Agenda

Welcome/Introduction
Terese Rosenthal

US/Global Natural Catastrophe Update
Carl Hedde

Special Topic: Convective Storms and Floods
Peter Höppe

Economic Implications of Natural Catastrophe Losses
Dr. Robert Hartwig

Questions and Answers
Questions and Answers

You will have an opportunity to ask questions at the conclusion of the presentation.

To ask a question, please dial 1 4 on your phone.

An operator will facilitate your participation.

Live Tweeting

@Munichre_US  @lworters  @iiiorg  #NATCAT2013
US/Global Natural Catastrophe Update

Carl Hedde, SVP, Head of Risk Accumulation
Munich Reinsurance America, Inc.

Source: FEMA
MR NatCatSERVICE
The world’s largest database on natural catastrophes

The Loss Database Today

- From 1980 until today all loss events; for USA 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 33,000 events
2013 Headlines


- Despite a relatively quiet year for tornadoes, insured losses from thunderstorm events exceeded $6.0 billion.

- Severe drought cripples agriculture over large section of central United States.

- Dry conditions lead to the most damaging wildfire in Colorado history, breaking the previous record set in 2012.
## Natural Disaster Losses in the United States, 2013

<table>
<thead>
<tr>
<th>As of July 1, 2013</th>
<th>Number of Events</th>
<th>Fatalities</th>
<th>Estimated Overall Losses (US $m)</th>
<th>Estimated Insured Losses (US $m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe Thunderstorm</td>
<td>29</td>
<td>66</td>
<td>10,180</td>
<td>6,325</td>
</tr>
<tr>
<td>Winter Storm</td>
<td>13</td>
<td>17</td>
<td>2,434</td>
<td>1,255</td>
</tr>
<tr>
<td>Flood</td>
<td>10</td>
<td>9</td>
<td>500</td>
<td>Minor</td>
</tr>
<tr>
<td>Earthquake &amp; Geophysical</td>
<td>5</td>
<td>0</td>
<td>Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Tropical Cyclone</td>
<td>1</td>
<td>1</td>
<td>Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Wildfire, Heat, &amp; Drought</td>
<td>11</td>
<td>23</td>
<td>700</td>
<td>365</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>68</strong></td>
<td><strong>116</strong></td>
<td><strong>13,814</strong></td>
<td><strong>7,945</strong></td>
</tr>
</tbody>
</table>

Source: MR NatCatSERVICE

© 2013 Munich Re
US Natural Catastrophe Update

Natural Disasters in the United States, 1980 – 2013
Number of Events, January – June only

First Six Months 2013
68 Events

Source: MR NatCatSERVICE
Natural Disasters in the United States, 1980 – 2013
Number of Events (Annual Totals 1980 – 2012 vs. First Six Months 2013)

First Six Months 2013
68 Events

Geophysical events
(Earthquake, tsunami, volcanic eruption)

Meteorological events
(Storm)

Hydrological events
(Flood, mass movement)

Climatological events
(Extreme temperature, drought, forest fire)

Source: MR NatCatSERVICE

© 2013 Munich Re
Losses Due to Natural Catastrophes in the United States
1980 – 2013 (Jan – June only)

Insured losses in the US totaled US$ 7.9bn

Sources: MR NatCatSERVICE, Property Claims Services
2013 US Thunderstorm Season
US Natural Catastrophe Update

US Tornado Count
First Half 2013

United States Annual Trend of LSR Tornadoes*

*Preliminary tornadoes from NWS Local Storm Reports (LSRs)
Annual average is based on preliminary LSRs, 2005-2012
Thunderstorm losses for the period January – June in 2013 are lower than the past two years, but in line with experience over the past 10 years.

Source: Property Claims Service
Average thunderstorm losses have increased sevenfold since 1980.
May 18-20: Large outbreak of over 60 tornadoes across the midwest and southern Great Plains. Moore, Oklahoma, was hit by an EF5 tornado (5th tornado strike of EF2 or above in the town since 1998). Thousands of homes, 2 schools, and a hospital destroyed. Overall insured losses from the outbreak are estimated at US$ 1.6 billion.
**May 28-31**: Another large outbreak occurred over the southern Plains. The city of El Reno, Oklahoma, was hit by an EF5 tornado that possessed the largest diameter ever observed in a tornado, over 2 miles. Fortunately, downtown El Reno was not hit. Overall insured losses from the outbreak are estimated at US$ 815 million.
US Tropical Cyclones 2013
Tropical Storm Andrea

- Landfall on June 6 near Cedar Key, Florida as a tropical storm with sustained winds of 65 mph.
- Minor wind damage in Florida, storm and its remnants causes localized flooding along length of eastern seaboard.
There has not been a major hurricane landfall in the US since Wilma in 2005.

Source: NOAA
The current 5-year average (2008-2012) for privately insured tropical cyclone losses are $8.8 billion per year.

