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Japan's Great Tohoku Earthquake

Scale, Scope and Insurance and Reinsurance Markets In the Aftermath of the March 11, 2011 Earthquake

Insurance Information Institute

March 15, 2011

www.iii.org/facts_statistics/earthquakes-and-tsunamis.html

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Presentation Outline

- Recent Major Global Catastrophes
- Summary of March 11, 2011, Earthquake in Japan
- Discussion by Peril
- Historical Analysis of Japanese Earthquake Risk
- Historical Analysis of Global Earthquake Risk
- Historical Analysis of U.S. Earthquake Risk
- 2010 Catastrophe Loss Summary and Long-Term Trends

ADDITIONAL DETAILS AVAILABLE AT:

http://www.iii.org/facts_statistics/earthquakes-and-tsunamis.html

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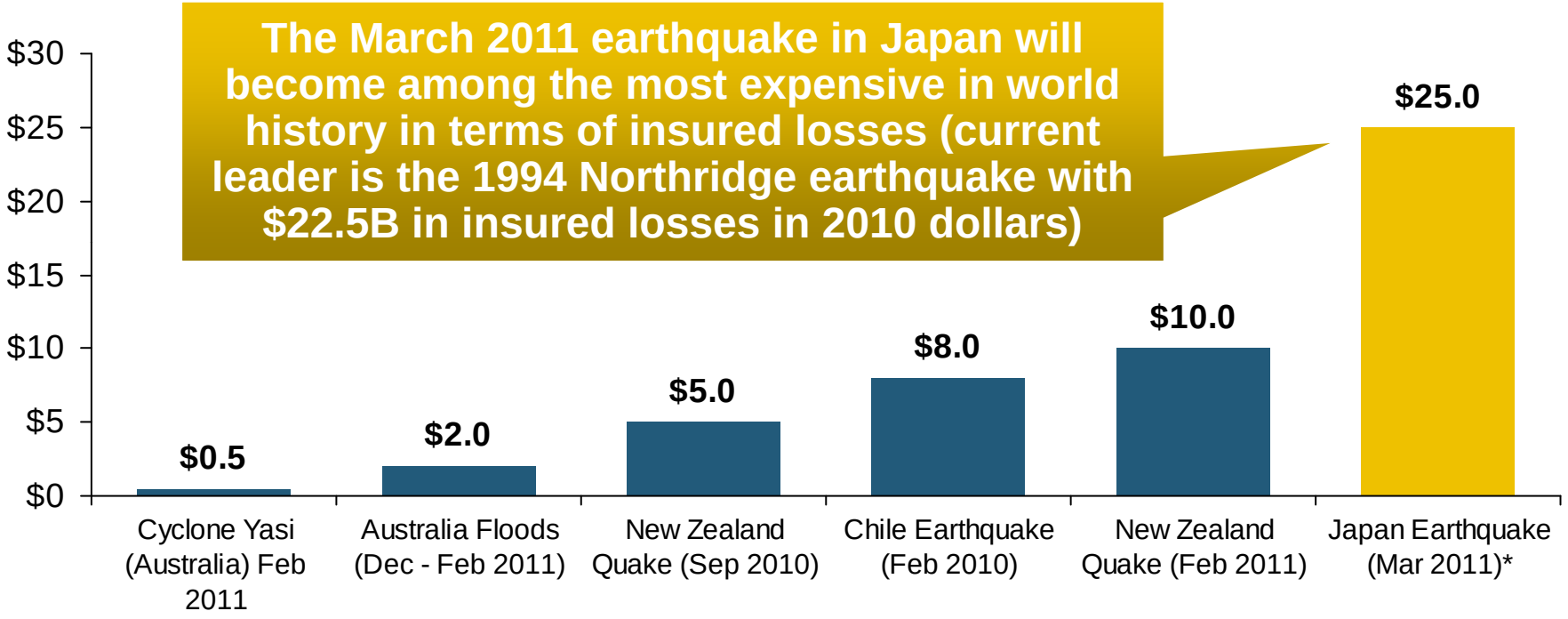
Summary of Recent Major Catastrophe Loss Activity

Earthquake Losses Dominate

Recent Major Catastrophe Losses

(Insured Losses, $US Billions)



Insured Losses from Recent Major Catastrophe Events Exceed $50 Billion, an Estimated $48 Billion of that from Earthquakes

*Midpoint of AIR Worldwide estimated insured loss range of $15 billion to $35 billion as of March 13, 2011. Does not include tsunami losses.

Sources: Insurance Council of Australia, Munich Re, AIR Worldwide; Insurance Information Institute.

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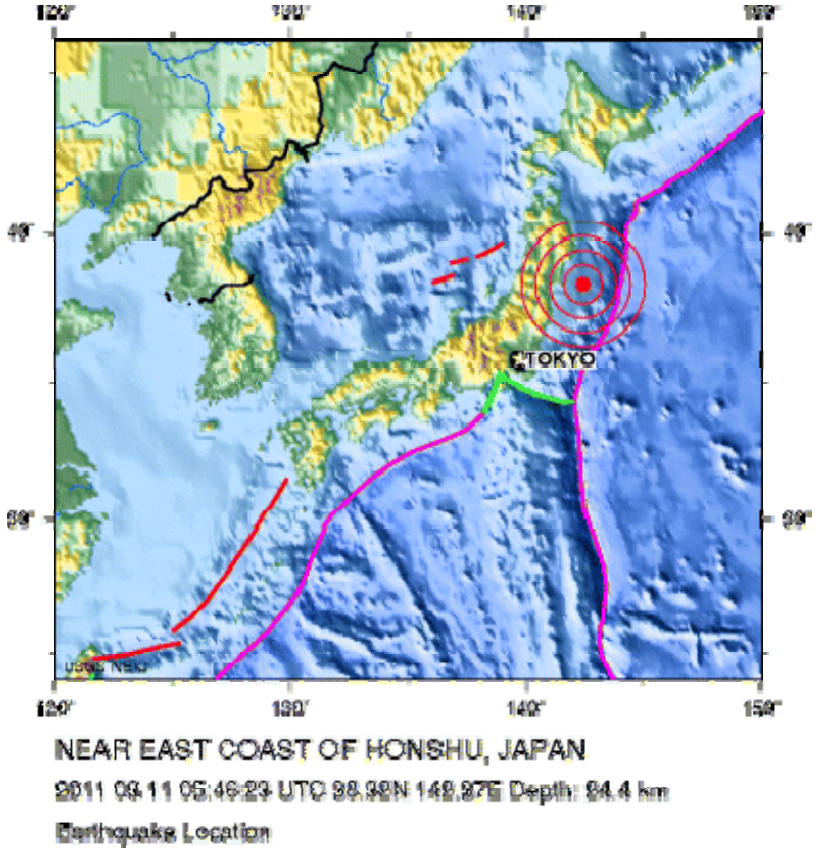
Summary of March 11, 2011 Japanese Earthquake Activity

