

# Structure effective P&C reinsurance/retrocession program in a hardening market

September 10, 2021

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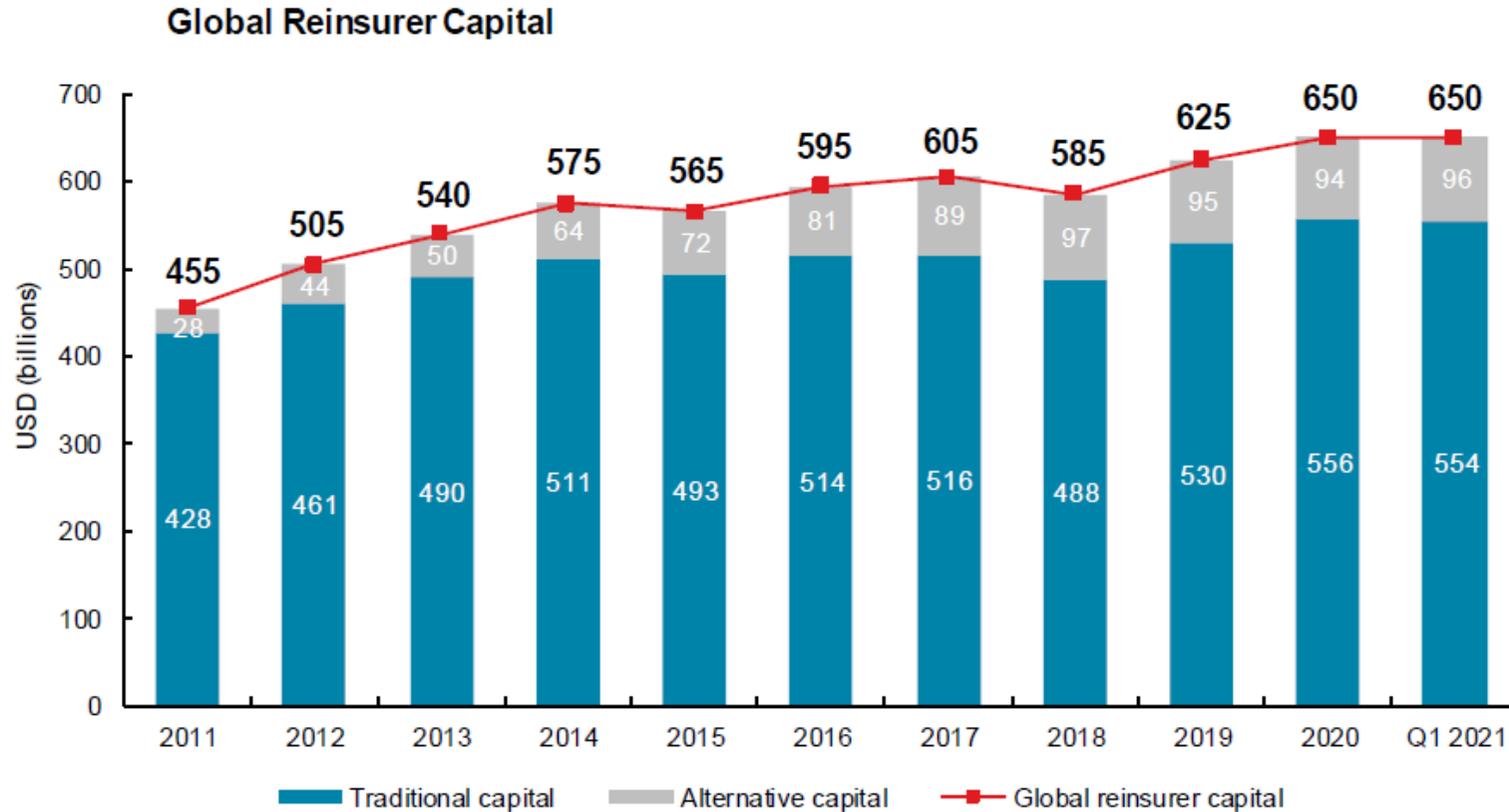
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- 2 Review of recent CAT losses by perils
- 3 Climate change on Catastrophe losses
- 4 Responses to climate changes
- 5 Comparison of different reinsurance/retrocession options and considerations in structuring effective reinsurance/retro program

# Section 1

## Overview of reinsurance market

# Global Reinsurer Capital

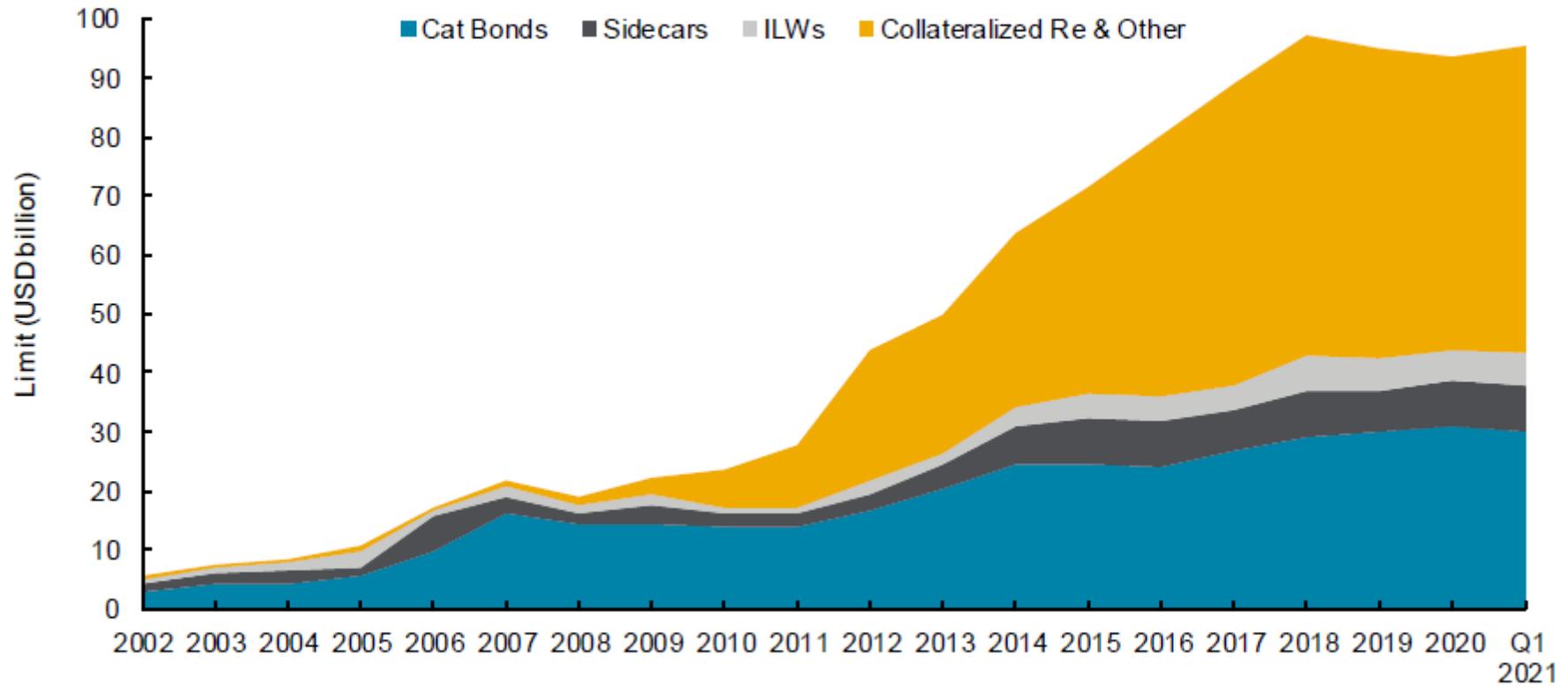


Sources: Company financial statements / Aon Business Intelligence / Aon Securities Inc.

- The 2019/2020 year-on-year increase of 4% was heavily influenced by depreciation of the US dollar in the fourth quarter, particularly against the Euro (the reporting currency of several large reinsurers). At constant exchange rates, underlying growth was around 1%

