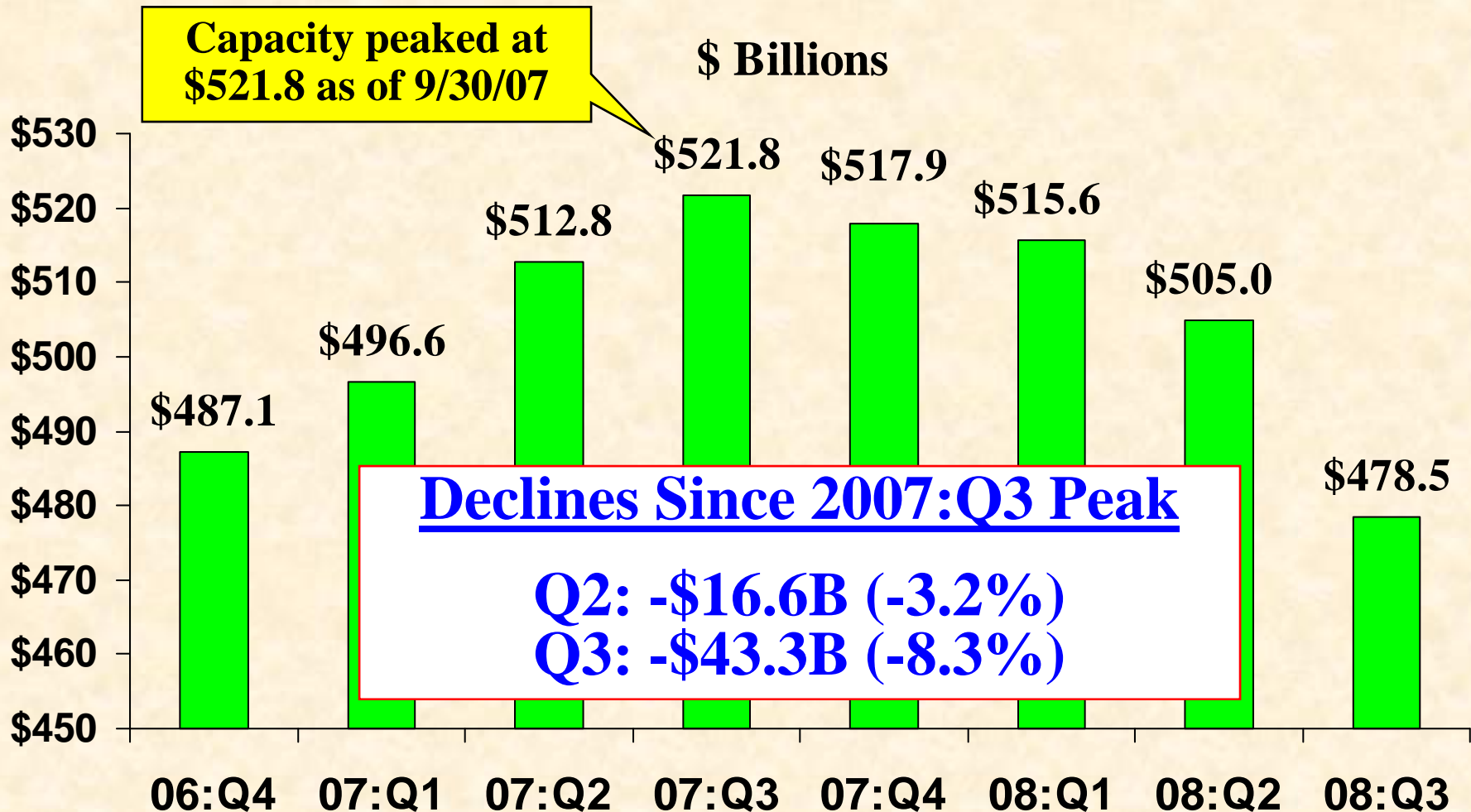
CAPITAL & CAPACITY

**The Insurance Industry
is Financially Strong**



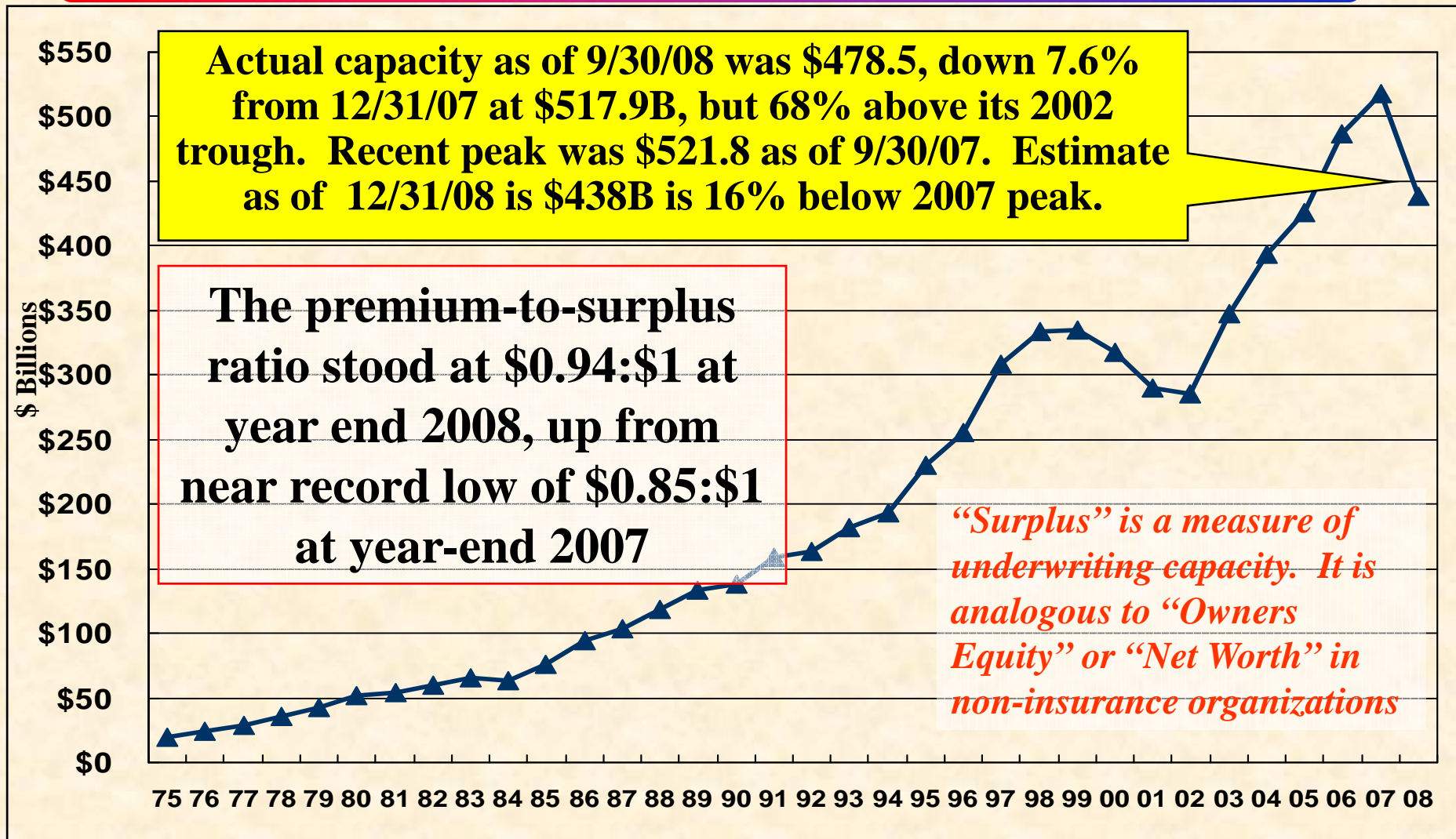