March 11 Earthquake Is Among the Strongest in Recorded History

Location of March 11, 2011 Earthquake Near Sendai, Honshu, Japan



LOCATION

130 km (80 miles) E of **Sendai, Honshu, Japan**
178 km (110 miles) E of **Yamagata, Honshu, Japan**
178 km (110 miles) ENE of **Fukushima, Honshu, Japan**
373 km (231 miles) NE of **TOKYO, Japan**

March 11 Earthquake Facts as of 3/13/2009

- Magnitude 9.0 earthquake struck Japan at 2:46PM local time (2:46AM Eastern) off the northeast cost of Honshu, 80 miles east of the city of Sendai
- Quake is among the 5 strongest in recorded history and the strongest in the 140 years for which records have been kept in Japan
- Thousands are dead
- Cost will be in the billions (US $)
- Significant tsunami damage was recorded in Japan, with relatively minor damage on the U.S. West Coast

Source: US Geological Service; Insurance Information Institute.

Loss Estimates

- **Early estimates from the catastrophe modeling firm AIR Worldwide put insured property losses, not including the costs of the tsunami, at $15 billion to $35 billion.**
- **AIR's estimates reflect insured losses from shaking and "fire following" damage to onshore residential and commercial buildings and contents.**
- **The estimates also include some agricultural losses. The figures are net of Japan Earthquake Reinsurance recoveries.**
- **Many of the properties destroyed by the tsunami first sustained damage from ground shaking and fire. However, any other estimates of tsunami losses should not be added to the loss estimates provided here, as that would result in significant double counting.**
- **These losses do not include uninsured property losses. According to AIR Worldwide, earthquake insurance penetration in Japan is relatively low (ranging between 14 to 17 percent nationwide).**
- **Estimates of fatalities are still evolving, but are expected to be in the thousands.**

Source: AIR Worldwide, March 13, 2011.

Earthquake Damage

- **Strong shaking from the quake was felt over most of the country's northern Honshu region. Roads across the region buckled and several landslides were reported.**
- **High-rise office and apartment buildings in Tokyo—some 370 km from the epicenter—shook visibly. Trains and subways in the capital were halted and elevators shut down. Shaking was felt as far south as Kyoto and Osaka.**
- **In Japan about 70% of all residential construction is made of wood and about 25% of concrete. Commercial construction consists of more than 50% ductile reinforced concrete, about one-third light metal or steel and less than 10% wood.**
- **Residential structures in the region of Japan impacted by the March 11 quake are generally resistant to earthquake shaking. However, some vulnerable structures do exist. These are comprised primarily of non-ductile reinforced concrete frame and heavy wood-frame construction.**
- **There have been relatively few reports of major structural damage in the Tokyo and Chiba areas, though several serious fires broke out. Many instances of non-structural damage and damage to contents are expected to be reported.**
- **Power outages plagued the northern Honshu region, and many homes are without running water.**

Source: AIR Worldwide, March 13, 2011.

Nuclear Concerns

- **An explosion in one of the buildings at the Fukushima Daiichi Nuclear Power Station prompted officials to evacuate a 12-mile radius around the plant, affecting as many as 170,000 people.**
- **Officials flooded the reactor with seawater in an effort to avoid a reactor core meltdown. Reports indicated that a partial meltdown may have already occurred.**
- **On March 13 a second reactor at the same plant was also experiencing critical failures of its cooling system. Several insurance experts have said that the plant operator, Tokyo Eclectic Power Co., will be responsible for any clean-up costs associated with radiation contamination, but that insurance is likely to have been purchased by the company directly from the Japanese government.**

Source: AIR Worldwide, March 13, 2011.

Human Cost

- **The death toll, expected to rise, stands at thousands.**
- **Deaths have been reported in Miyagi, Iwate, Fukushima and Ibate prefectures.**
- **A ship carrying 100 people was swept away off the northeastern coast.**
- **At least 200 people were caught in a landslide in the province of Sendai.**

Source: AIR Worldwide, March 13, 2011.

Property Damage

- **Building collapses, including a nursing home, reported in Fukushima prefecture; many collapses in Iwaki-city and Fukushima-city.**
- **Building collapses reported in Ibaraki prefecture.**
- **Three buildings collapsed in Kurihara-city in Miyagi prefecture.**
- **Building collapses in Chiba prefecture's Narita city.**
- **Many residential homes washed out by the tsunami in Miyagi and Iwate prefectures.**
- **Oil tanks were damaged in Miyagi prefecture.**
- **More than 300 houses collapsed or were washed away in the coastal city of Ofunato.**

Source: AIR Worldwide, March 13, 2011.

Fire Damage

- **Fire damage in the following prefectures, particularly at chemical plants, nuclear plants and oil refineries: Iwate, Miyagi, Akita, Fukishima, Ibaraki, Tochigi, Chiba, Tokyo and Kanagawa.**
- **Chiba prefecture: fire and explosion at an oil refinery and fire at a steel plant.**
- **Kanagawa: fire at a mid-rise building and at an industrial facility.**
- **Fire at one office building in Tokyo.**

Source: AIR Worldwide, March 13, 2011.

Infrastructure Damage

- **All highways closed around Kanto and Tōhoku.**
- **More than four million buildings were without power in Tokyo and its suburbs.**
- **Sendai airport was inundated by the tsunami.**
- **Haneda airport stopped all departures.**
- **Narita airport stopped all departures.**
- **Ibaraki airport stopped all departures.**
- **The Japanese railway stopped all trains in Kanto and Tōhoku; other, private, railroads stopped trains.**
- **Cooling systems at the Fukushima Daichi power plant were damaged. Three thousand residents near the plant were being evacuated early this morning.**
- **Electronics giant Sony Corp. and carmaker Toyota shut down production at several of their plants.**

Source: AIR Worldwide, March 13, 2011.

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Discussion by Peril: Japanese Earthquake

Several Different Types of Policies Must Be Considered

Discussion by Peril: Earthquake Shaking

- **This is the biggest exposure in direct sums insured. EQ Shake policies have two primary forms: high deductibles with insurance covering a proportion of the damage excess deductible; and first loss policies that have minimal deductibles but also sub-limits that are a small fraction of the fire insurance value of a property.**

- **The ground motions in Japan were at a level that generates the expectation of widespread, moderate damage (as opposed to an expectation of the destruction seen in the Christchurch CBD, NZ). There are reports of 6,000-10,000 houses destroyed in this event, representing a very small fraction of the housing stock affected. Most damage is expected to be below the level of deductibles. EQECAT believes this initial report of 6,000-10,000 is low due to a damaged communications infrastructure that prevents timely reporting, but this bias does not significantly alter the conclusion of widespread moderate damage.**

- **First loss policies are very likely to trigger losses to insurers in this event, especially first loss policies that apply to schedules of locations distributed throughout the area. Aggregated first loss insurance payouts are expected to be a fairly high percentage of the damage incurred by first loss policy holders.**

Source: Eqecat, March 14, 2011.