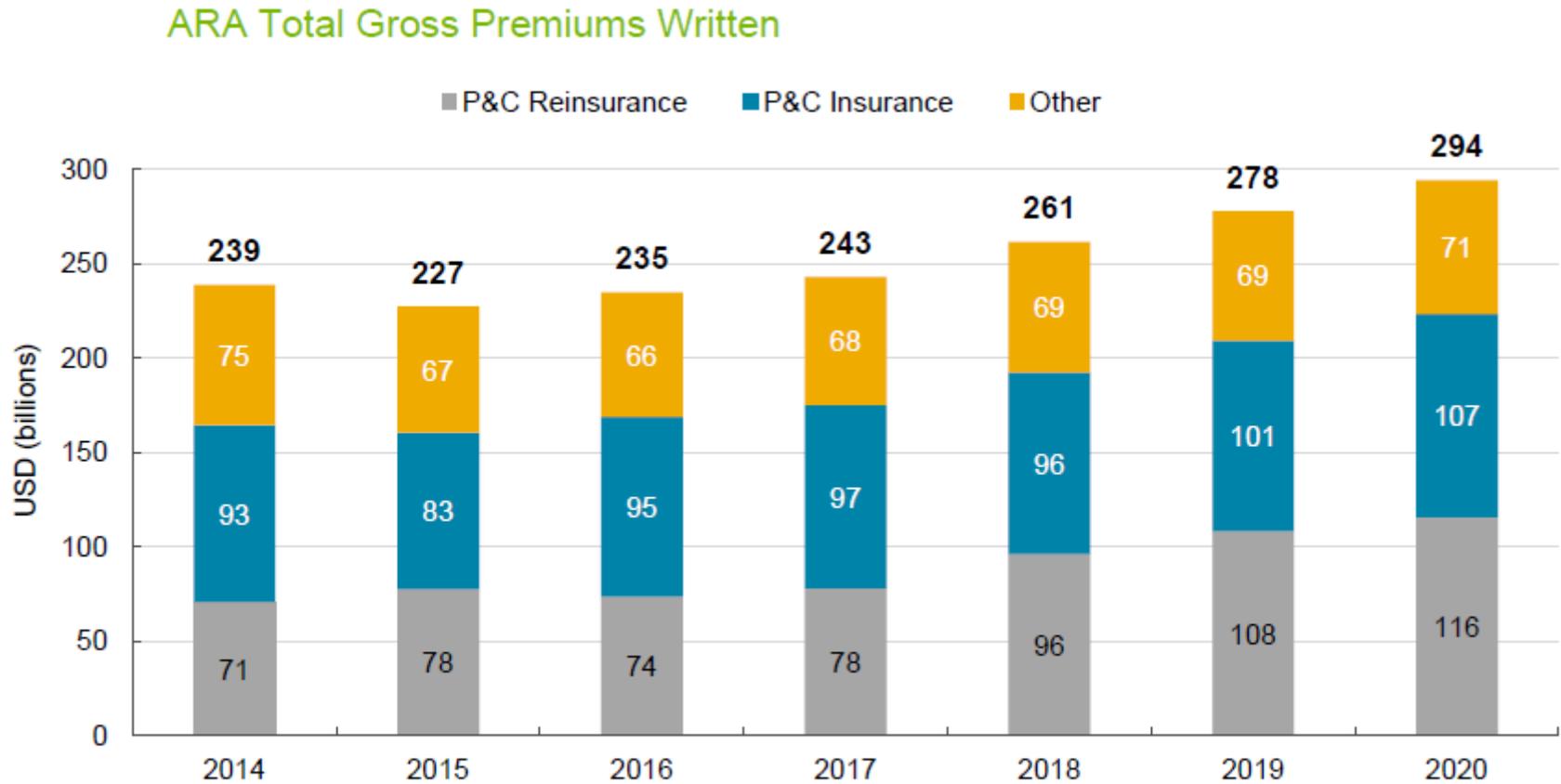
# Alternative Capital

## Alternative Capital Deployment



Source: Aon Securities Inc.

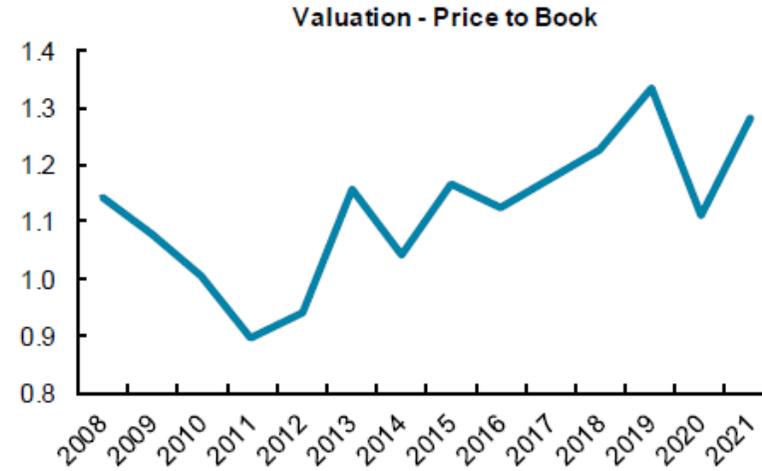
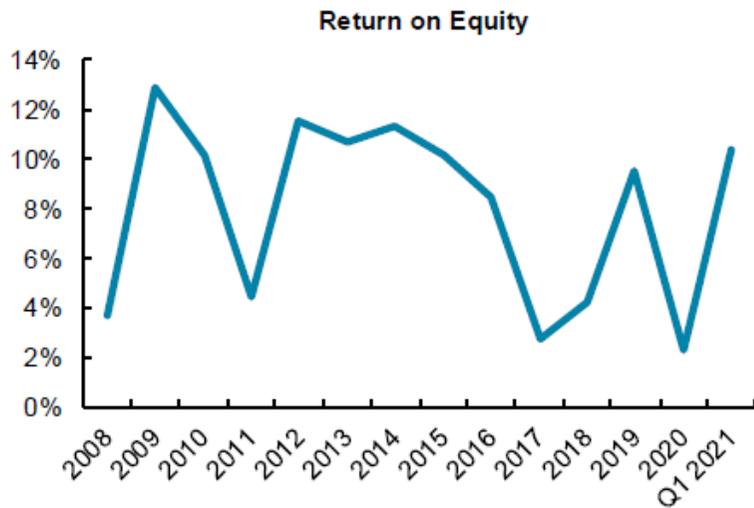
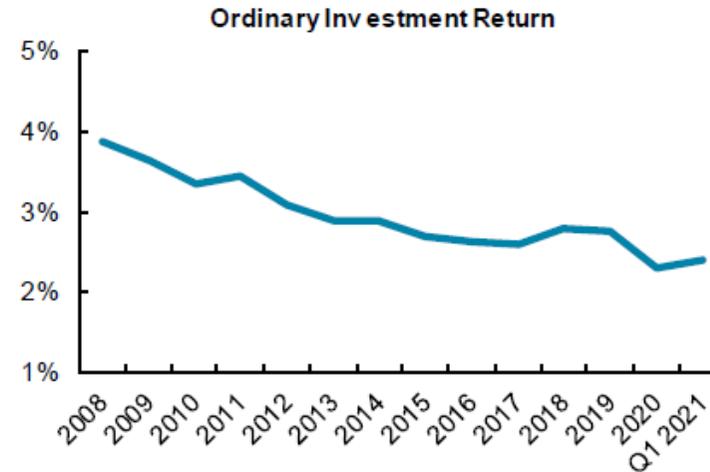
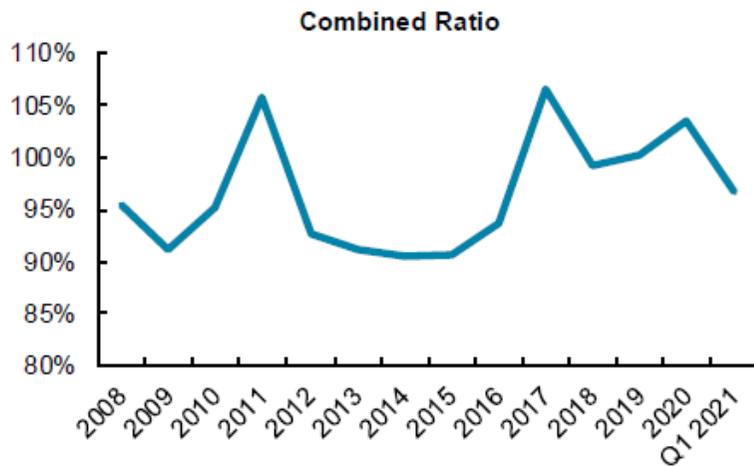
# ARA Total Gross Premiums Written



Source: Aon / company reports

# Global Reinsurer Performance

## Reinsurer Results\*

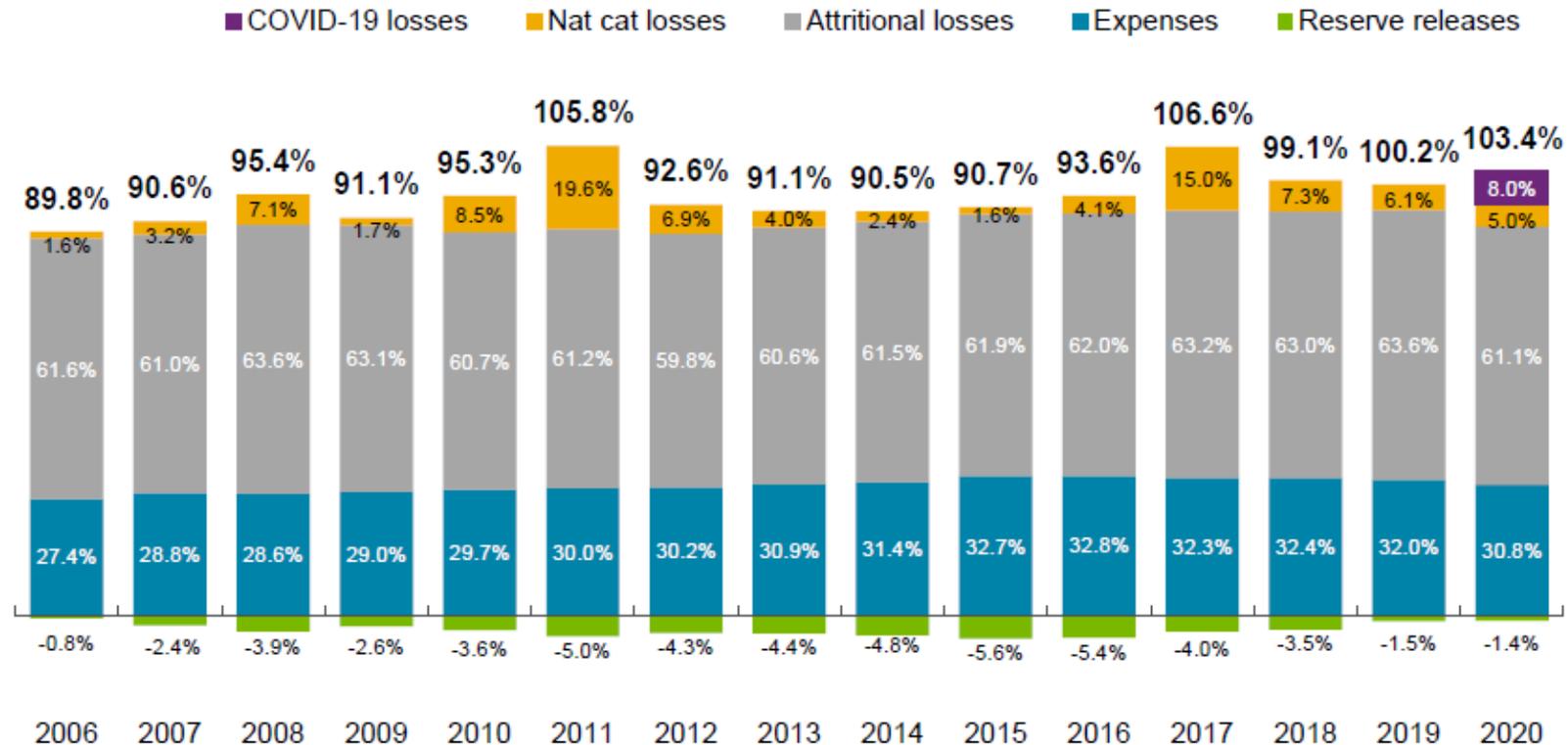


Source: Company financial statements / Aon's Business Intelligence

\* Based on Aon's Reinsurance Aggregate

# ARA P&C Net Combined Ratio

## ARA Net Combined Ratio



Source: Aon / company reports

The ARA net combined ratio stood at 103.4% in 2020.