Policyholder Surplus, 2006:Q4 – 2008:Q3



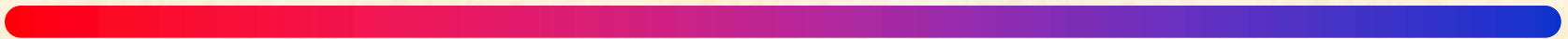


*U.S. Policyholder Surplus: 1975-2008**



FINANCIAL STRENGTH & RATINGS

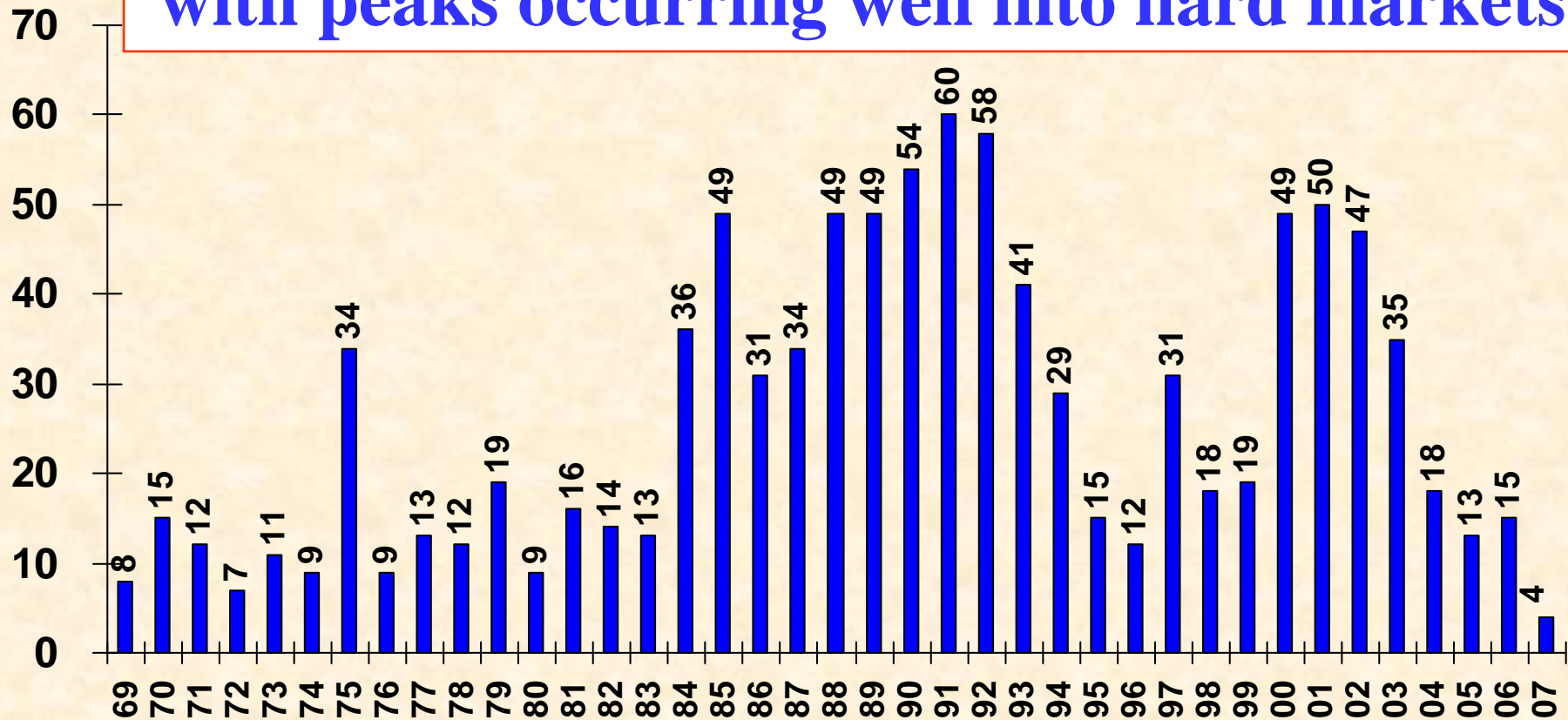
Industry Has Weathered
the Storms Well





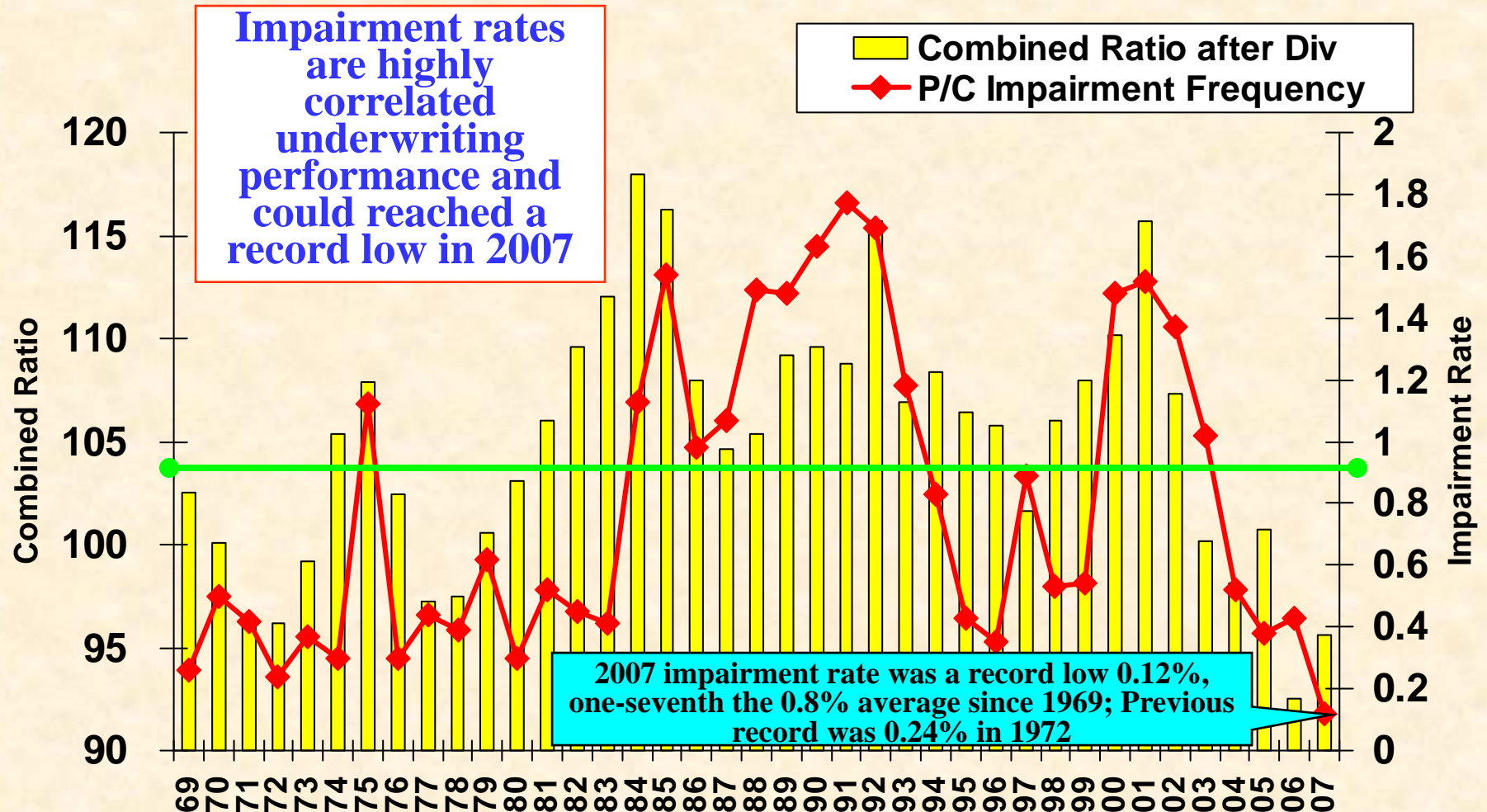
P/C Insurer Impairments, 1969-2007

The number of impairments varies significantly over the p/c insurance cycle, with peaks occurring well into hard markets