Sources: Property Claims Service, MR NatCatSERVICE, NFIP
Other US Natural Catastrophes in 2013

Source: NASA
US Natural Catastrophe Update

US Drought Conditions in December 2012

U.S. Drought Monitor

December 25, 2012
Valid 7 a.m. EST

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, December 27, 2012
Author: Richard Heim, NOAA/NESDIS/NCDC

© 2013 Munich Re
Severe drought continues over large area of western United States, encompassing 15 states and almost of half of the area of the lower 48 states.

Severe damage to crops (soybeans, sorghum) and livestock

Record setting heat in the desert southwest.

Ongoing economic losses from the drought are estimated at over $20 billion

Source: NOAA/CPC
Number of Acres Burned in Wildfires, 1980 – 2013 YTD

Source: National Interagency Fire Center
Notable Wildfires in 2013

- **Colorado:** “Black Forest” fire near Colorado Springs destroyed 511 homes, becoming the most damaging fire in state history, surpassing the losses from the “Waldo Canyon” fire in 2012. The insured loss estimate from this fire is US$ 365m.

- **Arizona:** “Yarnell Hill” fire near Prescott consumes over 8,400 acres, destroys over 200 buildings, and claimed the lives of at least 19 firemen, the sixth-worst loss of firemen from a single event in U.S. history.
Global Natural Catastrophe Update
Global Natural Catastrophe Update

Natural Catastrophes January – June 2013

World map with significant events

- **Natural catastrophes**
- **Geophysical events** (earthquake, tsunami, volcanic activity)
- **Hydrological events** (flood, mass movement)
- **Selection of significant loss events**
- **Meteorological events** (storm)
- **Climatological events** (extreme temperature, drought, wildfire)

Number of events: 460
### Natural Catastrophes Worldwide 2013
Overview and Comparison with Previous Years

<table>
<thead>
<tr>
<th>Category</th>
<th>2013 (Jan – June)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of events</td>
<td>460</td>
</tr>
<tr>
<td>Overall losses in US$m (original values)</td>
<td>45,000</td>
</tr>
<tr>
<td>Insured losses in US$m (original values)</td>
<td>13,000</td>
</tr>
<tr>
<td>Fatalities</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Source: MR NatCatSERVICE
Global Natural Catastrophe Update

Natural Catastrophes Worldwide 2013
Overview and Comparison with Previous Years

<table>
<thead>
<tr>
<th></th>
<th>2013 (Jan – June)</th>
<th>2012 (Jan – June)</th>
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</thead>
<tbody>
<tr>
<td>Number of events</td>
<td>460</td>
<td>520</td>
</tr>
<tr>
<td>Overall losses in US$m (original values)</td>
<td>45,000</td>
<td>58,000</td>
</tr>
<tr>
<td>Insured losses in US$m (original values)</td>
<td>13,000</td>
<td>19,000</td>
</tr>
<tr>
<td>Fatalities</td>
<td>4,000</td>
<td>4,500</td>
</tr>
</tbody>
</table>

Source: MR NatCatSERVICE

© 2013 Munich Re
## Natural Catastrophes Worldwide 2013

**Overview and Comparison with Previous Years**

<table>
<thead>
<tr>
<th></th>
<th>2013 (Jan – June)</th>
<th>2012 (Jan – June)</th>
<th>Average of the last 10 years 2003-2012 (Jan –June)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of events</strong></td>
<td>460</td>
<td>520</td>
<td>390</td>
</tr>
<tr>
<td><strong>Overall losses in</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US$m (original values)</td>
<td>45,000</td>
<td>58,000</td>
<td>85,000</td>
</tr>
<tr>
<td><strong>Insured losses in</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US$m (original values)</td>
<td>13,000</td>
<td>19,000</td>
<td>22,000</td>
</tr>
<tr>
<td><strong>Fatalities</strong></td>
<td>4,000</td>
<td>4,500</td>
<td>53,000</td>
</tr>
</tbody>
</table>

*Source: MR NatCatSERVICE*
Global Natural Catastrophe Update

Natural Catastrophes Worldwide 2013
Overview and Comparison with Previous Years

<table>
<thead>
<tr>
<th></th>
<th>2013 (Jan – June)</th>
<th>2012 (Jan – June)</th>
<th>Average of the last 10 years 2003-2012 (Jan –June)</th>
<th>Average of the last 30 years 1983-2012 (Jan –June)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of events</td>
<td>460</td>
<td>520</td>
<td>390</td>
<td>300</td>
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<tr>
<td>Overall losses in US$m (original values)</td>
<td>45,000</td>
<td>58,000</td>
<td>85,000</td>
<td>61,600</td>
</tr>
<tr>
<td>Insured losses in US$m (original values)</td>
<td>13,000</td>
<td>19,000</td>
<td>22,000</td>
<td>13,500</td>
</tr>
<tr>
<td>Fatalities</td>
<td>4,000</td>
<td>4,500</td>
<td>53,000</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Source: MR NatCatSERVICE
## Global Natural Catastrophe Update