COVID-19 related losses were booked at \$14.0bn, contributing 8.0pp.

Disclosed natural catastrophe losses of \$8.7bn added another 5.0pp, which was some way below the five- and ten-year averages of just over 7pp.

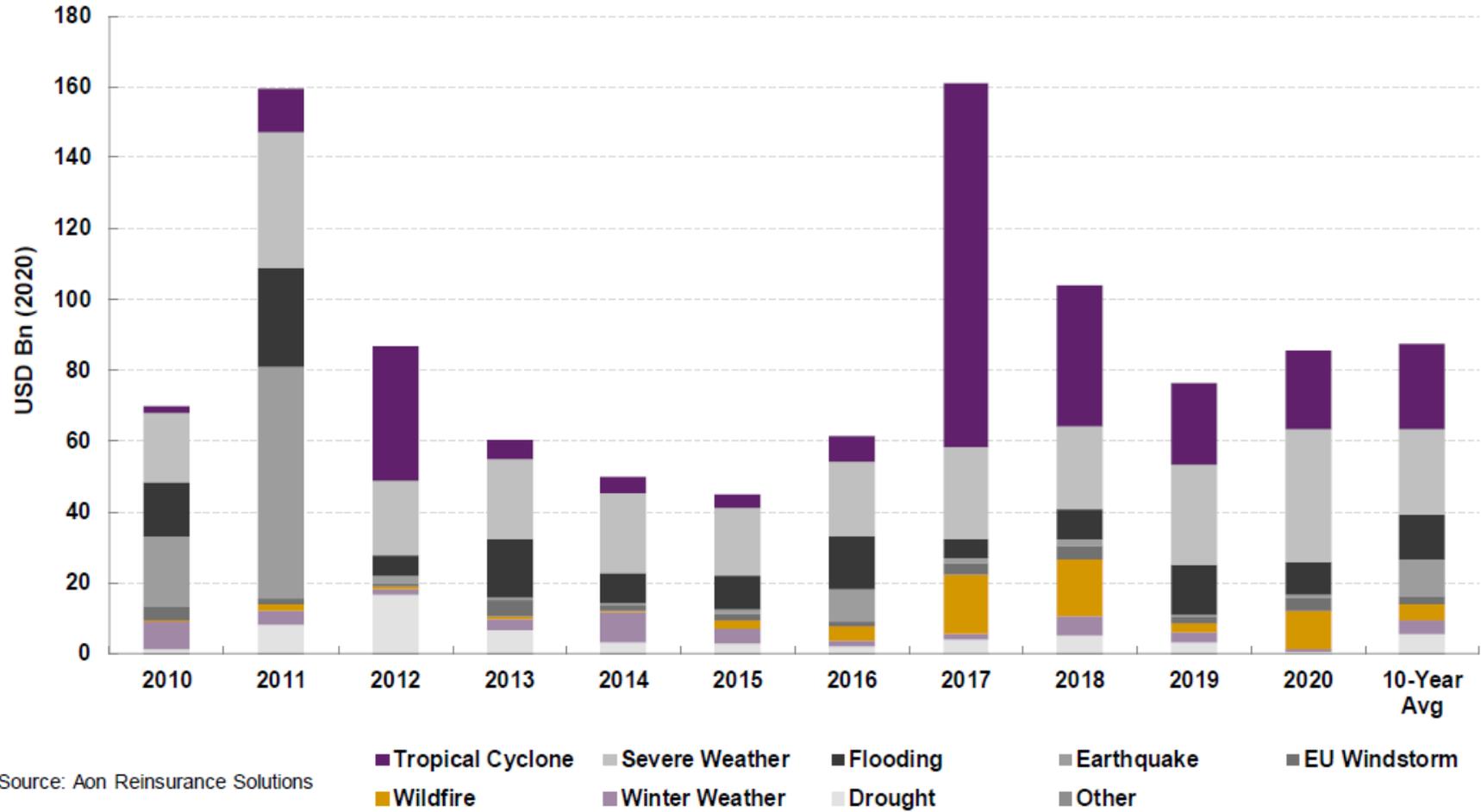
Development of prior year reserves remains favorable overall

## Section 2

### Recent CAT losses by perils

# Insured CAT losses

Insured Losses by Year by Type



Source: Aon Reinsurance Solutions

# Summary of 2020



**1,922**

fatalities during the India monsoon season; deadliest disaster of 2020

**\$35B**



Cost of China's monsoon season in the worst Yangtze River Basin floods since 1998

**M5.3**



Magnitude of the destructive earthquake in Croatia on March 22

**195 mph**  
(315 kph)



Wind speed of Typhoon Goni at landfall in the Philippines; strongest landfalling storm ever recorded globally

**140 mph**  
(220 kph)

Estimated wind gusts during the August 10 Midwest derecho in Cedar Rapids, Iowa

**30%**

Portion of South America's Pantanal Region that burned due to wildfires in 2020



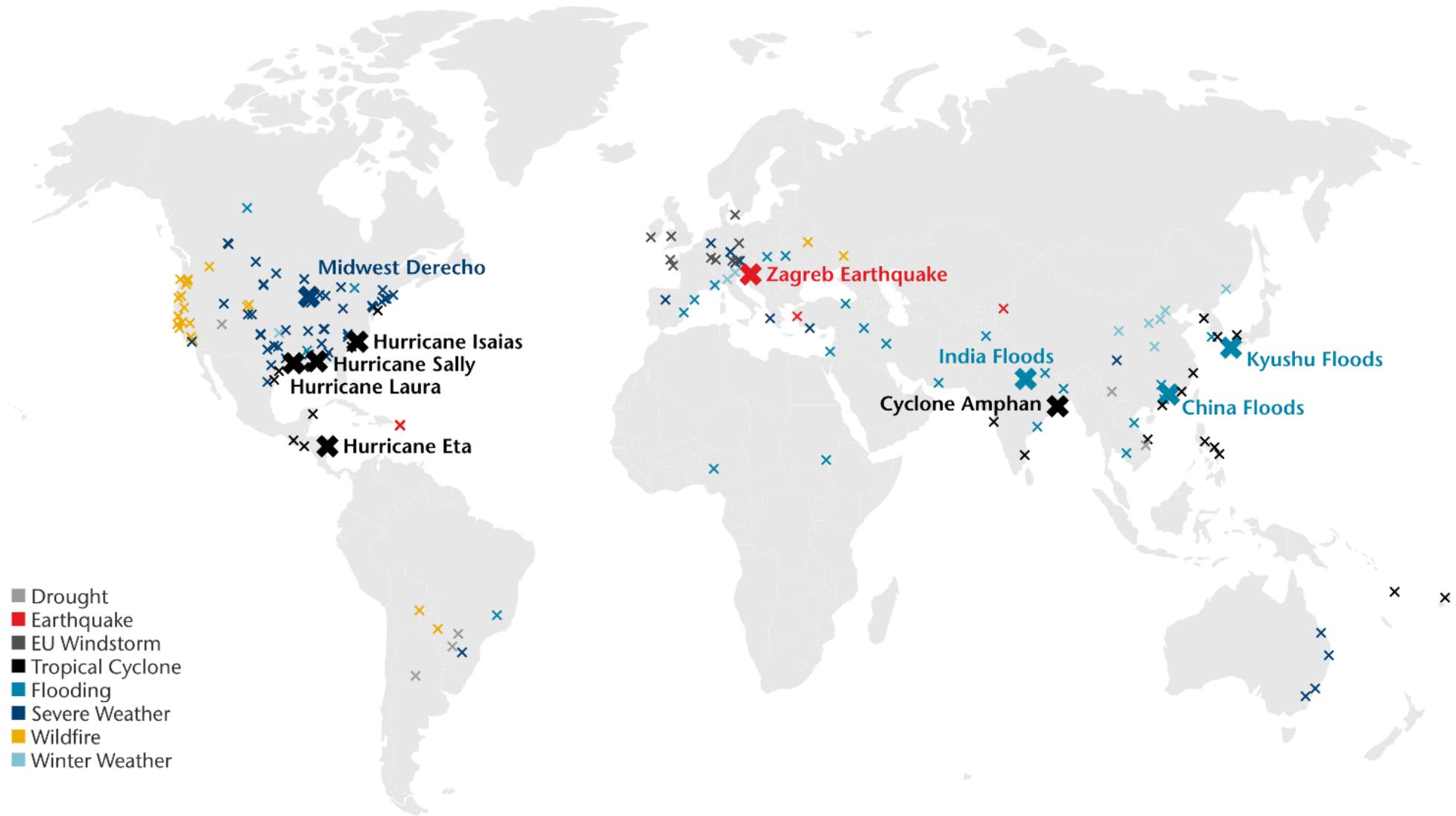
**38.0°C /  
100.4°F**

Hottest temperature ever recorded above the Arctic Circle; June 20 at Verkhoyansk, Russia

**+0.98°C  
(+1.76°F)**

Above the 20<sup>th</sup> Century Average Per NOAA: World's second-warmest year on record for land and ocean temperatures dating to 1880