Discussion by Peril: Fire Following Earthquake

- **As demonstrated by many events in Japan, fire following earthquake represents a significant risk. Despite there being several very large fires from this event, there have been no uncontrolled urban conflagrations. Payouts from the EFEI (Earthquake Fire Expense Insurance) are not expected to be significant; the individual payouts are very limited on a policy basis.**

- **Fire losses are not expected to be a large portion of the insured losses for this event; the small number and size of fires has limited the number of houses affected and the insurance limits are a small fraction of the overall fire losses.**

- **Many fires have been identified within the rubble piles caused by the tsunami. It is not clear how these policies will be settled, but the initial cause of these rubble piles was likely the tsunami not fire. The largest fires have been within industrial facilities, primarily refineries and power production facilities.**

Source: Eqecat, March 14, 2011.

Discussion by Peril: Flood and Tsunami

- **Indemnification from flooding and tsunami is an optional coverage for most policies in Japan, and take-up rates are fairly low. It is currently expected that much of the losses from flooding are not insured.**

- **The University of Tokyo (ERI) has posted a ground motion summary from the National Research Institute for Earth Science and Disaster Prevention based on data captured by networks of strong-ground-motion instruments in Japan (K-Net and KiK-Net data). The data includes many recordings closer to the fault where peak ground acceleration exceeded 0.5 g (quite strong) in some cases. Therefore, the shaking damage along the coast might have been significant in some regions; however, these same regions (especially the lowlands where the strongest shaking would have been) were overrun by the tsunami, thus erasing any evidence of possible shaking damage.**

Source: Eqecat, March 14, 2011.

Discussion by Peril: Nuclear Contamination Evacuation

- **Most insurance policies contain exclusions for nuclear contamination. The experience from past earthquakes has been that there is not a lot of business interruption coverage that could be triggered by the large-scale evacuations now in progress.**

Source: Eqecat, March 14, 2011.

Discussion by Peril: Loss Estimates – Comparisons With Previous Major Quakes

- **Economic losses from this event are likely to exceed $100B USD, according to March 14 estimates by Eqecat. The 1995 Great Hanshin Earthquake (Kobe, Japan) was reported to have economic losses in excess of this value. The Great Hanshin event was a M6.8 earthquake located in the heart of the port of Osaka. It occurred in a larger industrial center, and was more concentrated geographically.**

- **Insured losses from the 1995 event were estimated at $6 Billion USD (a ratio of insured losses to economic losses of 6%). The relatively low ratio was due to the low propensity to buy earthquake insurance coverage in this area of perceived low risk. Last week's Tohoku Pacific Offshore Earthquake affected an area that has a much higher rate of insurance purchase. A $100 Billion USD loss represents about 2% of Japan's Gross Domestic Product. This ratio allows a comparison of the severity of this event with other recent catastrophes.**

Source: Eqecat, March 14, 2011.

Discussion by Peril: Loss Estimates – Comparisons With Previous Major Quakes (con't)

- **The 2010 Maule Earthquake (Chile) caused an estimated $30 Billion USD in economic damages. With a GDP of approximately $300 Billion USD, the 2010 Maule earthquake was a far more direct hit although about 25% of the economic losses were covered by insurance. The aggregate economic losses from the two recent Christchurch, NZ, earthquakes may approach $20 Billion USD on a GDP of approximately $120 Billion USD.**

- **Current estimates note that approximately 75% of the Christchurch losses will be covered by insurance. In 2004, Hurricane Katrina caused an estimated $125 Billion USD in economic losses to an economy with a GDP of $13 Trillion USD, or about 1%, with approximately 25% of the losses covered by insurance.**

- **Economic losses will continue to rise as significant earthquake-related events develop; serious concerns grow as officials struggle to control damage at three nuclear power plants.**

Source: Eqecat, March 14, 2011.

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Japanese Nonlife Insurance Market Facts

Market Is Dominated by Large, Domestic Insurers

Top 20 Nonlife Insurance Companies in Japan by DPW, 2008

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Rank	Companies	Direct premiums written, 2008		Market share	Cumulative Market Share
		JPY (millions)	U.S. ($ millions)		
1	Tokio & Marine Nichido	$2,032,131.2	$19,660.9	24.0%	24.0%
2	Sompo Japan	1,504,262.7	14,553.8	17.8	41.8%
3	Mitsui Sumitomo	1,455,161.8	14,078.7	17.2	59.0%
4	Aioi	897,182.6	8,680.3	10.6	69.6%
5	Nipponkoa	728,262.9	7,046.0	8.6	78.2%
6	Nisay Dowa	361,530.7	3,497.8	4.3	82.5%
7	Fuji	329,345.7	3,186.4	3.9	86.4%
8	AIU	253,522.8	2,452.8	3.0	89.4%
9	Kyoei	199,393.1	1,929.1	2.4	91.8%
10	Nisshin	149,735.8	1,448.7	1.8	93.6%
11	American Home	82,889.8	802.0	1.0	94.6%
12	Asahi	73,600.1	712.1	0.9	95.5%
13	Sony	60,868.3	588.9	0.7	96.2%
14	ACE	54,876.2	530.9	0.7	96.9%
15	Zurich	45,471.3	439.9	0.5	97.4%
16	SECOM	44,245.0	428.1	0.5	97.9%
17	Sumi Sei	33,594.0	325.0	0.4	98.3%
18	AXA	30,418.9	294.3	0.4	98.7%
19	Mitsui Direct	29,471.9	285.1	0.4	99.1%
20	Daido	15,690.4	151.8	0.2	99.3%

Source: © AXCO 2011.

Top 10 Nonlife Insurance Companies in Japan by DPW, 2008

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10	Nisshin	149,735.8	1,448.7	1.8%	93.6%

Source: © AXCO 2011.

Ownership of Residential Earthquake Insurance in Japan

Year	Percent (1)
2009	46.5%
2008	45.0%
2007	44.0%
2006	41.7%
2005	40.3%

(1) Percentage of homeowners with fire policies who purchased earthquake insurance. In Japan quake insurance is usually purchased on top of a fire policy.

Source: Non-Life Insurance Rating Organization of Japan.