### Natural Catastrophes Worldwide 2013

**Overview and Comparison with Previous Years**

<table>
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<tr>
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<tr>
<td><strong>Number of events</strong></td>
<td>460</td>
<td>520</td>
<td>390</td>
<td>300</td>
<td>2012 620</td>
</tr>
<tr>
<td><strong>Overall losses in US$m (original values)</strong></td>
<td>45,000</td>
<td>58,000</td>
<td>85,000</td>
<td>61,600</td>
<td>2011 (EQ Japan) 302,000</td>
</tr>
<tr>
<td><strong>Insured losses in US$m (original values)</strong></td>
<td>13,000</td>
<td>19,000</td>
<td>22,000</td>
<td>13,500</td>
<td>2011 (EQ, Japan) 82,000</td>
</tr>
<tr>
<td><strong>Fatalities</strong></td>
<td>4,000</td>
<td>4,500</td>
<td>53,000</td>
<td>30,000</td>
<td>2010 (EQ Haiti) 230,000</td>
</tr>
</tbody>
</table>

*Source: MR NatCatSERVICE*
Global Natural Catastrophe Update

Natural Catastrophes Worldwide 1980 – 2013
Number of Events (Annual Totals 1980 – 2012 vs. First Six Months 2013)

Number

First Six Months in 2013
460 Events

Source: MR NatCatSERVICE
Global Natural Catastrophe Update

Natural Catastrophes Worldwide 1980 – 2013
Number of Events (January – June only)

First Six Months in 2013
460 Events

Source: MR NatCatSERVICE
© 2013 Munich Re
Overall losses totaled US$ 45bn; Insured losses totaled US$ 13bn
Overall losses totaled US$ 45bn; Insured losses totaled US$ 13bn
Global Natural Catastrophe Update

Natural Catastrophes: Comparison of Insured Losses
Percentage Distribution – Annual Totals 1980 – 2012 vs. First Six Months 2013

Insured losses

<table>
<thead>
<tr>
<th>Year</th>
<th>US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 – 2012 (annual totals):</td>
<td>970bn*</td>
</tr>
<tr>
<td>*losses in 2012 values</td>
<td></td>
</tr>
<tr>
<td>2013 (first six months):</td>
<td>13bn</td>
</tr>
</tbody>
</table>

Source: MR NatCatSERVICE
# Natural Catastrophes Worldwide 2013

The Five Costliest Natural Catastrophes for the Insurance Industry

<table>
<thead>
<tr>
<th>Date</th>
<th>Region</th>
<th>Event</th>
<th>Fatalities</th>
<th>Overall losses US$ m</th>
<th>Insured losses US$ m</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2013</td>
<td>Europe</td>
<td>Floods</td>
<td>22</td>
<td>&gt;16,000*</td>
<td>~3,900*</td>
</tr>
<tr>
<td>18-20.5.2013</td>
<td>USA</td>
<td>Thunderstorms, tornado</td>
<td>26</td>
<td>3,100</td>
<td>1,575</td>
</tr>
<tr>
<td>18-19.3.2013</td>
<td>USA</td>
<td>Thunderstorms</td>
<td>2</td>
<td>2,000</td>
<td>1,415</td>
</tr>
<tr>
<td>June 2013</td>
<td>Canada</td>
<td>Floods</td>
<td>3</td>
<td>&gt;3,000*</td>
<td>&gt;1,000*</td>
</tr>
<tr>
<td>21-31.1.2013</td>
<td>Australia</td>
<td>Floods</td>
<td>6</td>
<td>2,000</td>
<td>1,100</td>
</tr>
</tbody>
</table>

*Loss estimation in progress

Source: PCS - Property Claim Services
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Region</th>
<th>Insured loss US$m (in original values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Hurricane Katrina</td>
<td>USA</td>
<td>62,200</td>
</tr>
<tr>
<td>2011</td>
<td>EQ, tsunami</td>
<td>Japan</td>
<td>40,000</td>
</tr>
<tr>
<td>2012</td>
<td>Hurricane Sandy</td>
<td>USA, Caribbean</td>
<td>30,150</td>
</tr>
<tr>
<td>2008</td>
<td>Hurricane Ike</td>
<td>USA, Caribbean</td>
<td>18,500</td>
</tr>
<tr>
<td>1992</td>
<td>Hurricane Andrew</td>
<td>USA</td>
<td>17,000</td>
</tr>
<tr>
<td>2011</td>
<td>Floods</td>
<td>Thailand</td>
<td>16,000</td>
</tr>
<tr>
<td>2012</td>
<td>Drought</td>
<td>USA</td>
<td>16,000</td>
</tr>
<tr>
<td>1994</td>
<td>EQ Northridge</td>
<td>USA</td>
<td>15,300</td>
</tr>
<tr>
<td>2004</td>
<td>Hurricane Ivan</td>
<td>USA, Caribbean</td>
<td>13,800</td>
</tr>
<tr>
<td>2011</td>
<td>EQ Christchurch</td>
<td>New Zealand</td>
<td>13,000</td>
</tr>
</tbody>
</table>
Special Topic:
Convective Storms and Floods