# Significant 2020 Economic Loss Events



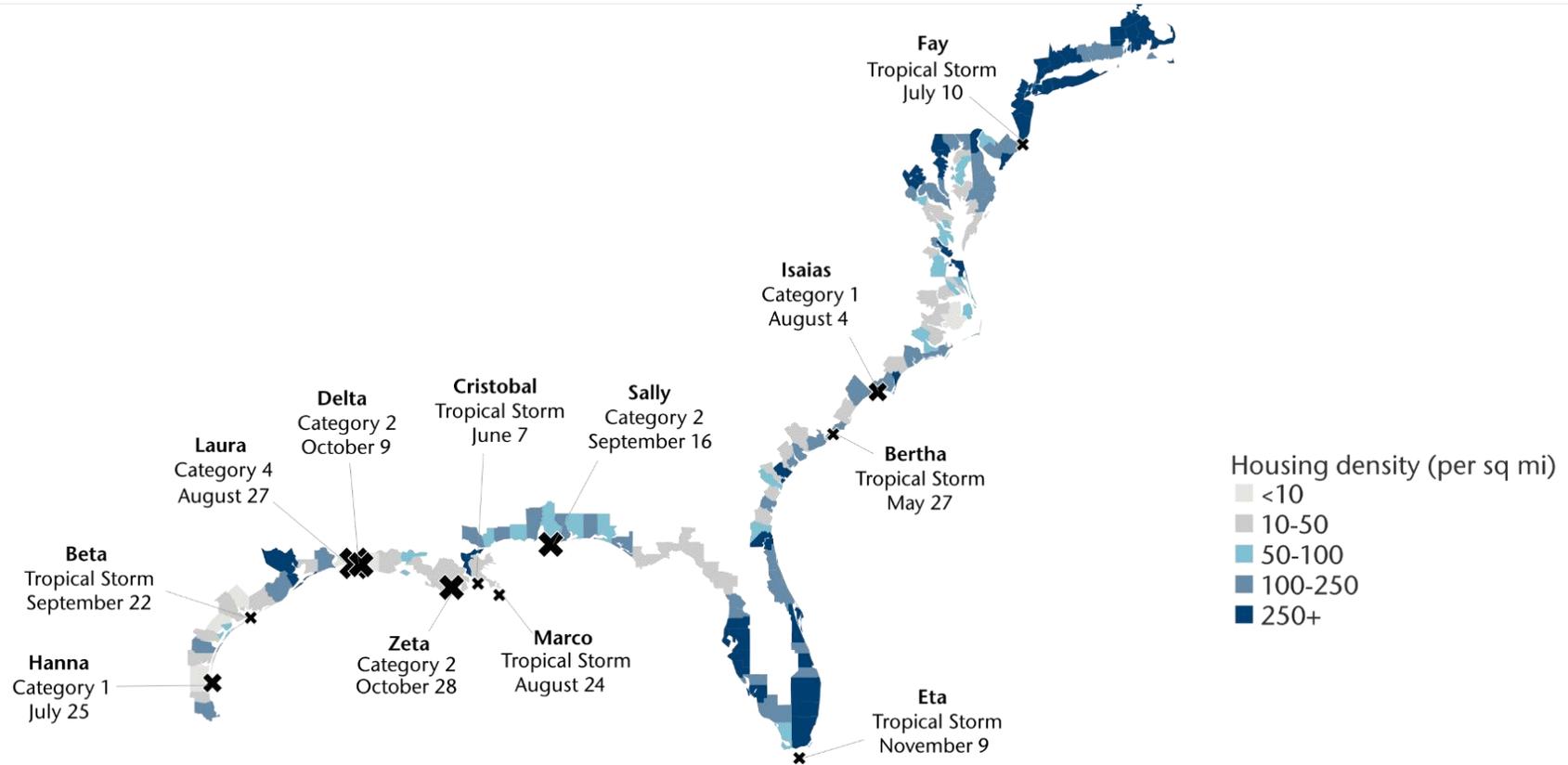
# Top 10 Global Economic Loss Events in 2020

Date(s)	Event	Location	Deaths	Economic Loss (USD billion)	Insured Loss (USD billion)
June-September	Seasonal Floods	China	280	35.0	2.0
August 21-29	Hurricane Laura	U.S., Caribbean	68	18.2	10.0
May 15-21	Cyclone Amphan	South Asia	133	15.0	0.5
August 8-12	SCS (incl. Midwest Derecho)	United States	4	12.6	8.3
July 3-15	Kyushu Floods	Japan	82	8.5	2.0
November 2-13	Hurricane Eta	Caribbean, U.S.	309	8.3	0.7
June-September	Seasonal Floods	India	1,922	7.5	0.8
September 14-18	Hurricane Sally	United States	0	7.0	3.5
March 22	Zagreb Earthquake	Croatia	2	6.1	0.1
July 30-August 5	Hurricane Isaias	U.S., Caribbean, Canada	18	5.0	2.7
All other events				145 billion	66 billion
<b>Totals</b>				<b>268 billion</b>	<b>97 billion</b>

## 2020 Global Tropical Cyclone Activity by Basin

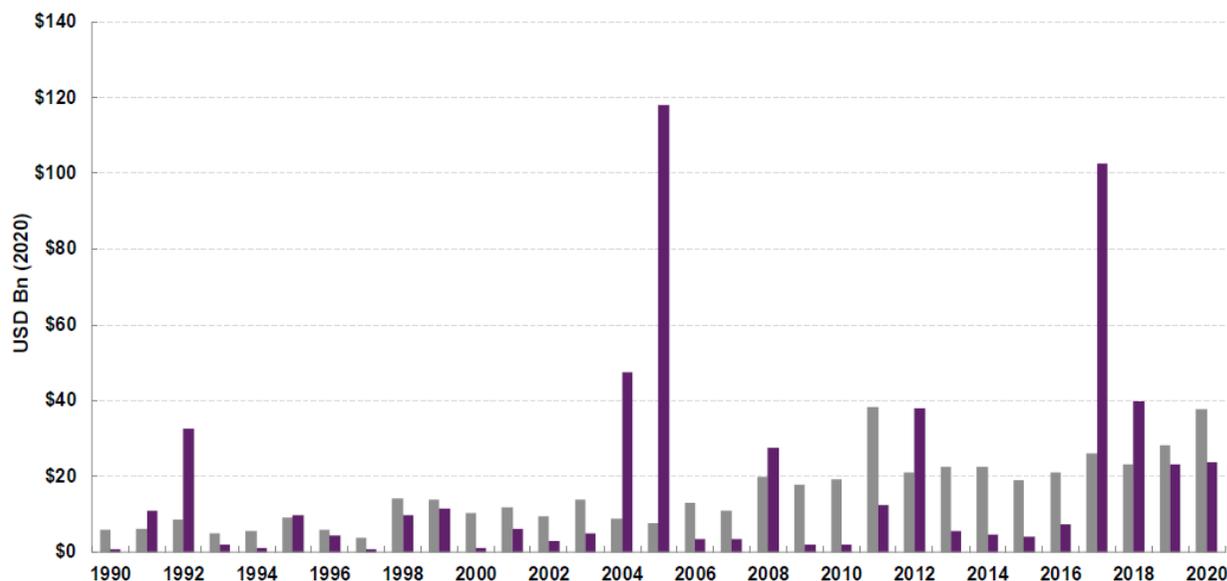
Basin	Named Storms		Hurricanes		Major Hurricanes	
	2020	Climo	2020	Climo	2020	Climo
Atlantic	30	12.1	13	6.4	6	2.7
East Pacific	16	16.7	4	8.9	3	4.3
West Pacific	23	25.9	12	16.7	6	8.9
North Indian	5	4.9	4	1.5	2	0.7
Northern Hemisphere	74	59.5	33	33.6	17	16.6
South Pacific	10	9.7	5	5.0	1	2.3
South Indian	17	16.2	9	8.7	3	4.5
Southern Hemisphere	27	26.0	14	13.7	4	6.8
<b>Global</b>	<b>101</b>	<b>85.6</b>	<b>47</b>	<b>47.3</b>	<b>21</b>	<b>23.4</b>

# 2020 U.S. Tropical Cyclone Landfalls & Housing Unit Density by County



# Severe Convective Storm vs Tropical Cyclone

Annual Global Severe Convective Storm & Tropical Cyclone Insured Losses

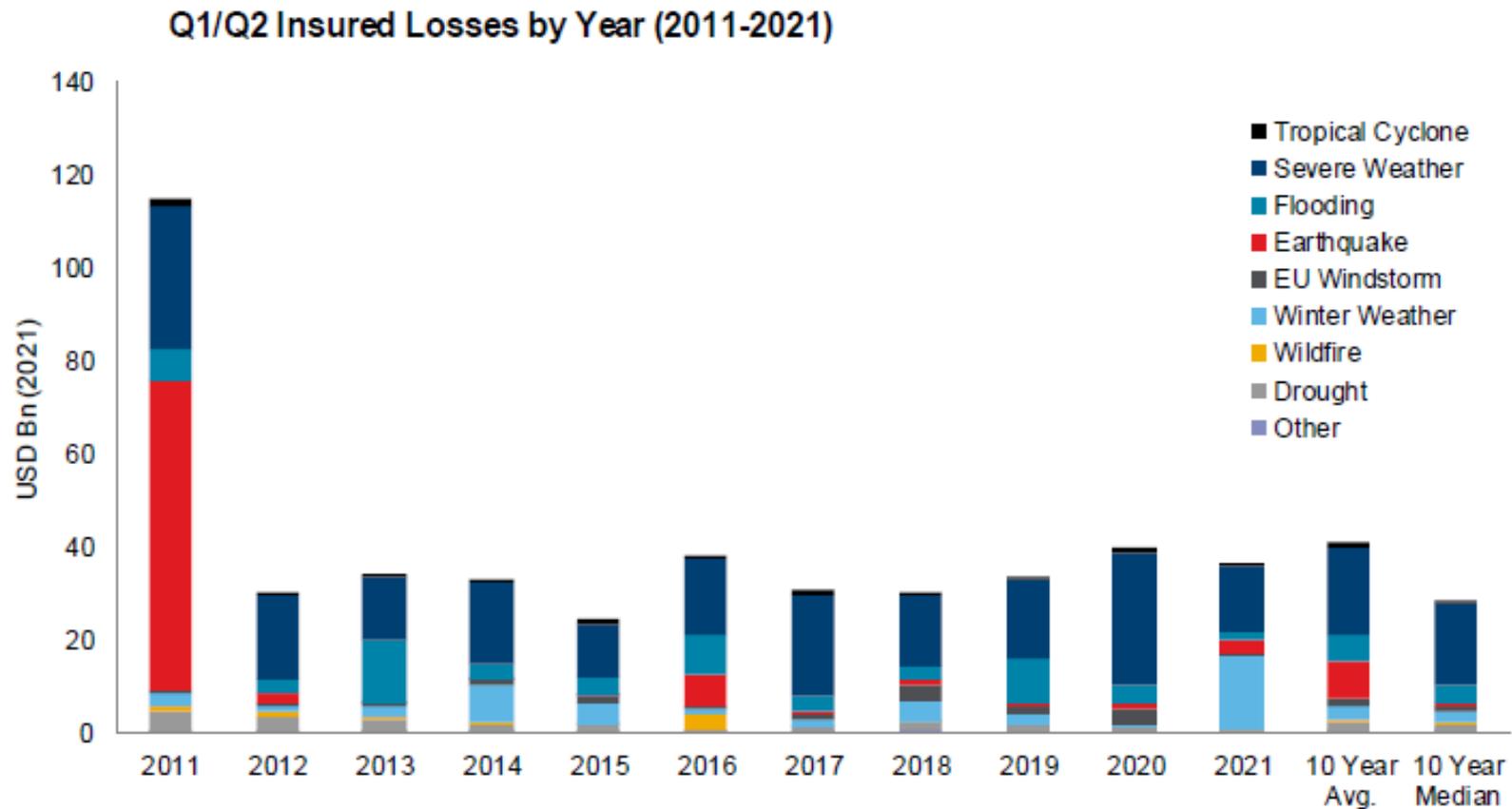


Source: Aon Reinsurance Solutions

■ Severe Convective Storm ■ Tropical Cyclone

- Severe convective storm and tropical cyclone had the greatest losses and highest costs in 2020, indicative of an ongoing trend.
- SCS has been a higher loss year than tropical cyclone for the re/insurance industry in 22 of 31 years since 1990.
- Tropical cyclone payouts tend to show tremendous volatility on an annual basis. Major spikes in years such as 2004, 2005, and 2017 skew the mid- and long-term averages for the peril, since the highest tropical cyclone years are higher than those of SCS, but it masks the underlying fact that SCS has much more annual consistency