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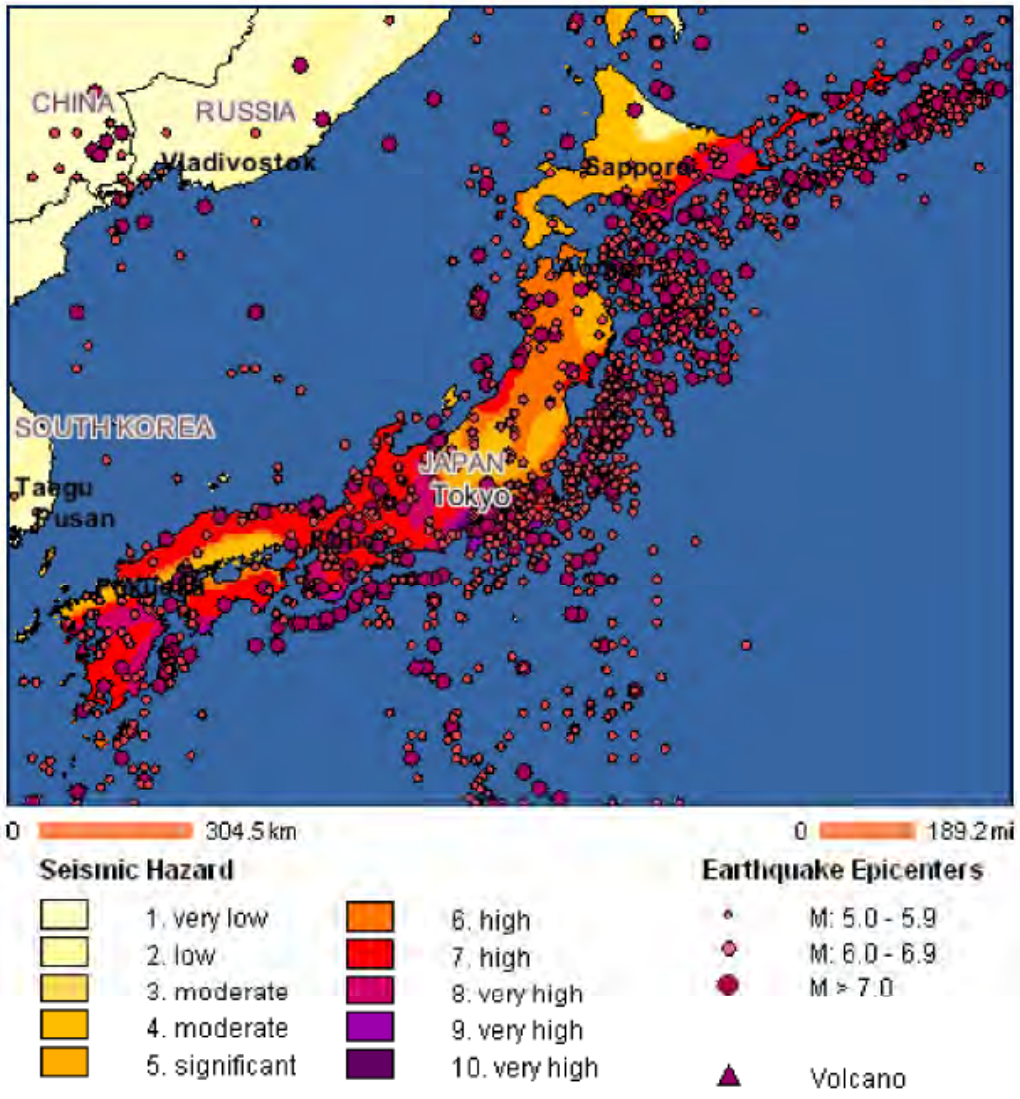
Historical Analysis of Japanese Earthquake Activity

Japan Has a Long and Tragic History of Earthquake Loss

CatNet(TM) Earthquake Map



Source: Axco Insurance Information Services.

Significant Earthquakes/Tsunamis in Japan: 1900 – February 2011

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10 Costliest Events Ordered by Overall Losses

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
17.1.1995	Earthquake	Prefecture Hyogo, Kobe, Osaka, Kyoto	100,000	3,000	6,430
23.10.2004	Earthquakes	Honshu, Niigata, Ojiya, Tokyo, Nagaoka, Yamakoshi	28,000	760	46
16.7.2007	Earthquake	Niigata, Kashiwazaki, Nagaoka, Sanjo, Tsubame, Joetsu, Ojiya, Izumozaki, Kariwa	12,500	335	11
1.9.1923	Earthquake	Tokyo, Yokohama	2,800	590	142,800
12.7.1993	Earthquake, tsunami	Hokkaido S, Honshu NW, esp. Okushiri	1,000	16	247
28.6.1948	Earthquake	Fukui	1,000	minor	3,895
12.6.1978	Earthquake	Honshu island, Sendai	865	2	28
16.6.1964	Earthquake, tsunami	Hodo island, Niigata	800	5	30
13.6.2008	Earthquake, landslides	Eastern Honshu, Furukawa, Miyagi, Kurihara, Morioka, Iwate	570	minor	13
26.5.1983	Earthquake, tsunami	Nihon Kai Chubu, NW of Honshu, Akita, Aomori, Hokkaido	560	26	104

Significant Earthquakes/Tsunamis in Japan: 1900 – February 2011

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23.10.2004	Earthquake	Honshu, Niigata, Ojiya, Tokyo, Nagaoka, Yamakoshi	28,000	760	46
1.9.1923	Earthquake	Tokyo, Yokohama	2,800	590	142,800
16.7.2007	Earthquake	Niigata, Kashiwazaki, Nagaoka, Sanjo, Tsubame, Joetsu, Ojiya, Izumozaki, Kariwa	12,500	335	11
10.8.2009	Earthquake	Tokyo, Shizuoka, Makinohara, Honshu	400	250	1
26.7.2003	Earthquake	Honshu, Miyagi, Sendai, Naruse	500	200	
25.3.2007	Earthquake	Noto, Ishikawa-Ken, Wajima, Hokuriku	550	150	1
6.10.2000	Earthquake	Tottori, Shimane and Okayama prefecture, Saihaku, Mizokuchi	500	150	
24.3.2001	Earthquake	Hiroshima Prefecture, Geiyo	500	128	2
20.3.2005	Earthquake	Kyushu, Fukuoka, Genkai, Saga	400	120	1