Prof. Dr. Peter Höppe,
Head Geo Risks Research/Corporate Climate Centre,
Special Topic: Convective Storms and Floods

Convective loss events in the U.S.
Number of events 1980 – 2012 and the half year 2013

Source: Geo Risks Research, NatCatSERVICE – As at July 2013
Special Topic: Convective Storms and Floods

Convective loss events in the U.S.
Overall and insured losses 1980 – 2012 and the half year 2013

Analysis contains: straight-line winds, tornadoes, hail, heavy precipitation, flash floods, lightning.

Source: Geo Risks Research, NatCatSERVICE – As at July 2013

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New Munich Re/DLR scientific paper on U.S. Thunderstorm Trends

Weather, Climate and Society

Rising variability in thunderstorm-related U.S. losses as a reflection of changes in large-scale thunderstorm forcing

---Manuscript Draft---

<table>
<thead>
<tr>
<th>Manuscript Number:</th>
<th>WCAS-D-12-00023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Title:</td>
<td>Rising variability in thunderstorm-related U.S. losses as a reflection of changes in large-scale thunderstorm forcing</td>
</tr>
<tr>
<td>Article Type:</td>
<td></td>
</tr>
</tbody>
</table>
| Corresponding Author: | Eberhard Alfred Faust, Ph.D.  
                               Munich Reinsurance Company  
                               Munich, GERMANY |
| Corresponding Author’s Institution: | Munich Reinsurance Company |
| Order of Authors:  | Julia Sander, Ph.D.  
                               Jan Falk Eichner, Ph.D.  
                               Eberhard Alfred Faust, Ph.D.  
                               Markus Steuer, M.Sc. |
Study examines convective (hail, tornado, thundersquall and heavy rainfall) events in the US with losses exceeding US$ 250m in the period 1970–2009 (80% of all losses)

Past losses are normalized to currently exposed values

After normalization there are still increases of losses

Increases are correlated with the increase in the meteorological potential for severe thunderstorms and its variability

For the first time it could be shown that climatic changes have already influenced US thunderstorm losses!
Specific humidity has risen in large parts of northern hemisphere

Black dots: trends significant at the 95% level

Climate model based studies: Increase has to be expected from anthropogenic climate change (Willett et al., 2010, Environ. Res. Letter, 5; Santer et al., 2007, PNAS, 104)
Observed changes in sea surface temperature in tropical ocean basins (1968-2012)

Five-year running mean

Floods
Special Topic: Convective Storms and Floods

Floods in Europe in May/June 2013
Most probably the most expensive nat cat in Germany!

<table>
<thead>
<tr>
<th>Region</th>
<th>Overall losses</th>
<th>Insured losses</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany, Austria, Czech Republic</td>
<td>US$ &gt; 16 bn*</td>
<td>US$ ~3.9 bn*</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: GDV

* Loss estimation still ongoing
Special Topic: Convective Storms and Floods

Historical Precipitation and River Gauge Records

Precipitation anomalies in May 2013

72 h precipitation sums June 1-3, 2013
Weather pattern trough over central Europe

- The number of days with the weather pattern trough over central Europe has increased (see upper graph)
- One reason is that weather patterns in general move more slowly from west to east, leading to a longer persistence (see lower graph)
- Scientific findings indicate that climate change driven arctic warming is responsible for the reduced propagation (Francis and Vavrus 2012)

Data source: Katalog der Grosswetterlagen Europas (1881-2009).
PIK Report No. 119.
Floods in Calgary Region (Alberta, Canada) June 20-23
Worst flood in documented Canadian history

<table>
<thead>
<tr>
<th>Region</th>
<th>Overall losses</th>
<th>Insured losses</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada, Alberta</td>
<td>US$ &gt;3.0bn*</td>
<td>US$ &gt; 1.0bn*</td>
<td>3</td>
</tr>
</tbody>
</table>

* Loss estimation still ongoing

220 mm precipitation within 36 hours (= average half year precipitation), 75,000 people evacuated