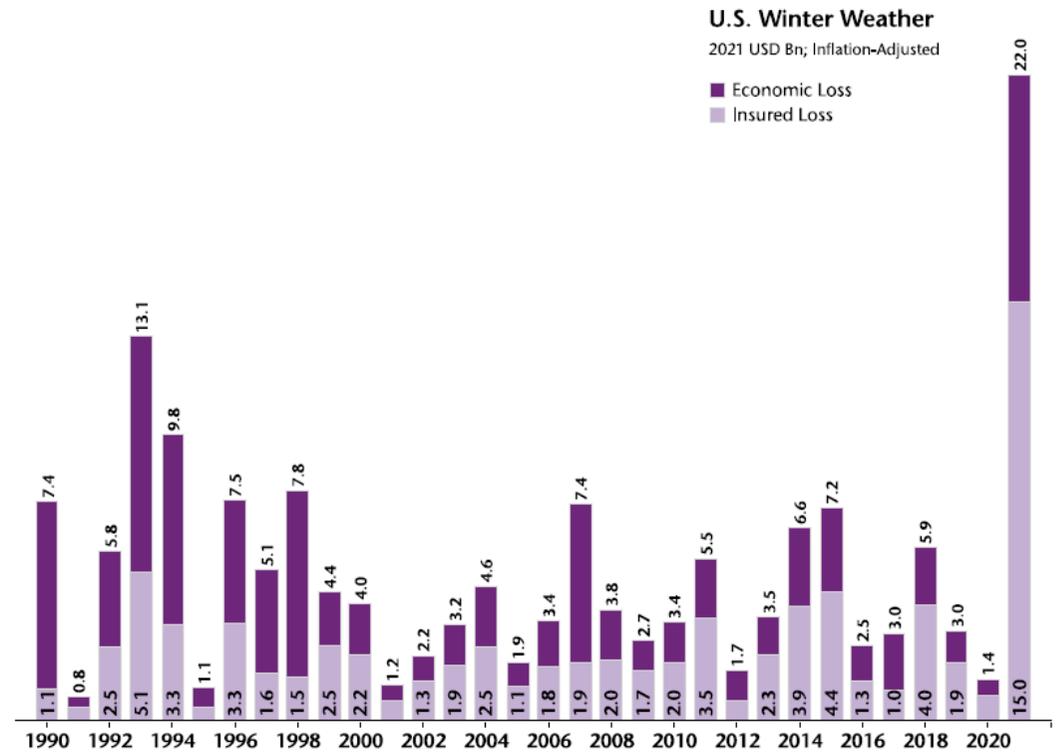
# Half-year insured CAT losses



Source: Aon's Reinsurance Solutions

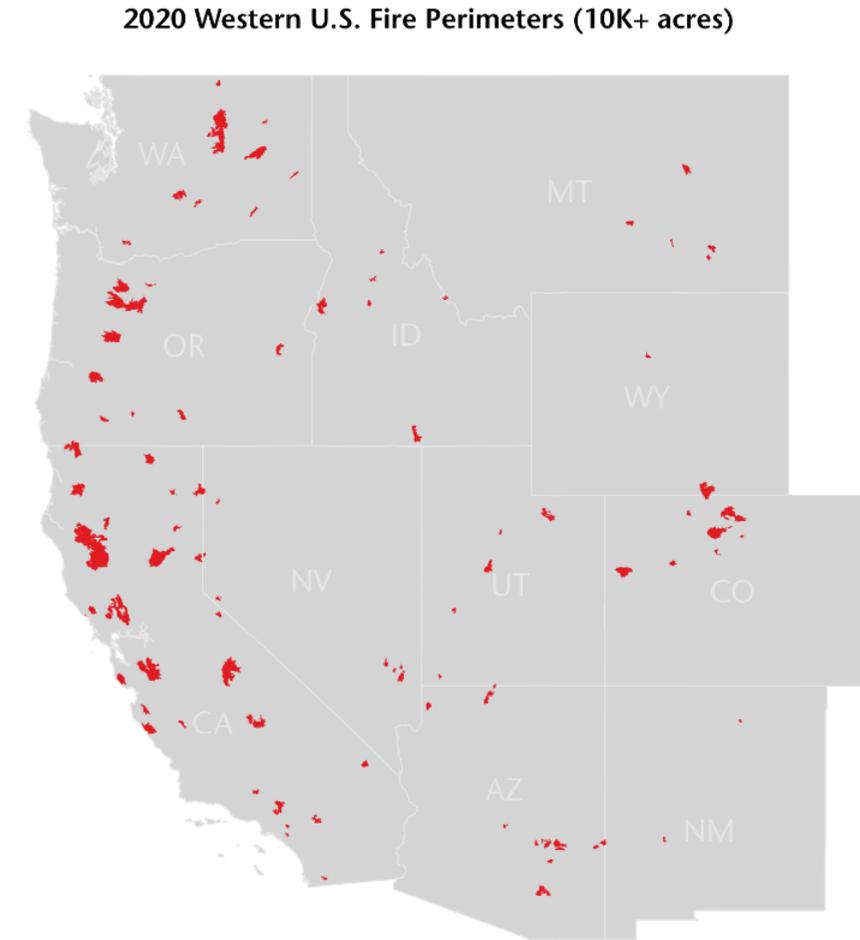
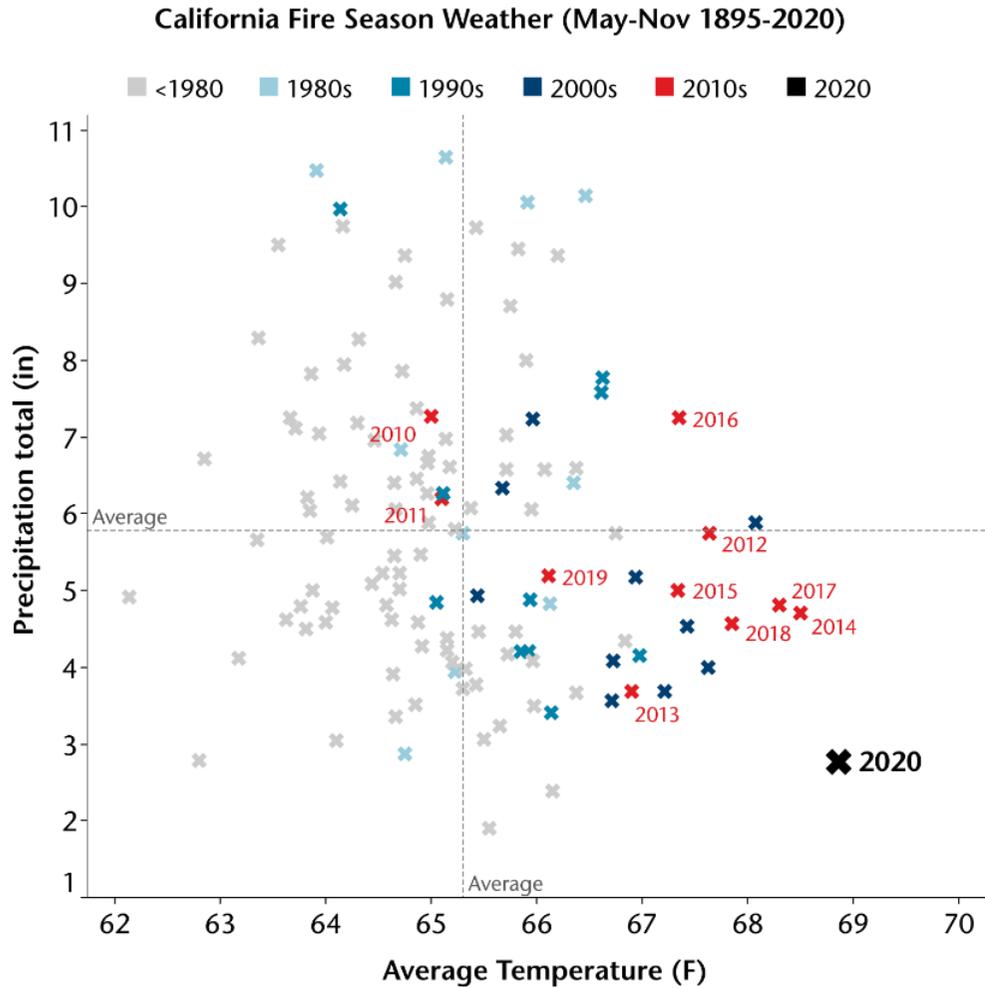
# 2021 February winter events in the United States

- Insured losses will approach USD15 billion, most expensive period of winter storm losses for the insurance industry on record.
- It has far surpassed the USD3.7 billion incurred during the March 1993 “Storm of the Century”.
- Most publicly available modeled insured loss estimates for the state of Texas were at most a 1-in-1,000 year, or 0.1 percent exceedance probability event.
- “Hurricane-level” of insurance claims filed in Texas (nearly 600,000), which is in the ballpark of the 700,000+ claims which were filed following Hurricane Harvey in 2017.