Significant Earthquakes/Tsunamis in Japan: 1900 – February 2011

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10 Deadliest Events

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
1.9.1923	Earthquake	Tokyo, Yokohama	2,800	590	142,800
17.1.1995	Earthquake	Prefecture Hyogo, Kobe, Osaka, Kyoto	100,000	3,000	6,430
28.6.1948	Earthquake	Fukui	1,000		3,895
3.3.1933	Earthquake, tsunami	Sanriku, Kamaishi	25		3,064
7.3.1927	Earthquake	Kita-Tango	40		2,925
20.12.1946	Tsunami	Nankaido			2,000
7.12.1944	Earthquake, tsunami	Tonankai			1,200
Sept. 1943	Earthquake	Tottori			1,083
12.7.1993	Earthquake, tsunami	Hokkaido S, Honshu NW, esp. Okushiri	1,000	16	247
22.5.1960	Tsunami	Onagawa	140		138

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Historical Analysis of Global Earthquake Activity

Earthquakes Are Often Costly and Deadly; Activity in 2010 and 2011 Has Been Elevated

Significant Earthquakes/Tsunamis Worldwide: 1980 – February 2011

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10 Costliest Events Ordered by Overall Losses

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
17.1.1995	Earthquake	Japan: Kobe	100,000	3,000	6,430
12.5.2008	Earthquake	China: Sichuan	85,000	300	84,000
17.1.1994	Earthquake	United States: Northridge	44,000	15,300	61
27.2.2010	Earthquake, tsunami	Chile: Maule	30,000	8,000	520
23.10.2004	Earthquake	Japan: Niigata	28,000	760	46
22.2.2011	Earthquake	New Zealand: Christchurch	20,000*	10,000*	>150
21.9.1999	Earthquake	Taiwan: Nantou	14,000	750	2,368
7.12.1988	Earthquake	Armenia: Spitak	14,000	minor	25,000
16.7.2007	Earthquake	Japan: Niigata	12,500	335	11
17.8.1999	Earthquake	Turkey: Izmit	12,000	600	17,118

*loss estimation still in progress

Significant Earthquakes/Tsunamis Worldwide: 1980 – February 2011

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10 Costliest Events Ordered by Insured Losses

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
17.1.1994	Earthquake	United States: Northridge	44,000	15,300	61
22.2.2011	Earthquake	New Zealand: Christchurch	20,000*	10,000*	>150
27.2.2010	Earthquake, tsunami	Chile: Maule	30,000	8,000	520
3.9.2010	Earthquake	New Zealand: Canterbury, Christchurch	6,500	5,000	
17.1.1995	Earthquake	Japan: Kobe	100,000	3,000	6,430
26.12.2004	Earthquake, tsunamis	SOUTHERN ASIA: Sri Lanka, Indonesia, Thailand, India, Bangladesh, Myanmar, Maldives, Malaysia	10,000	1,000	220,000
17.10.1989	Earthquake	United States: Loma Prieta	10,000	960	68
23.10.2004	Earthquake	Japan: Niigata	28,000	760	46
21.9.1999	Earthquake	Taiwan: Nantou	14,000	750	2,368
28.12.1989	Earthquake	Australia: Newcastle	1,200	670	13

*loss estimation still in progress

Significant Earthquakes/Tsunamis Worldwide: 1980 – February 2011

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10 Deadliest Events

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
12.1.2010	Earthquake	Haiti: Port-au-Prince	8,000	200	222,570
26.12.2004	Earthquake, tsunamis	SOUTHERN ASIA: Sri Lanka, Indonesia, Thailand, India, Bangladesh, Myanmar, Maldives, Malaysia	10,000	1,000	220,000
8.10.2005	Earthquake	Pakistan. India (Kashmir region)	5,200	5	88,000
12.5.2008	Earthquake	China: Sichuan	85,000	300	84,000
20.6.1990	Earthquake	Iran: Gilan province, Manjil	7,100	100	40,000
26.12.2003	Earthquake	Iran: Bam	500	19	26,200
7.12.1988	Earthquake	Armenia: Spitak	14,000	minor	25,000
17.8.1999	Earthquake	Turkey: Izmit	12,000	600	17,118
26.1.2001	Earthquake	India: Gujarat	4,500	100	14,970
19.9.1985	Earthquake	Mexico: Mexico City	4,000	275	9,500

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Historical Analysis of U.S. Earthquake Activity

Most—But Not All—Major U.S. Earthquakes Have Occurred on the West Coast

Estimated Insured Losses for the Top 10 Historical Earthquakes Based on Current Exposures (1) ($ Billion)

Rank	Date	Location	Magnitude	Insured loss (current exposures)
1	Feb. 7, 1812	New Madrid, MO	7.7	$100
2	Apr. 18, 1906	San Francisco, CA	7.8	96
3	Aug. 31, 1886	Charleston, SC	7.3	37
4	Jun. 1, 1838	San Francisco, CA	7.4	27
5	Jan. 17, 1994	Northridge, CA	6.7	21
6	Oct. 21, 1868	Hayward, CA	7.0	21
7	Jan. 9, 1857	Fort Tejon, CA	7.9	8
8	Oct. 17, 1989	Loma Prieta, CA	6.3	6
9	Mar. 10, 1933	Long Beach, CA	6.4	5
10	Jul. 1, 1911	Calaveras, CA	6.4	4

(1) Modeled loss to property, contents, and business interruption and additional living expenses for residential, mobile home, commercial and auto exposures as of December 31, 2008. Losses include demand surge and fire following earthquake. Policy conditions and earthquake insurance take up rates are based on estimates by state insurance departments and client claims data.

Source: AIR Worldwide Corporation.

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Catastrophe Losses Are Trending Adversely