Source: Reuters

© 2013 Munich Re
A large ridge in the jet stream caused record warmth in Alaska and hot weather across parts of Canada’s north and blocked a strong dip in the jet stream from moving quickly from west to east.
[1] Arctic amplification (AA) – the observed enhanced warming in high northern latitudes relative to the northern hemisphere – is evident in lower-tropospheric temperatures and in 1000-to-500 hPa thicknesses. Daily fields of 500 hPa heights from the National Centers for Environmental Prediction Reanalysis are analyzed over N. America and the N. Atlantic to assess changes in north-south (Rossby) wave characteristics associated with AA and the relaxation of poleward thickness gradients. Two effects are identified that each contribute to a slower eastward progression of Rossby waves in the upper-level flow: 1) weakened zonal winds, and 2) increased wave amplitude. These effects are particularly evident in autumn and winter consistent with sea-ice loss, but are also apparent in summer, possibly related to earlier snow melt on high-latitude land. Slower progression of upper-level waves would cause associated weather patterns in mid-latitudes to be more persistent, which may lead to an increased probability of extreme weather events that result from prolonged conditions, such as drought, flooding, cold spells, and heat waves. Citation: Francis, J. A., and S. J. Vavrus (2012), Evidence linking Arctic amplification to extreme weather in mid-latitudes, Geophys. Res. Lett., 39, L06801,
Special Topic: Convective Storms and Floods

Floods in India June 2013
The deadliest natural catastrophe of first half of 2013!

<table>
<thead>
<tr>
<th>Region</th>
<th>Overall losses</th>
<th>Insured losses</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>India, Uttarakhand</td>
<td>Loss estimation in progress</td>
<td>Loss estimation in progress</td>
<td>1,056</td>
</tr>
</tbody>
</table>

Source: NASA
Enhanced future variability during India's rainy season
New climate model simulations

Time series of intra seasonal standard deviation of all India summer monsoon rainfall (June-Sept.) for the strongest future warming scenario (RCP-8.5)

Ensemble climate model simulations (for IPCC AR-5) projects significant increases from pre-industrial climate to 2100 in day-to-day rainfall variability

- in all the 20 models (see graphic)
- and under all four future warming scenarios

(Representative Concentration Pathways RCP -2.6/-4.5/-6.0/-8.5)

Hexagonal, 378-381 (17 February 2011) | doi:10.1038/nature09763
Received 15 March 2010 | Accepted 17 December 2010 | Published online 16 February 2011

"... Here we show that human-induced increases in greenhouse gases have contributed to the observed intensification of heavy precipitation events found over approximately two-thirds of data-covered parts of Northern Hemisphere land areas. Changes in extreme precipitation projected by models and thus the impacts of future changes in extreme precipitation, may be underestimated because models seem to underestimate the observed increase in heavy precipitation with warming."
Market & Financial Impact of Catastrophe Loss:  
*First Half 2013*

Insurance Information Institute  
July 9, 2013
P/C Insurance Industry
Financial Overview

Industry’s Financial Strength and Overall Performance Improved During the First Half of 2013 in Part Due to Lower Catastrophe Losses
P/C Net Income After Taxes
1991–2013:Q1 ($ Millions)

- 2005 ROE* = 9.6%
- 2006 ROE = 12.7%
- 2007 ROE = 10.9%
- 2008 ROE = 0.1%
- 2009 ROE = 5.0%
- 2010 ROE = 6.6%
- 2011 ROAS1 = 3.5%
- 2012 ROAS1 = 5.9%
- 2013:Q1 ROAS1 = 9.6%

ROE figures are GAAP; 1Return on avg. surplus. Excluding Mortgage & Financial Guaranty insurers yields a 9.7% ROAS in 2013:Q1, 6.2% ROAS in 2012, 4.7% ROAS for 2011, 7.6% for 2010 and 7.4% for 2009.

Sources: A.M. Best, ISO, Insurance Information Institute
*Profitability = P/C insurer ROEs. 2011-13 figures are estimates based on ROAS data. Note: Data for 2008-2013 exclude mortgage and financial guaranty insurers.
Source: Insurance Information Institute; NAIC, ISO, A.M. Best.
A 100 Combined Ratio Isn’t What It Once Was: Investment Impact on ROEs

A combined ratio of about 100 generates an ROE of ~7.0% in 2012, ~7.5% ROE in 2009/10, 10% in 2005 and 16% in 1979.

Combined Ratios Must Be Lower in Today’s Depressed Investment Environment to Generate Risk Appropriate ROEs

* 2008-2012 figures are return on average surplus and exclude mortgage and financial guaranty insurers. 2012 combined ratio including M&FG insurers is 103.2, 2011 combined ratio including M&FG insurers is 108.1, ROAS = 3.5%.
Source: Insurance Information Institute from A.M. Best and ISO data.
INVESTMENTS: THE NEW REALITY

Depressed Yields Will Necessarily Influence Underwriting & Pricing
Investment Income Fell in 2012 and is Falling in 2013 Due to Persistently Low Interest Rates, Putting Additional Pressure on (Re) Insurance Pricing

**Investment earnings are running below their 2007 pre-crisis peak**

1 Investment gains consist primarily of interest and stock dividends.

*Estimate based on annualized actual Q1:2013 investment income of $11.385B.

Sources: ISO; Insurance Information Institute.
Industry Claims Paying Capital Stands at or Near Record High as of Mid-2013;

Strength Despite Large Catastrophe Losses in 2011-2012, Including Sandy
Policyholder Surplus, 2006:Q4–2013:Q1

($ Billions)

2007:Q3 Pre-Crisis Peak

Drop due to near-record 2011 CAT losses

The Industry now has $1 of surplus for every $0.80 of NPW, close to the strongest claims-paying status in its history.