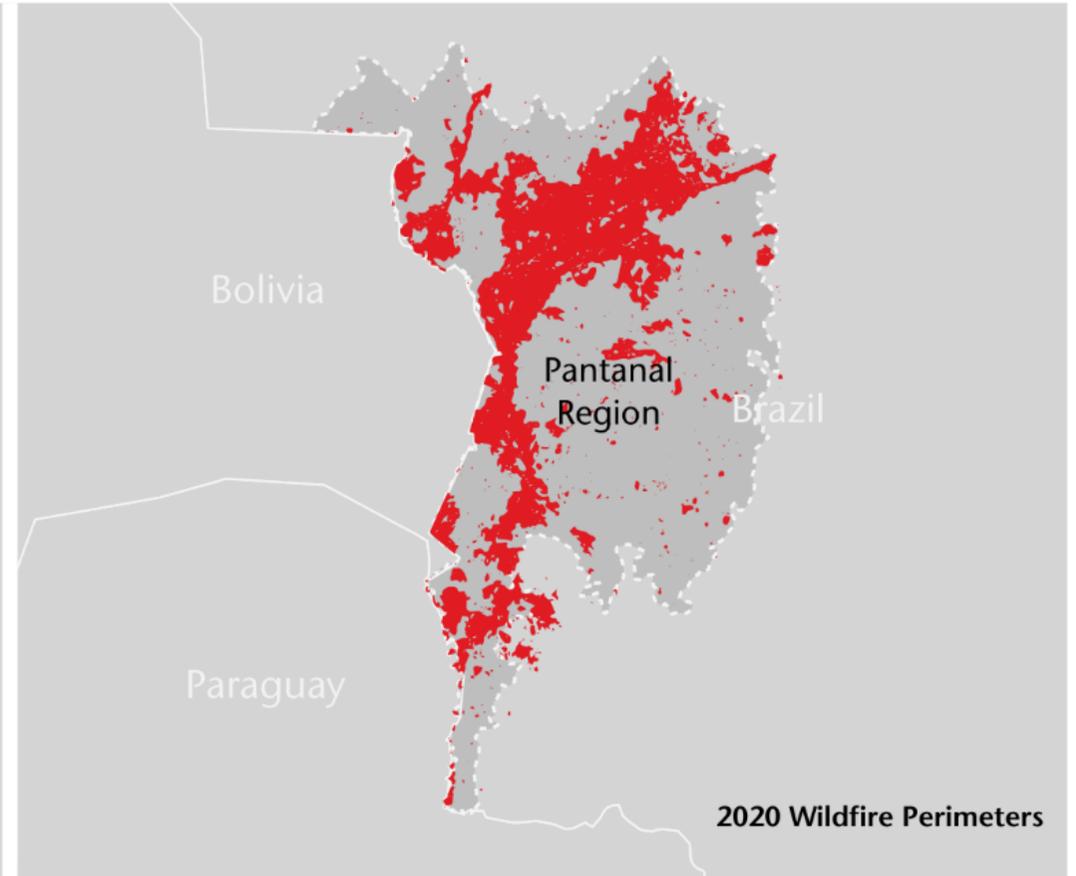
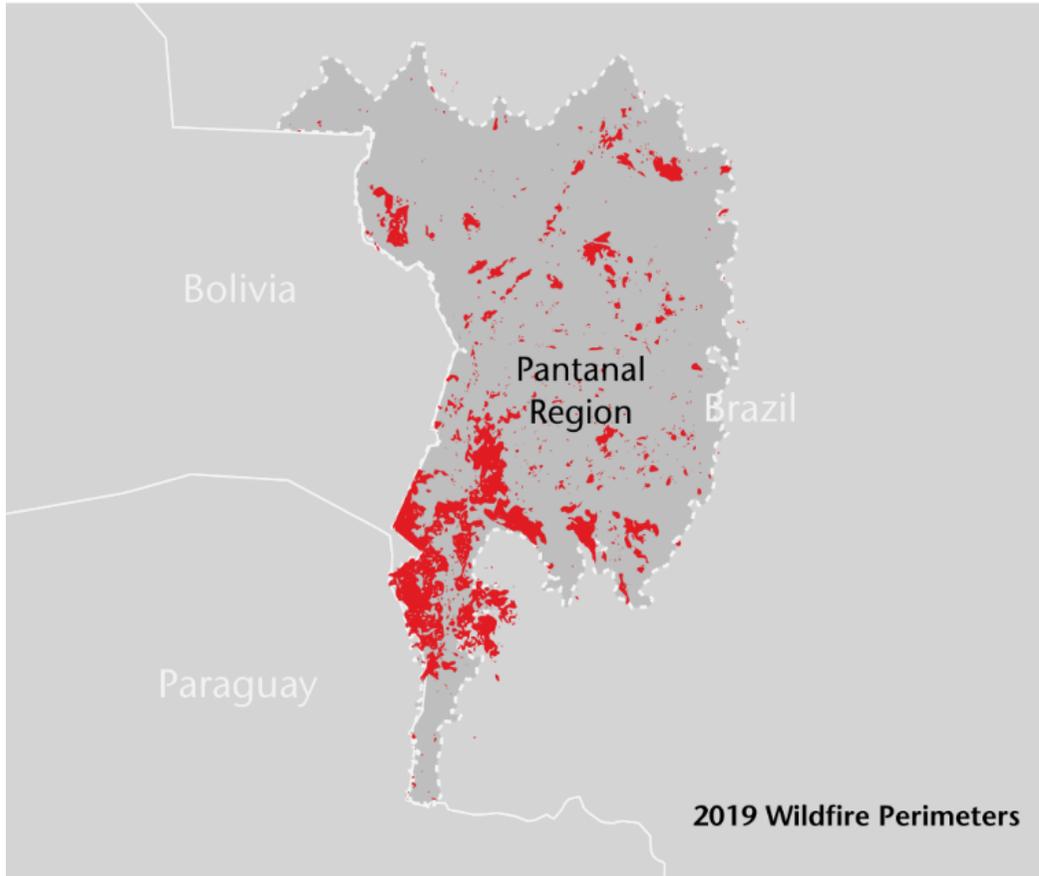


Data & Graphic: Aon (Catastrophe Insight)

# California Fire Season Weather



# Brazil Pantanal Region Wildfire Perimeters



# 2021 Western & Central Europe Floods

## MINIMUM NUMBER OF BUILDINGS FLOODED BY COUNTRY



- The German Weather Service (Deutscher Wetterdienst (DWD)) indicated that many areas of western Germany saw rainfall rates that exceeded a 1-in-100-year return period. DWD cited that some areas may have recorded rains with a 1-in-1,000-year return period.
- While climate change was not the direct cause of this event, it is another example of how more unusual heavy precipitation occurrences or stalled weather patterns are becoming more commonplace in a warming world
- For every 1°C (1.8°F) increase in warming, the atmosphere can absorb another 7 percent of moisture, which in turn can drop to the surface as measurable precipitation.
- As temperatures warm, this acts as an accelerant to the evaporation process – often over the oceans or other large bodies of water – which then places more water / moisture into the atmosphere. This evolving precipitation life cycle has resulted in heavier rainfall events all around the world.

## Section 3

# Climate change on Catastrophe losses

# Monthly temperature and precipitation records broken or tied in 2020

Monthly precipitation records



Monthly temperature records



# First Name Storm Formation in the Atlantic Ocean

## First Name Storm Formation in the Atlantic Ocean (1965-2021)

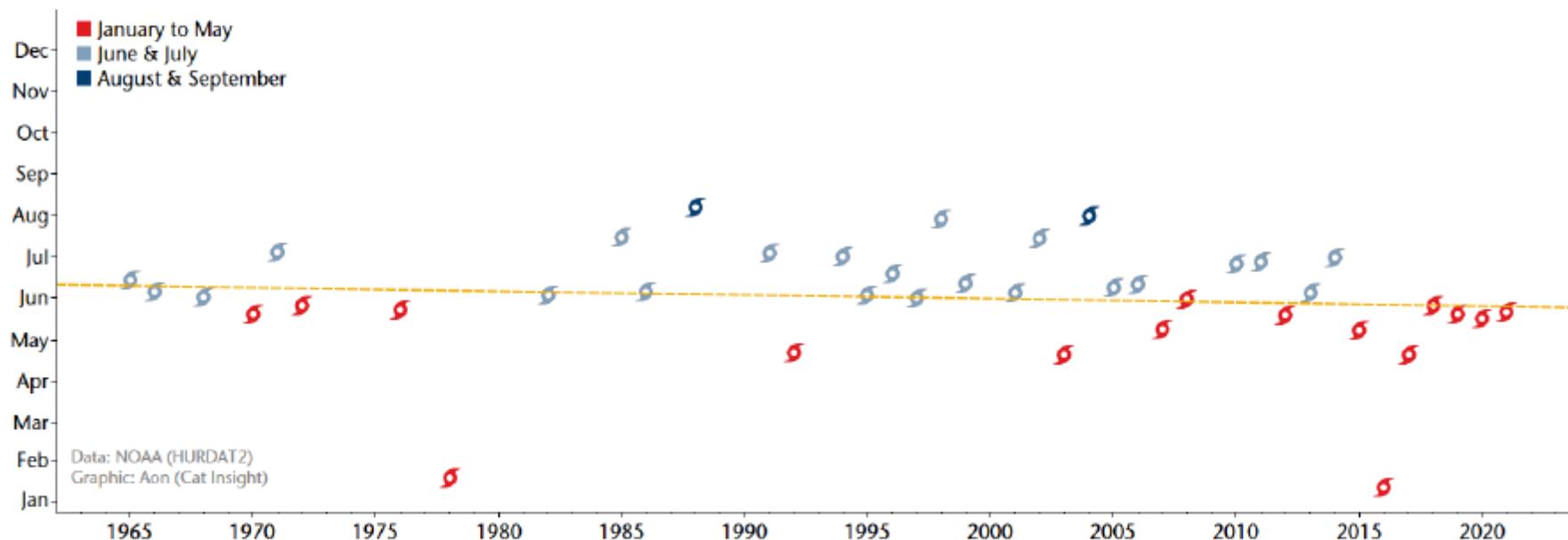
### First Named Storm Formation Atlantic Ocean: Satellite Era\* (1965-2021)

\*Highest quality data is in the Satellite Era, which began in the 1960s. This has since allowed for much improved storm detection.