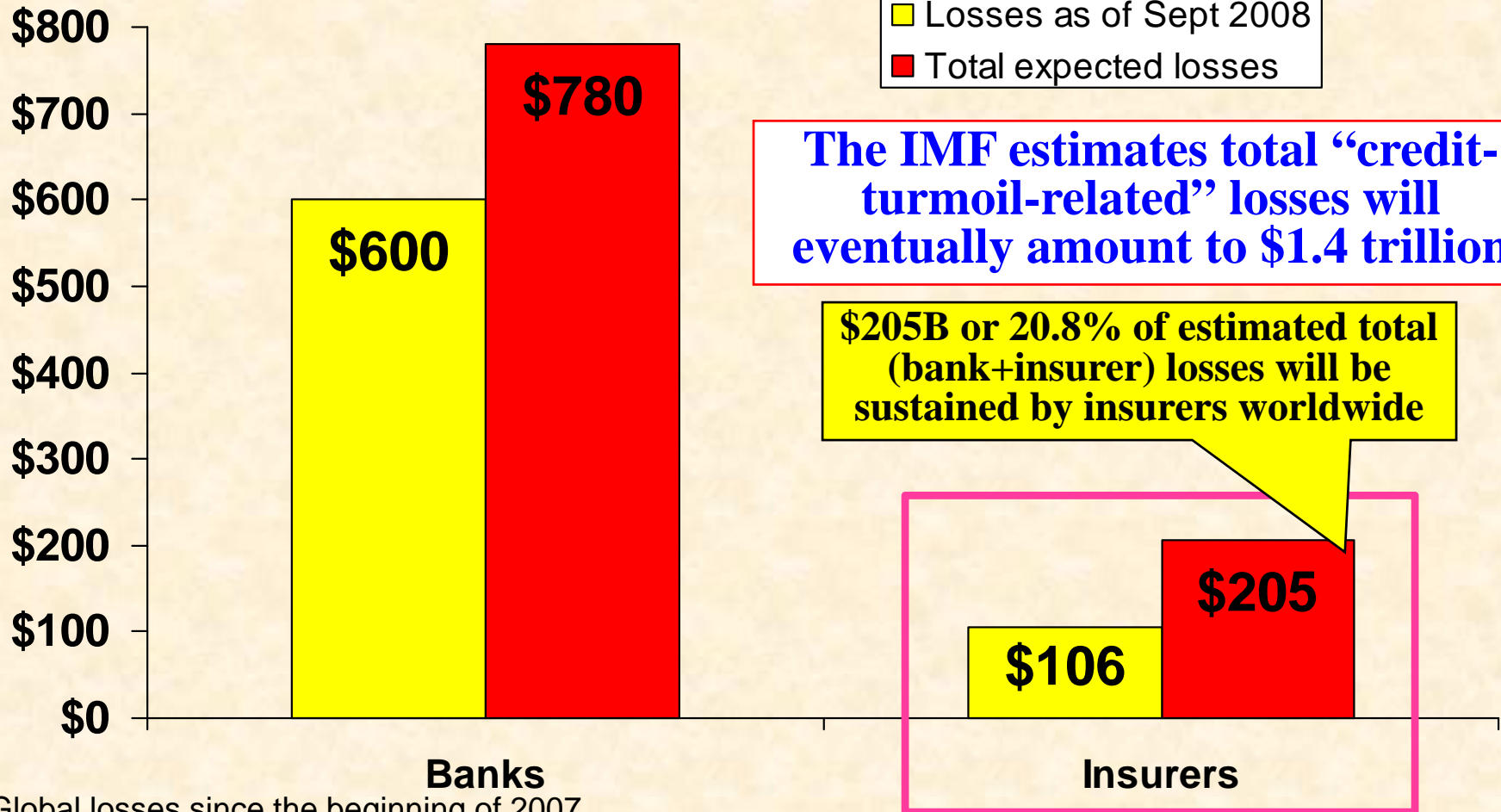


P/C Insurer Impairment Frequency vs. Combined Ratio, 1969-2007



*Financial Institutions Globally Facing Huge Losses from the Credit Crunch**

Billions



*Global losses since the beginning of 2007.

Source: IMF Global Financial Stability Report, October 2008, IIF, Bloomberg, accessed via Geneva Association web site.

2009 Hurricane Season

Severe Season Ahead, But
(Re) Insurers are
 Prepared



Outlook for 2009 Hurricane

Season: 35% Worse Than Average

| | Average* | 2005 | 2009F |
|-------------------------------|----------|-------|-------------|
| Named Storms | 9.6 | 28 | 14 |
| Named Storm Days | 49.1 | 115.5 | 70 |
| Hurricanes | 5.9 | 14 | 7 |
| Hurricane Days | 24.5 | 47.5 | 30 |
| Intense Hurricanes | 2.3 | 7 | 3 |
| Intense Hurricane Days | 5 | 7 | 7 |
| Accumulated Cyclone Energy | 96.1 | NA | 125 |
| Net Tropical Cyclone Activity | 100% | 275% | 135% |

*Average over the period 1950-2000.

Source: Philip Klotzbach and Dr. William Gray, Colorado State University, December 10, 2008.