Surplus as of 3/31/13 stood at a record high $607.7B

Fortune


*Includes $22.5B of paid-in capital from a holding company parent for one insurer’s investment in a non-insurance business in early 2010.

Sources: ISO, A.M. Best.
Reinsurance Capital Is at a Record High

Change in Global Reinsurer Capital

Source: Reinsurance Association of America from company reports and Aon Benfield Analytics.
Premium Growth

Catastrophe Losses Impact Trajectory of Premium Growth
Net Premium Growth: Annual Change, 1971—2013:Q1

Shaded areas denote “hard market” periods
Sources: A.M. Best (historical and forecast), ISO, Insurance Information Institute.
Sustained Growth in Written Premiums (vs. the same quarter, prior year) Will Continue through 2013

Sources: ISO, Insurance Information Institute.
Underwriting Losses in 2012 and 2011 Were Impacted by High Catastrophe Losses

Too Soon to Tell for 2013; Historically Q3 Has the Highest Losses for the US
As Recently as 2001, Insurers Paid Out Nearly $1.16 for Every $1 in Earned Premiums

Heavy Use of Reinsurance Lowered Net Losses

Relatively Low CAT Losses, Reserve Releases

Relatively Low CAT Losses, Reserve Releases

Higher CAT Losses, Shrinking Reserve Releases, Toll of Soft Market

Best Combined Ratio Since 1949 (87.6)

Avg. CAT Losses, More Reserve Releases

Cyclical Deterioration

Lower CAT Losses Before Sandy

90 95.7 99.3 100.8 106.3 102.4 100.1 98.4 100.8 92.6 95.7 99.3 100.8 101.0 94.8


Underwriting Gain (Loss)
1975–2013:Q1*

Cumulative underwriting deficit from 1975 through 2012 is $510B

Underwriting profit in 2013:Q1 totaled $4.6B

High cat losses in 2011 led to the highest underwriting loss since 2002

Large Underwriting Losses Are NOT Sustainable in Current Investment Environment

* Includes mortgage and financial guaranty insurers in all years.
Sources: A.M. Best, ISO; Insurance Information Institute.
Combined Ratio Points Associated with Catastrophe Losses: 1960 – 2012*

Combined Ratio Points

Avg. CAT Loss Component of the Combined Ratio by Decade

1960s: 1.04
1970s: 0.85
1980s: 1.31
1990s: 3.39
2000s: 3.52
2010s: 7.01*

Catastrophe losses as a share of all losses reached a record high in 2012

The Catastrophe Loss Component of Private Insurer Losses Has Increased Sharply in Recent Decades

Notes: Private carrier losses only. Excludes loss adjustment expenses and reinsurance reinstatement premiums. Figures are adjusted for losses ultimately paid by foreign insurers and reinsurers.
Source: ISO (1960-2011); A.M. Best (2012E) Insurance Information Institute.
Severe Weather Events: First Half 2013

Natural Catastrophe Activity Has Down from Elevated Levels of First Half 2011-2012
U.S. Tornado Count, 2005-2013*

There were 1,897 tornadoes in the U.S. in 2011 far above average, but well below 2008’s record.

2013 count is running well below average.

*Through July 6, 2013.
Source: http://www.spc.noaa.gov/wcm/.
Location of Tornado Reports: Through July 3, 2013

The storm system that spawned the deadly EF-5 tornado on May 19 in Moore, OK, produced insured losses of $1.575 billion.

There were 630 tornadoes through July 3, causing extensive property damage in several states.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2013_annual_summary.html; PCS.
Number of Tornadoes and Related Deaths, 1990 – 2013*

Tornadoes claimed 553 lives in 2011, the most since 1925.

628 tornadoes have been recorded so far this year, 44 deaths.*

Insured Losses from Tornadoes and Thunderstorms in the First Half of 2013 produced insured losses of approximately $6B.


There were 3,716 “Large Hail” reports through July 3, causing extensive property and vehicle damage.

Large hail reports were heavily concentrated in the Plains states.
There were 7,371 “Wind Damage” reports through July 3, causing extensive property damage.

Wind damage reports were more heavily concentrated in the Southeast.
Severe Weather Reports:
Through July 3, 2013

There were 11,717 severe weather reports through July 3; including 630 tornadoes; 3,716 “Large Hail” reports and 7,371 high wind events

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2013_annual_summary.html#
Number of Severe Weather Reports in US, by Type, 2013*

- Large Hail: 3,716, 32%
- Wind Damage: 7,371, 63%
- Tornadoes: 630, 5%

Tornadoes accounted for just 5% of all Severe Weather Reports so far in 2013. Tornado and Hail reports are running below average while Wind reports are close to average.