Top 12 Most Costly Disasters in U.S. History

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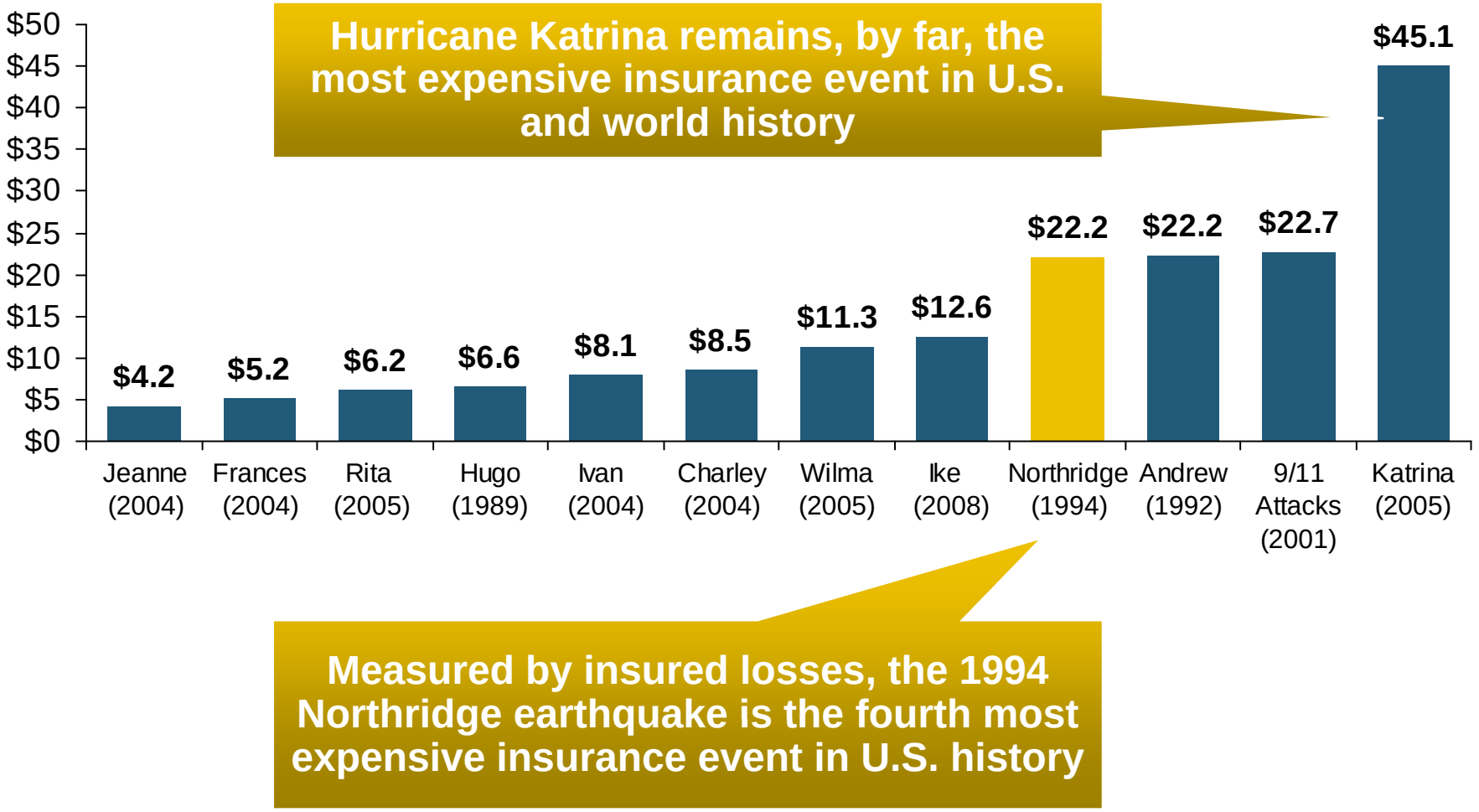
(Insured Losses, 2009, $ Billions)



Sources: PCS; Insurance Information Institute inflation adjustments.

Share of Losses Paid by Reinsurers for Major Catastrophic Events

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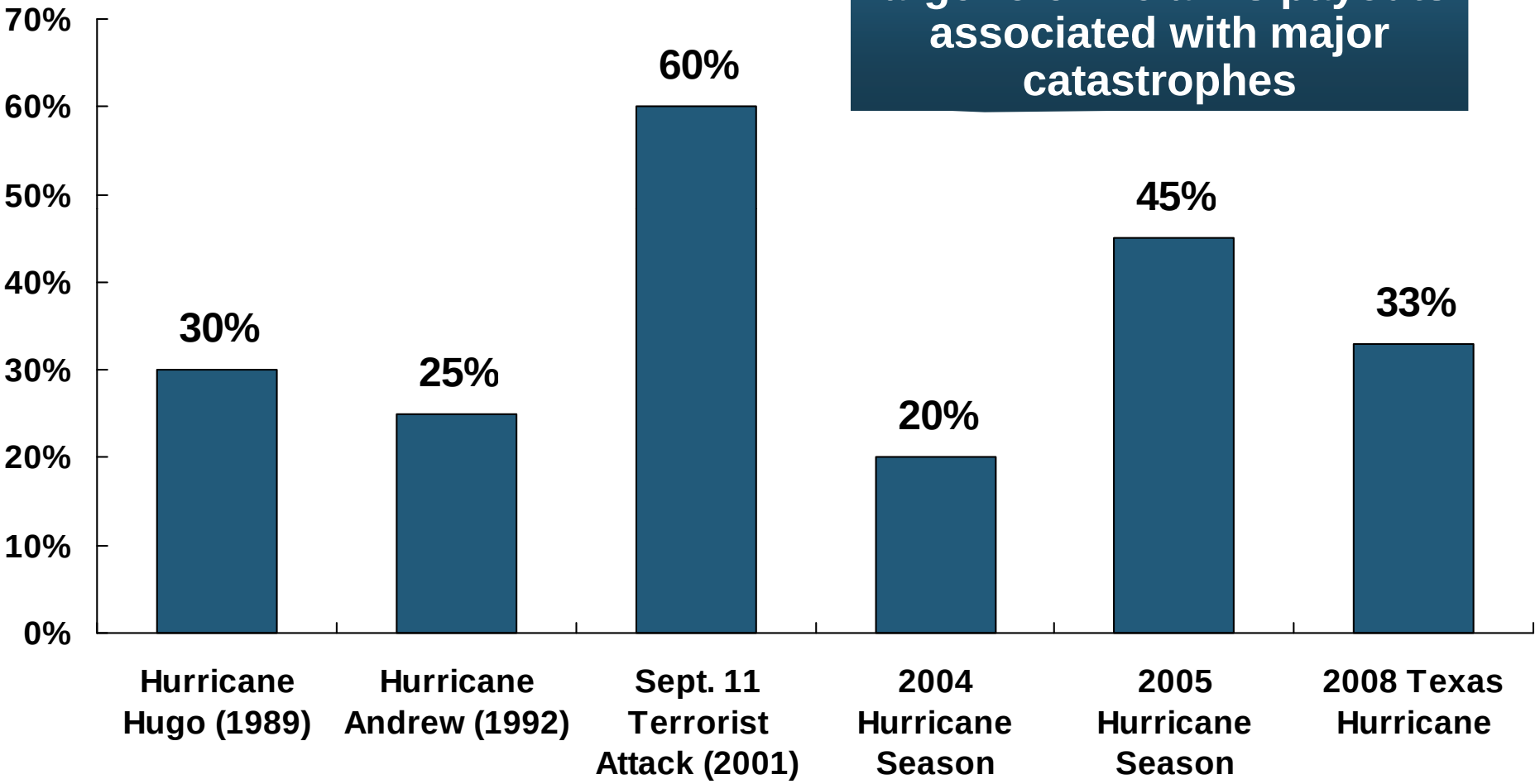
Reinsurance plays a very large role in claims payouts associated with major catastrophes



Source: Wharton Risk Center, Disaster Insurance Project, Renaissance Re, Insurance Information Institute.