Number of Pre-June 1  
First Named Storms

**6**  
1965-2000

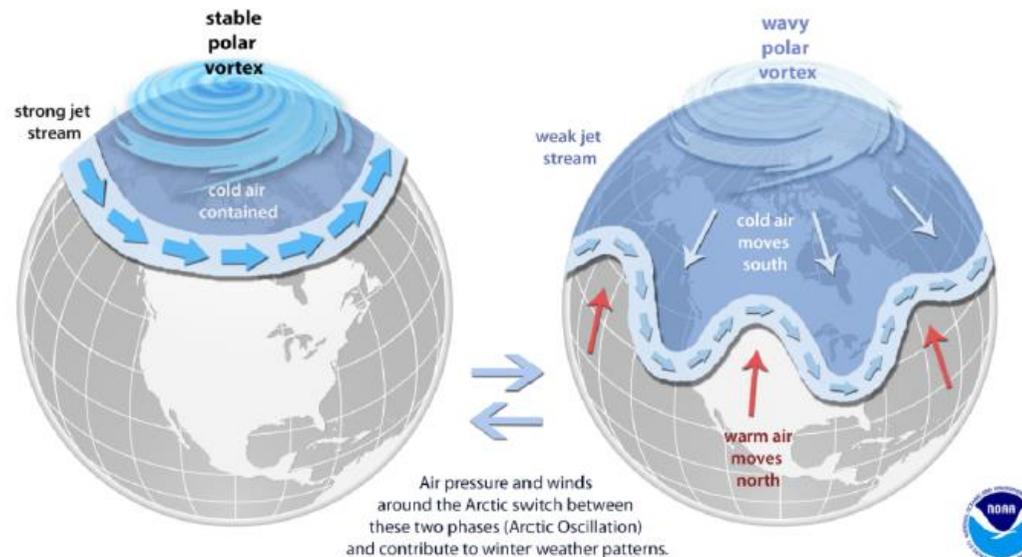
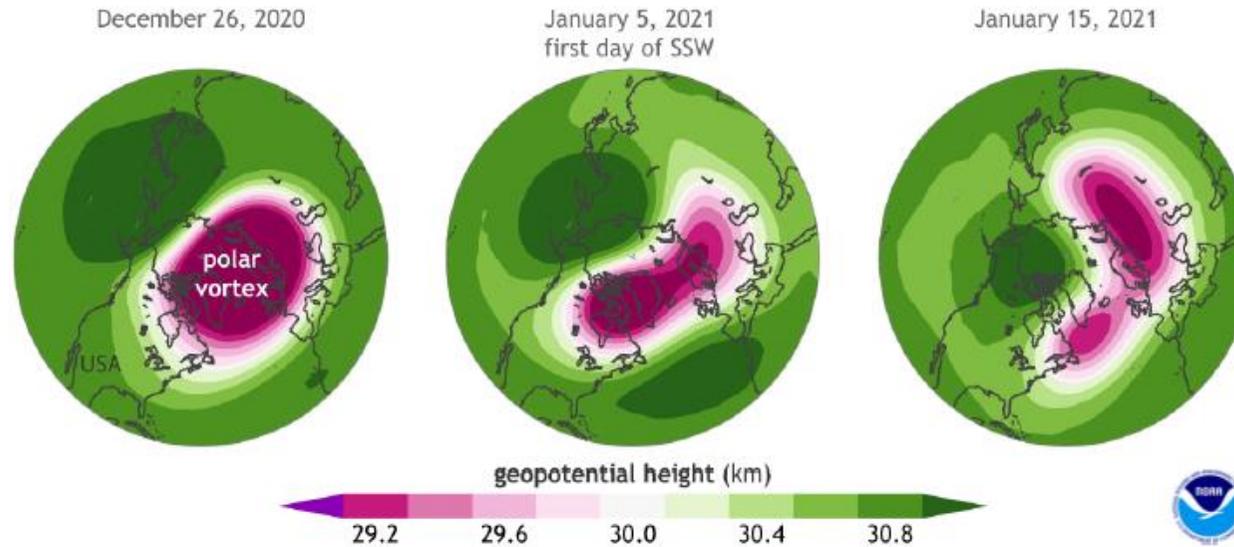
**11**  
2000-2021



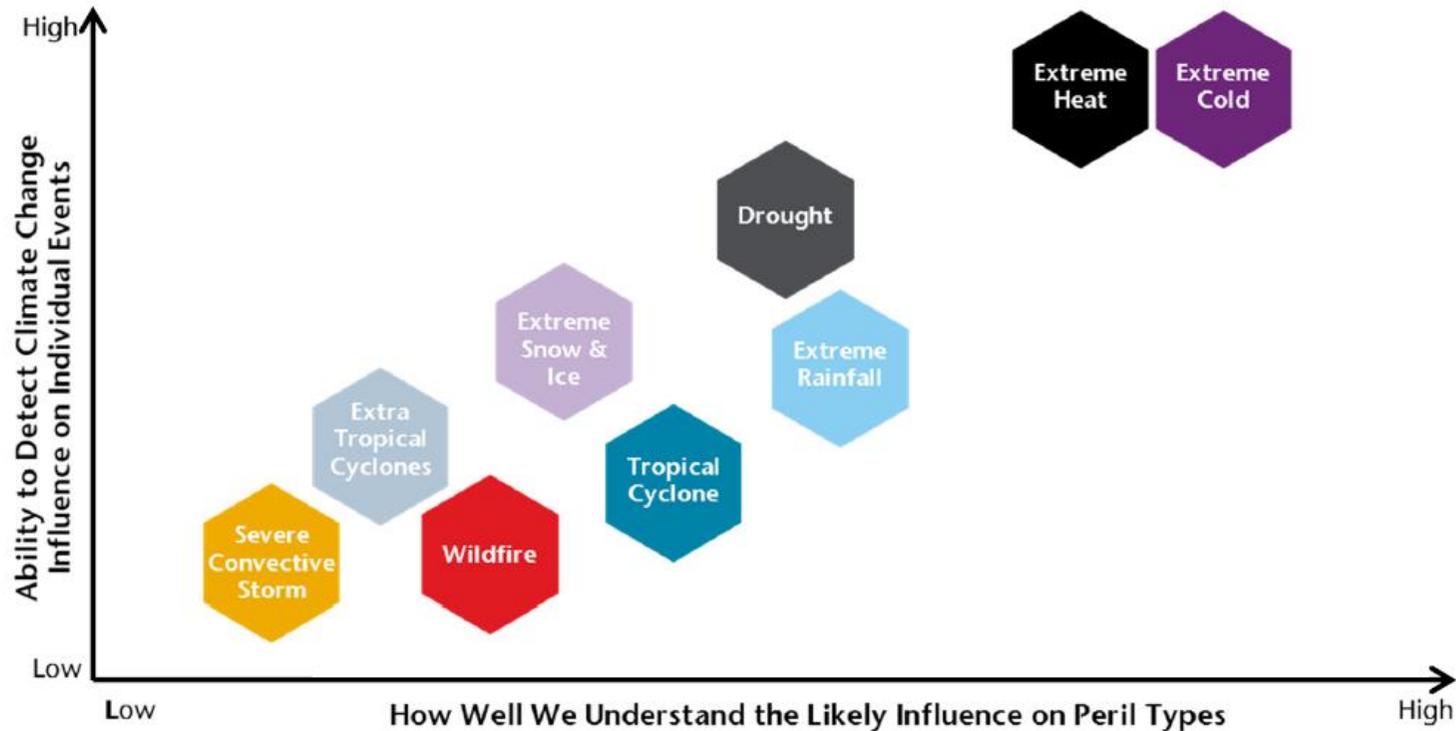
Source: Aon's Cat Insight

# Sudden Stratospheric Warming

Disruption of stratospheric polar vortex in early January 2021



# Knowledge of climate change impact on varies perils



- Varying levels of confidence around climate change impacts on each peril
- Temperature and precipitation-based impacts are best understood
- Severe convective storm has the least known effects
- Natural peril risk is growing!
- The need to properly plan, invest, and implement mitigation strategies against these heightened risks

## Section 4

# Responses to climate changes

# Climate Biennial Exploratory Scenario

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Bank of England runs regular stress tests to help assess the resilience of the UK financial system and individual institutions.

Running biennial exploratory scenarios allows policymakers to probe the resilience of the UK financial system to a wide range of risks, and is a tool to enhance participants' strategic thinking on how to manage those risks.

The 2021 exercise explores the resilience of the largest UK banks and insurers to the physical and transition risks associated with climate change.

## The desired outcomes of CBES

- Size the financial exposures of participants and the financial system more broadly to climate-related risks.
- Understand the challenges to participants' business models from these risks; and gauge their likely responses and the implications for the provision of financial services.
- Assist participants in enhancing their management of climate-related financial risks. This includes engaging counterparties to understand their vulnerability to climate change.
- *Will not have an impact on capital requirement*

# CBES participation

The 2021 Climate Biennial Exploratory Scenario explores the resilience of the largest UK banks and insurers to risks from climate change

## CBES participation and coverage

Large UK banking groups and building societies	Large UK life insurers	Large UK general insurers	
Participation:			
<ul style="list-style-type: none"> <li>Barclays</li> <li>HSBC</li> <li>Lloyds Banking Group</li> <li>Nationwide Building Society</li> <li>NatWest Group</li> <li>Santander UK</li> <li>Standard Chartered</li> </ul>	<ul style="list-style-type: none"> <li>Aviva</li> <li>Legal &amp; General</li> <li>M&amp;G</li> <li>Phoenix</li> <li>Scottish Widows</li> </ul>	<ul style="list-style-type: none"> <li>AIG (UK entities only)</li> <li>Allianz Holdings plc (UK entities only)</li> <li>Aviva</li> <li>AXA (UK entities only)</li> <li>Direct Line</li> <li>RSA (UK entities only)</li> </ul>	<ul style="list-style-type: none"> <li>Society of Lloyd's (Ten selected Syndicates)</li> </ul>
Coverage:			
Around 70% of UK bank lending to UK households and businesses.	<p>Around 65% of the UK life insurance market by asset size.</p> <p>A range of business models (annuities, with-profits, unit-linked).</p>	Around 60% of the UK general insurance market by Gross Written Premium.	<p>Ten selected Syndicates account for around 40% of the Society of Lloyd's property and liability insurance market by premium.</p> <p>Society of Lloyd's will estimate the results for the entire market based on their results.</p>