*As of July 3, 2013
Source: NOAA Storm Prediction Center; [http://www.spc.noaa.gov/climo/online/monthly/2013_annual_summary.html](http://www.spc.noaa.gov/climo/online/monthly/2013_annual_summary.html)
OUTLOOK FOR 2013 HURRICANE SEASON: ABOVE AVERAGE ACTIVITY EXPECTED

Hurricanes and Tropical Storms Frequently Drive Some of the Largest Losses Each Year as with Sandy in 2012
Outlook for 2013 Hurricane Season: 75% Worse Than Average

<table>
<thead>
<tr>
<th>Forecast Parameter</th>
<th>Median (1981-2010)</th>
<th>2013F</th>
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<tbody>
<tr>
<td>Named Storms</td>
<td>12.0</td>
<td>18</td>
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<tr>
<td>Named Storm Days</td>
<td>60.1</td>
<td>95</td>
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<tr>
<td>Hurricanes</td>
<td>6.5</td>
<td>9</td>
</tr>
<tr>
<td>Hurricane Days</td>
<td>21.3</td>
<td>40</td>
</tr>
<tr>
<td>Major Hurricanes</td>
<td>2.0</td>
<td>4</td>
</tr>
<tr>
<td>Major Hurricane Days</td>
<td>3.9</td>
<td>9</td>
</tr>
<tr>
<td>Accumulated Cyclone Energy</td>
<td>92.0</td>
<td>165</td>
</tr>
<tr>
<td>Net Tropical Cyclone Activity</td>
<td>103%</td>
<td>175%</td>
</tr>
</tbody>
</table>

## Landfall Probabilities for 2013 Hurricane Season: Above Average

<table>
<thead>
<tr>
<th>Region</th>
<th>Average*</th>
<th>2013F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire US East &amp; Gulf Coasts</td>
<td>52%</td>
<td>72%</td>
</tr>
<tr>
<td>US East Coast Including Florida Peninsula</td>
<td>31%</td>
<td>48%</td>
</tr>
<tr>
<td>Gulf Coast from Florida Panhandle to Brownsville</td>
<td>30%</td>
<td>47%</td>
</tr>
<tr>
<td>Caribbean</td>
<td>42%</td>
<td>61%</td>
</tr>
</tbody>
</table>

*Average over the past century.
Source: Philip Klotzbach and Dr. William Gray, Colorado State University, June 2013.
## Top 12 Most Costly Hurricanes in U.S. History

(Insured Losses, 2012 Dollars, $ Billions)

<table>
<thead>
<tr>
<th></th>
<th>Year</th>
<th>Insured Losses (billion $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane Sandy*</td>
<td>2012</td>
<td>$25.6</td>
</tr>
<tr>
<td>Andrew</td>
<td>1992</td>
<td>$18.8</td>
</tr>
<tr>
<td>Katrina</td>
<td>2005</td>
<td>$13.4</td>
</tr>
<tr>
<td>Ike</td>
<td>2008</td>
<td>$11.1</td>
</tr>
<tr>
<td>Wilma</td>
<td>2005</td>
<td>$9.2</td>
</tr>
<tr>
<td>Charley</td>
<td>2004</td>
<td>$8.7</td>
</tr>
<tr>
<td>Ivan</td>
<td>2004</td>
<td>$8.7</td>
</tr>
<tr>
<td>Hugo</td>
<td>1989</td>
<td>$7.8</td>
</tr>
<tr>
<td>Rita</td>
<td>2005</td>
<td>$6.7</td>
</tr>
<tr>
<td>Frances</td>
<td>2004</td>
<td>$5.6</td>
</tr>
<tr>
<td>Jeanne</td>
<td>2004</td>
<td>$5.6</td>
</tr>
<tr>
<td>Irene</td>
<td>2011</td>
<td>$4.4</td>
</tr>
</tbody>
</table>

*PCS estimate as of 4/12/13.

Sources: PCS; Insurance Information Institute inflation adjustments to 2012 dollars using the CPI.

Hurricane Sandy became the 3rd costliest hurricane in US insurance history.

Hurricane Irene became the 12th most expensive hurricane in US history in 2011.

10 of the 12 most costly hurricanes in insurance history occurred over the past 9 years (2004—2012)
Hurricane Sandy: Claim Payments to Policyholders, by State

TOTAL = $18.75 BILLION

At $9.6B and $6.6B, respectively, NY and NJ suffered, by far, the largest losses from Hurricane Sandy

Insurers Will Pay at Least $18.75 Billion to 1.52 Million Policyholders Across 15 States and DC in the Wake of Hurricane Sandy

Sources: Catastrophe loss data is for Catastrophe Serial No. 90 (Oct. 28 – 31, 2012) from PCS as of Jan. 18, 2013; Insurance Information Institute.
Hurricane Sandy: Insured Loss by Claim Type* ($ Millions)

Total Claim Value = $18.75 Billion*

- **Commercial**, $9,024, 48%
- **Auto**, $2,729, 15%
- **Homeowner**, $6,997, 37%

Although Commercial Lines accounted for only 13% of total claims, they account for 48% of all claim dollars paid. In most hurricanes, Commercial Lines accounts for about 1/3 of insured losses.