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Historical Global Catastrophe Loss Summary and Trends

Losses Have Been Generally Increasing on a Global Scale. Capacity Will Need to Increase if Current Disaster Trends Continue

Significant Natural Catastrophes: 1980 – February 2011

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10 Costliest Events Ordered by Overall Losses

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
25-30.8.2005	Hurricane Katrina	USA: LA, New Orleans, Slidell; MS, Biloxi, Pascagoula, Waveland, Gulfport	125,000	62,200	1,300
17.1.1995	Earthquake	Japan: Hyogo, Kobe, Osaka, Kyoto	100,000	3,000	6,400
12.5.2008	Earthquake	China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an	85,000	300	84,000
17.1.1994	Earthquake	USA: Northridge, Los Angeles, San Fernando Valley, Ventura, Orange	44,000	15,300	60
6-14.9.2008	Hurricane Ike	USA. Cuba. Haiti. Dominican Republic. Turks and Caicos Islands. Bahamas	38,300	18,500	170
May-Sept. 1998	Floods	China: Jangtsekiang, Songhua Jiang	30,700	1,000	4,200
27.2.2010	Earthquake, tsunami	Chile: Bio Bio, Concepción, Talcahuano, Coronel, Dichato, Chillán; Del Maule, Talca, Curicó	30,000	8,000	520
23.10.2004	Earthquake	Japan: Honshu, Niigata, Ojiya, Tokyo, Nagaoka, Yamakoshi	28,000	760	50
23-27.8.1992	Hurricane Andrew	USA: FL, Homestead; LA. Bahamas	26,500	17,000	60
27.6-13.8.1996	Floods	China: Guizhou, esp. Guiyang; Zhejiang; Sichuan; Hunan; Anhui; Jiangxi; Hubei; Guangxi; Jiangsu	24,000	445	3,050

Significant Natural Catastrophes: 1980 – February 2011

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10 Costliest Events Ordered by Insured Losses

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
25-30.8.2005	Hurricane Katrina	USA: LA, New Orleans, Slidell; MS, Biloxi, Pascagoula, Waveland, Gulfport	125,000	62,200	1,300
6-14.9.2008	Hurricane Ike	USA. Cuba. Haiti. Dominican Republic. Turks and Caicos Islands. Bahamas	38,300	18,500	170
23-27.8.1992	Hurricane Andrew	USA: FL, Homestead; LA. Bahamas	26,500	17,000	60
17.1.1994	Earthquake	USA: Northridge, Los Angeles, San Fernando Valley, Ventura, Orange	44,000	15,300	60
7-21.9.2004	Hurricane Ivan	USA. Trinidad and Tobago. Venezuela. Colombia. Mexico	23,000	13,800	130
19-24.10.2005	Hurricane Wilma	USA. Bahamas. Cuba. Haiti. Jamaica. Mexico	22,000	12,500	40
20-24.9.2005	Hurricane Rita	USA: LA, Lake Charles, Holly Beach, Cameron, New Orleans; MS; TX, Houston	16,000	12,100	10
22.2.2011	Earthquake	New Zealand: Christchurch	20,000*	10,000*	>150
27.2.2010	Earthquake, tsunami	Chile: Bio Bio, Concepción, Talcahuano, Coronel, Dichato, Chillán; Del Maule, Talca, Curicó	30,000	8,000	520
11-14.8.2004	Hurricane Charley	USA. Cuba. Jamaica. Cayman Islands	18,000	8,000	40

*loss estimation still in progress

Significant Natural Catastrophes: 1980 – February 2011

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10 Deadliest Events Worldwide

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
12.1.2010	Earthquake	Haiti: Port-au-Prince, Petionville	8,000	200	222,570
26.12.2004	Earthquake, tsunami	Sri Lanka. Indonesia. Thailand. India. Bangladesh. Myanmar. Maldives. Malaysia	10,000	1,000	220,000
2-5.5.2008	Cyclon Nargis	Myanmar: Ayeyawaddy, Yangon, Bugalay, Irrawaddy, Bago, Karen, Mon, Laputta, Haing Kyi	4,000		140,000
29-30.4.1991	Tropical cyclon	Bangladesh: Bay of Bengal, Cox's Bazar, Chittagong, Bola, Noakhali districts, esp. Kutubdia	3,000	100	139,000
8.10.2005	Earthquake	Pakistan. India. Afghanistan	5,200	5	88,000
12.5.2008	Earthquake	China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an	85,000	300	84,000
July-August 2003	Heatwave, drought	France. Germany. Italy. Portugal. Romania. Spain. United Kingdom	13,800	20	70,000
July-Sept. 2010	Heatwave, drought	Russia	2,000	20	56,000
21.6.1990	Earthquake	Iran: Caspian Sea, Gilan Provinz, Manjil, Rudbar, Zanjan, Safid, Qazvin	7,100	100	40,000
8-19.12.1999	Floods, flash floods	Venezuela: Vargas, La Guaira Punta de Mulatos, Miranda, Nueva Esparta, Yaracuy. Colombia	3,200	220	30,000

Natural Catastrophes Worldwide, 1980 – 2010 (Number of events with trend)