Landfall Probabilities for 2009 Hurricane Season: Above Average

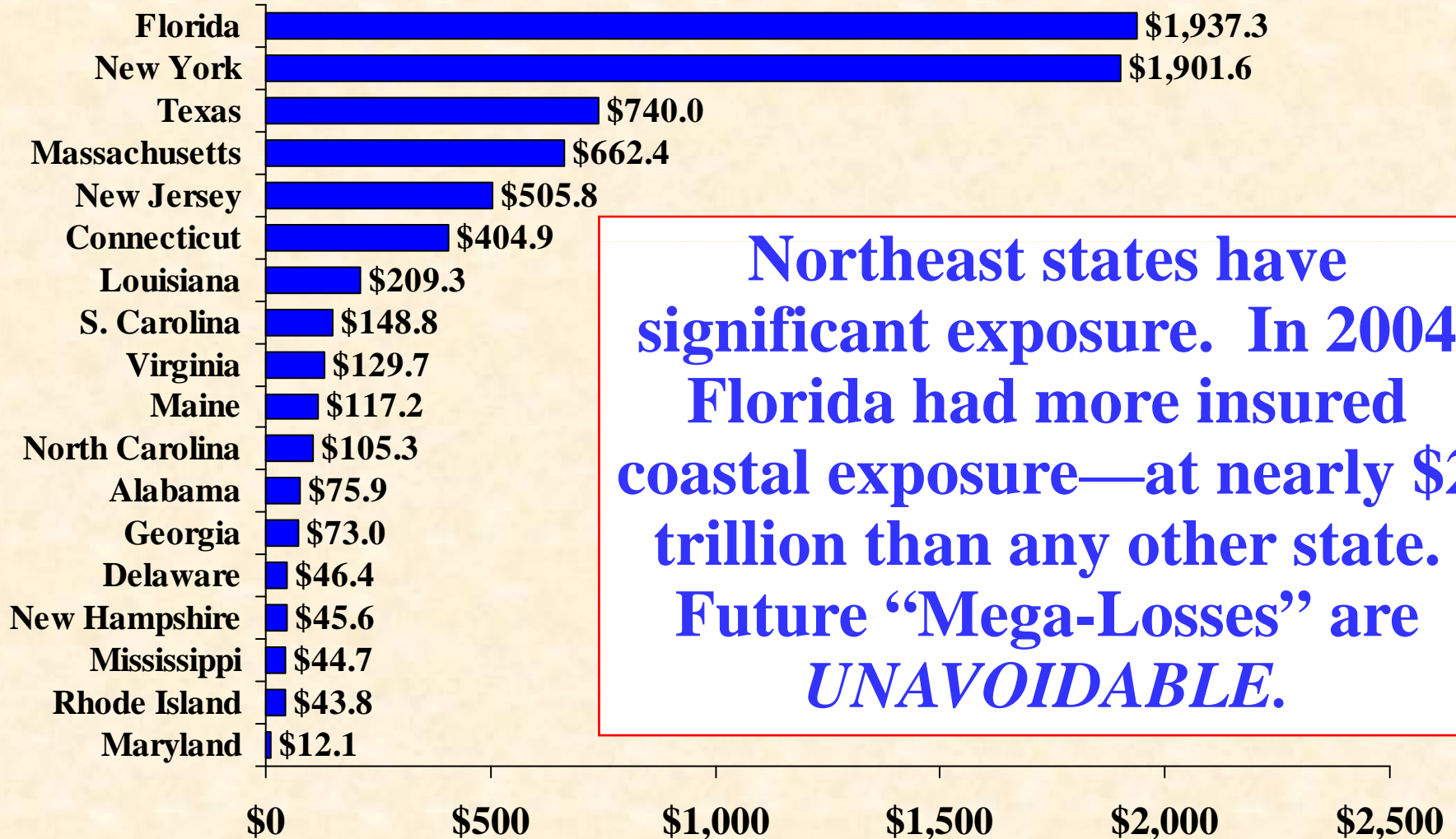
| | Average* | 2009F |
|---|----------|------------------|
| Entire US East & Gulf Coasts | 52% | 63% |
| US East Coast Including Florida Peninsula | 31% | 39% |
| Gulf Coast from Florida Panhandle to Brownsville | 30% | 38% |
| Caribbean | NA | Above Average |

*Average over the past century.

Source: Philip Klotzbach and Dr. William Gray, Colorado State University, December 10, 2008.