*PCS insured loss estimates as of 1/18/13. Catastrophe modeler estimates range up to $25 billion. All figures exclude losses paid by the NFIP. Source: PCS; Insurance Information Institute.
**Commercial (Business) Claims Were Nearly Seven Times More Expensive than Homeowners Claims; Vehicle Claims Were Unusually Expensive Due to Extensive Flooding**

Commercial (i.e., business claims) are more expensive because the value of property is often higher as well as the impact of insured business interruption losses.

The average insured flood loss was nearly 8 times larger than the average non-flood insured loss (mostly wind).

*Includes rental and condo policies (excludes NFIP flood).  **Preliminary as of May 14, 2013.
Sources: Catastrophe loss data is for Catastrophe Serial No. 90 (Oct. 28 – 31, 2012) from PCS as of March 2013; Insurance Information Institute.
In 2012, New York ranked as the #1 most exposed state to hurricane loss, overtaking Florida with $2.862 trillion. Texas is very exposed too, and ranked #3 with $1.175 trillion in insured coastal exposure.

The insured value of all coastal property was $10.6 trillion in 2012, up 20% from $8.9 trillion in 2007 and up 48% from $7.2 trillion in 2004.

Source: AIR Worldwide.
Total Potential Home Value Exposure to Storm Surge Risk in 2013*

($ Billions)

- Florida: $386.5
- New York: $135.0
- New Jersey: $118.8
- Virginia: $78.0
- Louisiana: $72.0
- S. Carolina: $65.6
- N. Carolina: $65.2
- Texas: $51.0
- Massachusetts: $50.3
- Connecticut: $35.0
- Maryland: $22.4
- Georgia: $20.5
- Delaware: $15.9
- Mississippi: $10.4
- Rhode Island: $7.2
- Alabama: $4.7
- Maine: $3.1
- New: $2.7
- Pennsylvania: $2.6
- DC: $0.6

Nearly $400 billion in home value is exposed to storm surge in FL

The Value of Homes Exposed to Storm Surge was $1.147 Trillion in 2013.* Only a fraction of this is insured, hence the huge demand for federal aid following major coastal flooding events.

*Insured and uninsured property. Based on estimated property values as of April 2013.
Source: Storm Surge Report 2013, CoreLogic.
NHC shooting for mid-season for deployment. First of many ways of distributing storm-surge forecasts.
Catastrophe Losses and Public Opinion: First Half 2013 Poll

Many Americans Don’t Believe It’s Fair to Reflect Higher Catastrophe Losses in Rates; Government Aid Influences Insurance Purchase Decision
Q. Do you think that it is fair that people who live in areas affected by record storms in 2011 and 2012 should pay more for their homeowners insurance in the future?

Public believes it is not fair to raise premiums of homeowners due to events they cannot control.

Nearly 60 percent of Americans believe that homeowners insurance premiums should not be raised as a result of recent storms in their areas.

Source: Insurance Information Institute Annual Pulse Survey.
I.I.I. Poll: Disaster Preparedness

Q. If you expect some relief from the government, do you purchase less insurance coverage against these natural disasters than you would have otherwise?

More than 20 percent cut back on insurance coverage in expectation of government disaster aid.

Seventy-two percent of Americans would not purchase less insurance if they expect some relief from the government—but 22% would.

Source: Insurance Information Institute Annual Pulse Survey.
I.I.I. Poll: Flood Insurance

Q. The federal government plans to raise the price of flood insurance so it reflects the costs of paying claims. Do you believe this is fair?

[55% Responding “NO”]

Most people believe it is unfair for government to raise flood insurance premiums, even though they are subsidized by taxpayers.

More than one-half of Americans do not think it is fair for the federal government to raise its flood insurance premiums to better reflect claims payouts.

Source: Insurance Information Institute Annual Pulse Survey.
I.I.I. Poll: Disaster Preparedness

Q. Have recent flooding events such as Hurricane Sandy or Hurricane Irene motivated you to buy flood coverage?¹

Despite recent major flood events, few people see the need to buy coverage.

Recent storms have not motivated people to buy flood insurance coverage.

¹Asked of those who have homeowners insurance but not flood insurance.

Source: Insurance Information Institute Annual Pulse Survey.
Insurance Information Institute Online:

www.iii.org

Thank you for your time and your attention!

Twitter: twitter.com/bob_hartwig
Question and Answer
To ask a question, please dial 1 4 on your phone.

An operator will facilitate your participation.
Press Inquiries
Terese Rosenthal
Phone: +1 (609) 243-4339
E-mail: trosenthal@munichreamerica.com
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## More Information

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Thank you very much for attending

July 9, 2013