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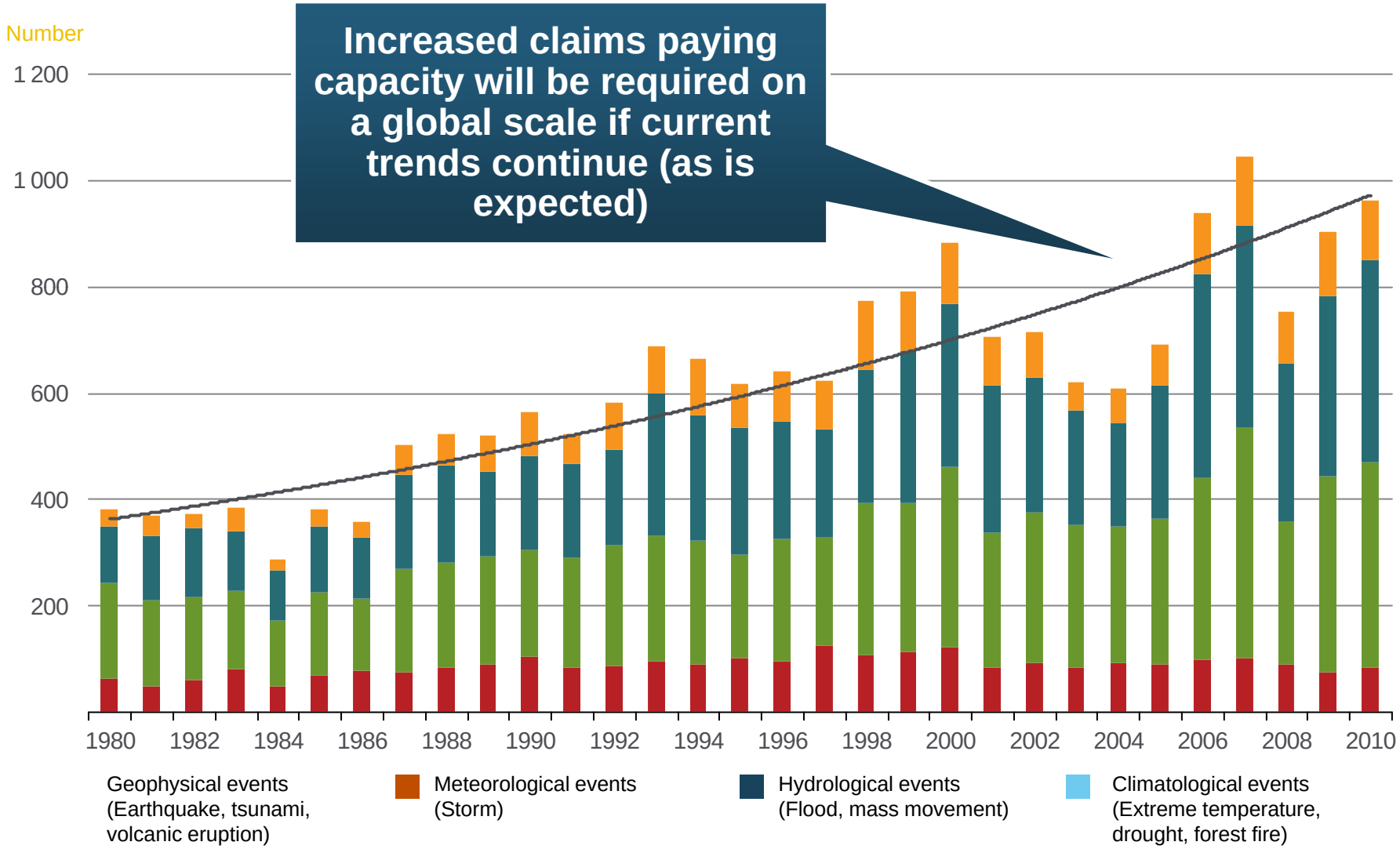

Source: Geo Risks Research, NatCatSERVICE.

Natural Catastrophes, 2010

Overview and comparison with previous years

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	2010	2009	Average of the last 10 years 2000-2009	Average of the last 30 years 1980-2009
Number of events	**950**	900	785	615
Overall losses (US$m)	**130,000**	60,000	110,000	95,000
Insured losses (US$m)	**37,000**	22,000	35,000	23,000
Fatalities	**295,000**	11,000	77,000	66,000

The number and cost of natural catastrophes on a global scale was far above average in 2010

Source: Geo Risks Research, NatCatSERVICE.

Natural Catastrophes, 2010
950 loss events

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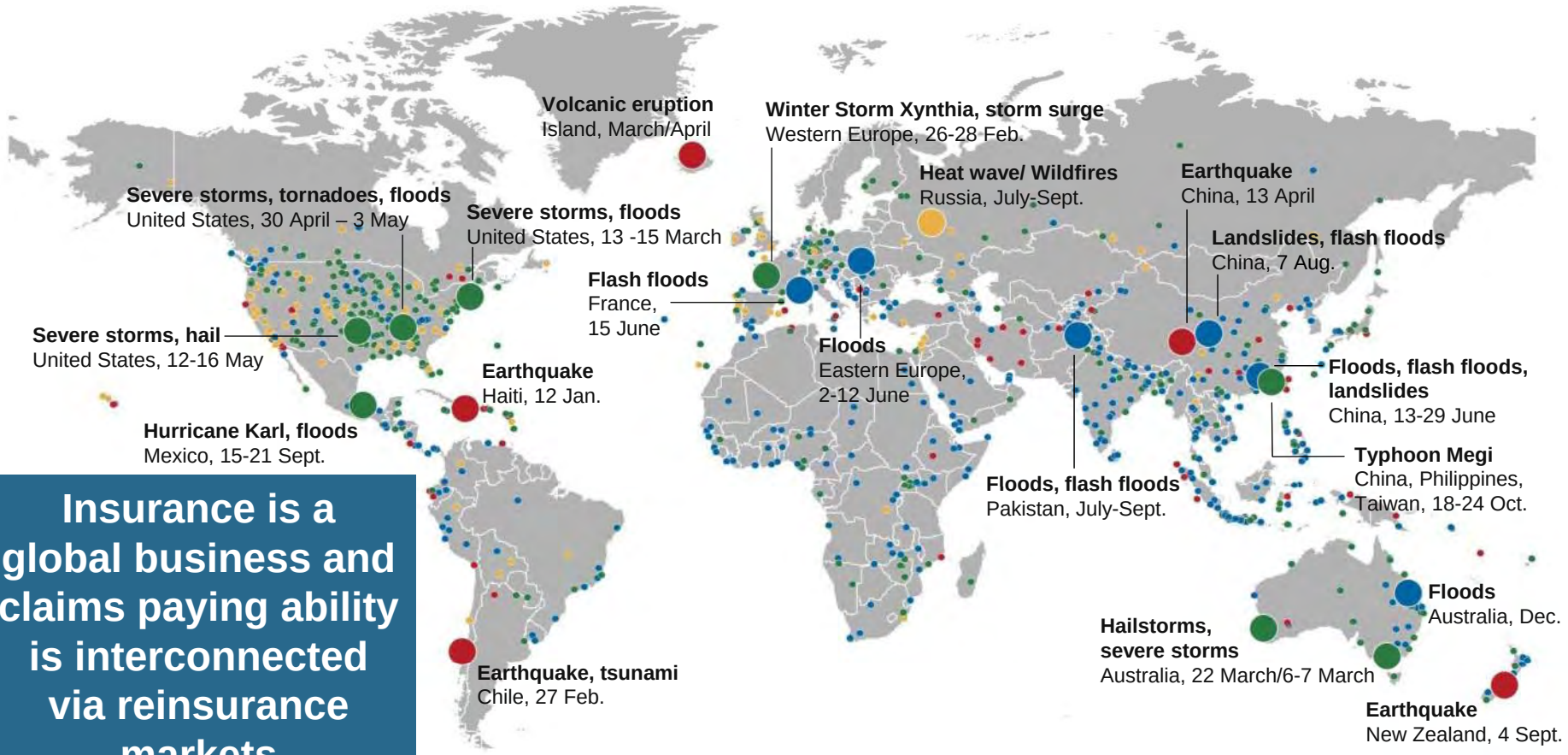

Insurance is a global business and claims paying ability is interconnected via reinsurance markets

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

Source: Geo Risks Research, NatCatSERVIC.E

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