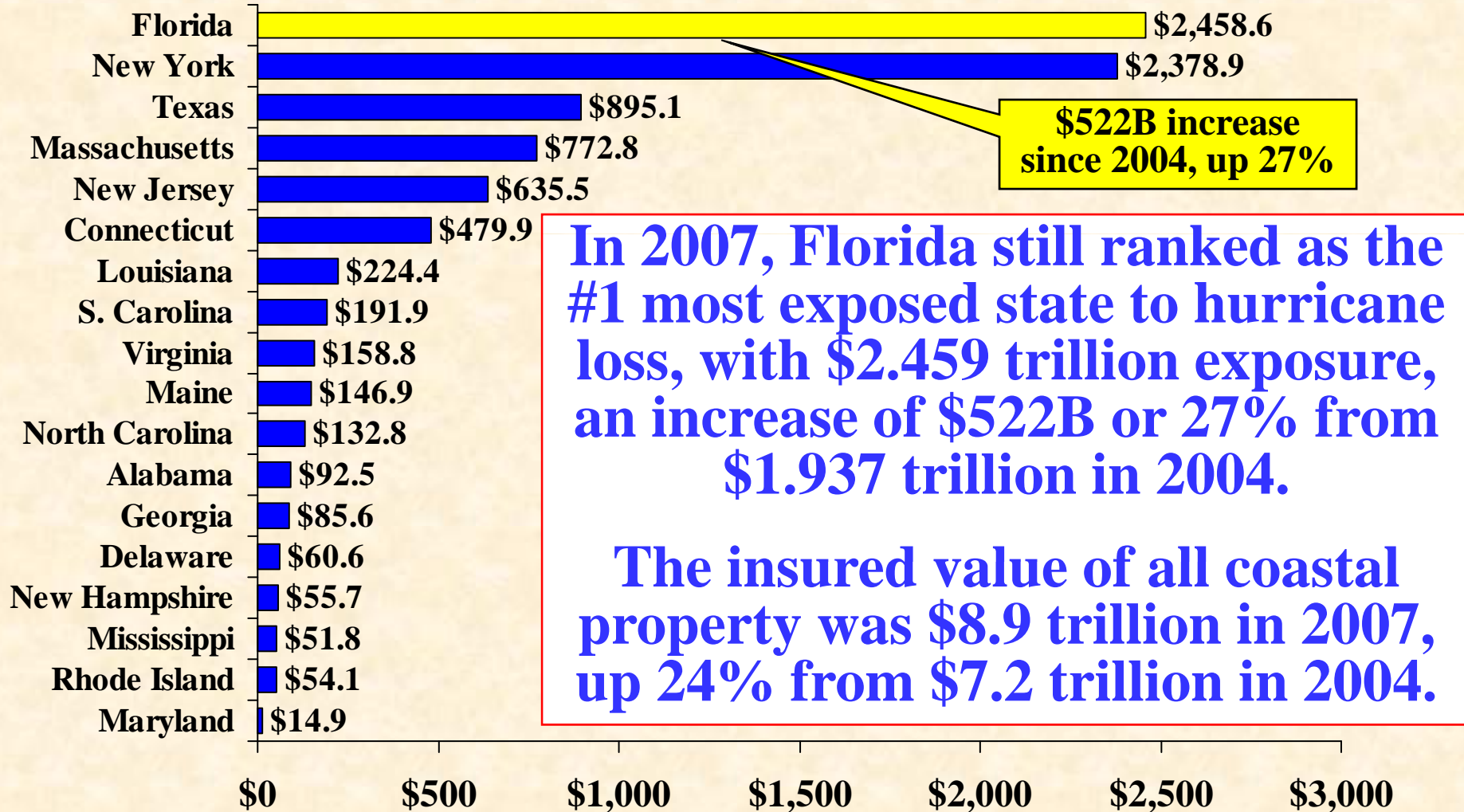


Total Value of Insured Coastal Exposure (2004, \$ Billions)





Total Value of Insured Coastal Exposure (2007, \$ Billions)





Summary

- **Property/Casualty (Re)Insurance Industry Remains Well Capitalized Despite Financial Crisis, Recession & Higher Catastrophe Losses**
- **Industry is Highly Resilient**
 - **Designed to withstand major catastrophes and market crashes simultaneously**
- **The Industry Operates Under a Continuous “Doomsday” Philosophy**
 - **Assume that the worst can and will happen at any time**
- **This Means: Insurance Markets—Unlike Banking—Are Operating *Normally***
- **The Promise to Pay Is Intact**



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Thank you for your time and interest!

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