# Impacts in the CBES scenarios

Summary of impacts in the CBES scenarios

	Early Action	Late Action	No Additional Action
Transition risks	● Medium	● High	● Limited
Transition begins in	2021	2031	n.a.
Nature of transition	Early and orderly	Late and disorderly	Only policies that were in place before 2021
Peak UK shadow carbon price (carbon tax and other policies) (2010 US\$/tonne carbon dioxide equivalent)	900	1,100	30
Physical risks	● Limited	● Limited	● High
Mean global warming relative to pre-industrial times by the end of scenario (°C)	1.8	1.8	3.3
Mean sea level rise in the UK (m)	0.16	0.16	0.39
Impact on output	● Temporarily lower growth	● Sudden contraction (recession)	● Permanently lower growth and higher uncertainty
Average annual output growth in the UK (per cent)			

# Heatwaves in the CBES scenarios

**Land area exposed to heatwaves increases by around 25% in the No Additional Action scenario, with significant variation across regions**

## Heatwaves in the CBES scenarios

		Early and Late Action			No Additional Action	
Global Warming Levels (°C)	1.1	1.4	1.8	2.5	3.3	
	Year 0	Year 10	Year 30	Year 10	Year 30	
	Land area exposed to heatwave (percentage change in annual mean from the period 1986–2005)					
US	1.7	2.6	3.8	6.7	10.8	
Japan	0.1	0.9	2.0	5.5	9.3	
China	0.4	0.7	1.7	5.3	9.9	
Hong Kong	2.8	7.0	16.5	19.5	67.6	
France	0.0	0.0	0.0	0.1	0.2	

# Change in precipitation rates in the CBES scenarios

**There is a material increase in precipitation rates in the No Additional Action scenario, which increases the risk of flooding**

## Change in annual average precipitation rates in the CBES scenarios

	Early and Late Action			No Additional Action	
	Year 0	Year 10	Year 30	Year 10	Year 30
Global Warming Levels (°C)	1.1	1.4	1.8	2.5	3.3
Per cent	Change in annual average precipitation rates relative to the period 1986–2005, unless otherwise stated.				
UK <sup>(a)</sup>	1.0	0.9	0.3	10.6	11.0
US	2.4	2.2	3.6	2.5	2.4
Japan	0.9	1.6	3.1	6.0	5.2
China	2.4	3.1	4.9	6.2	10.2
Hong Kong	-0.3	0.6	1.7	-1.5	0.8
Canada	2.0	4.0	5.8	9.3	14.7
Germany	2.1	4.3	3.7	3.8	3.5
France	1.1	2.0	2.1	-1.0	-3.7

# Material climate signal under 3.3°C global warming level

List of peril/territories with material climate signal by 2080 under a 3.3°C global warming level<sup>(2)</sup>

	Inland flooding	Drought/ heatwave	Severe weather (eg convective storm)	Sea-level rise	Storm (tropical, extra-tropical cyclone, including coastal flooding)	Wildfire
UK	Yes	Yes		Yes	Yes	
China	Yes	Yes	Yes	Yes	Yes	
Japan	Yes			Yes	Yes	
Canada	Yes			Yes	Yes	Yes
EU	Yes	Yes	Yes	Yes	Yes	Yes
US	Yes	Yes	Yes	Yes	Yes	Yes
Taiwan	Yes			Yes	Yes	
Singapore				Yes	Yes	
Indonesia	Yes			Yes	Yes	
South Korea	Yes	Yes		Yes	Yes	
South Africa	Yes			Yes		
Mexico	Yes	Yes		Yes	Yes	
Russia	Yes					
Brazil	Yes			Yes	Yes	
Australia	Yes	Yes	Yes	Yes	Yes	Yes
Argentina	Yes			Yes	Yes	
India	Yes	Yes		Yes	Yes	

## Section 5

# Considerations in structuring effective reinsurance/retro program

# Key considerations

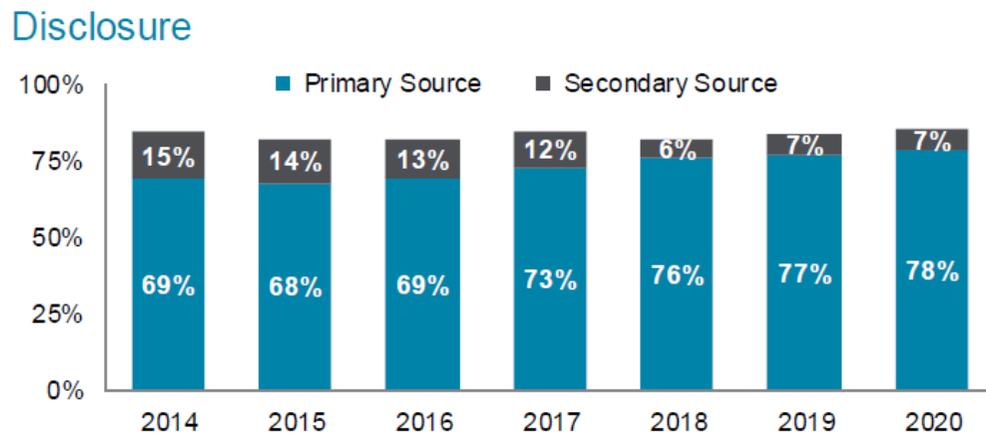
## Clear communications at all levels:

- Investors
- Regulators
- Management team
- Employees

## Impacts underwriting, reinsurance and investment decisions

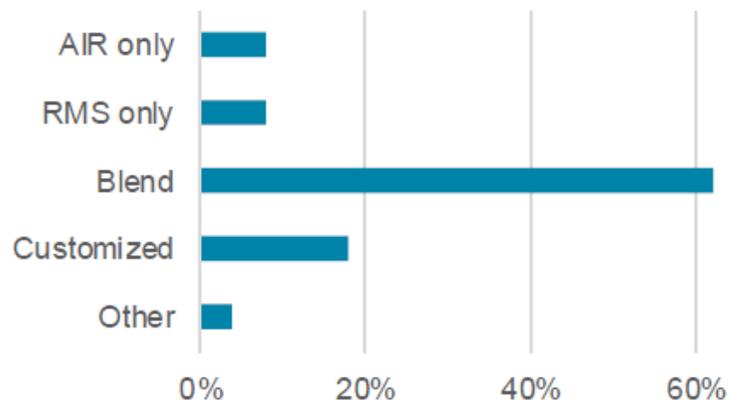
Post-event share price decline indicates a greater sensitivity to a single large loss rather than an aggregation of events (Katrina vs. Harvey, Irma & Maria)

## Increasing % of companies report catastrophe loss information in their primary source financial disclosures

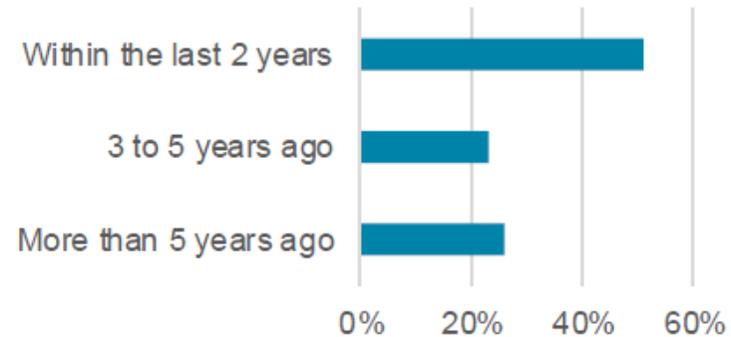


# 2020 “View of Risk” Poll Results

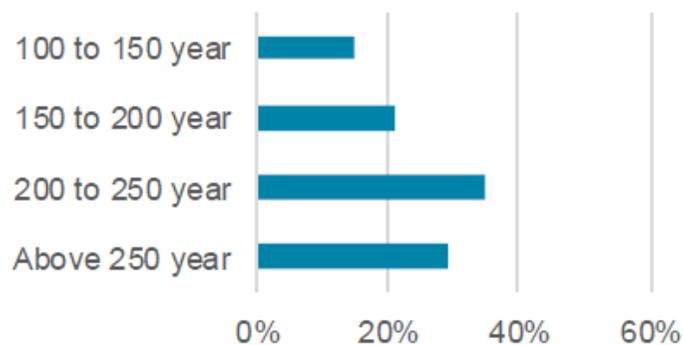
What catastrophe model results form “management view” of risk?



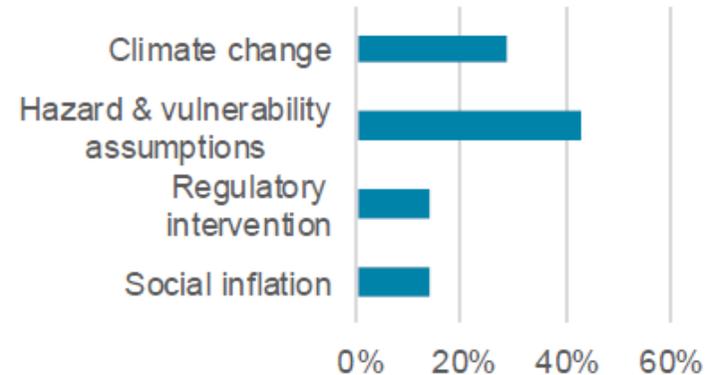
When was the last time your company re-evaluated its model selection & assumptions in determining “management view” of cat risk?



What probable maximum loss (PML) return period does your company target to protect to when determining catastrophe reinsurance limit?



What “model miss” factors concern you the most about your firm’s catastrophe exposure?



# Retro Pricing Indices – 2005 Through 2021 (Forecast)

## Retro Occurrence



## Retro Aggregate



# Retrocession Market Landscape

		XOL Retro	Cat on D&F	ILW's	Cat Bonds (via Aon Securities)	Quota Share	Sidecar
Limit	2020	\$20.0bn	\$5.3bn	\$5.3bn	\$9.0bn	\$12.0bn	\$7.0bn
	2019	\$19.0bn	\$5.0bn	\$5.0bn	\$10.4bn	\$12.0bn	\$9.0bn
Year Split	Q1	75%	50%	40%	35%	95%	85%
	Q2,3,4	25%	50%	60%	65%	5%	15%
Product (Limit 2020)		71% Occ	85% Occ	80% Occ	20% Occ	10% Occ Cap	90% Property
		29% Agg	15% Agg	20% Agg	80% Agg	90% Agg Cap	10% Multi-Class
Supply	Rated	48%	79%	14%	0%	84%	0%
	Non-rated	52%	21%	86%	100%	16%	100%