

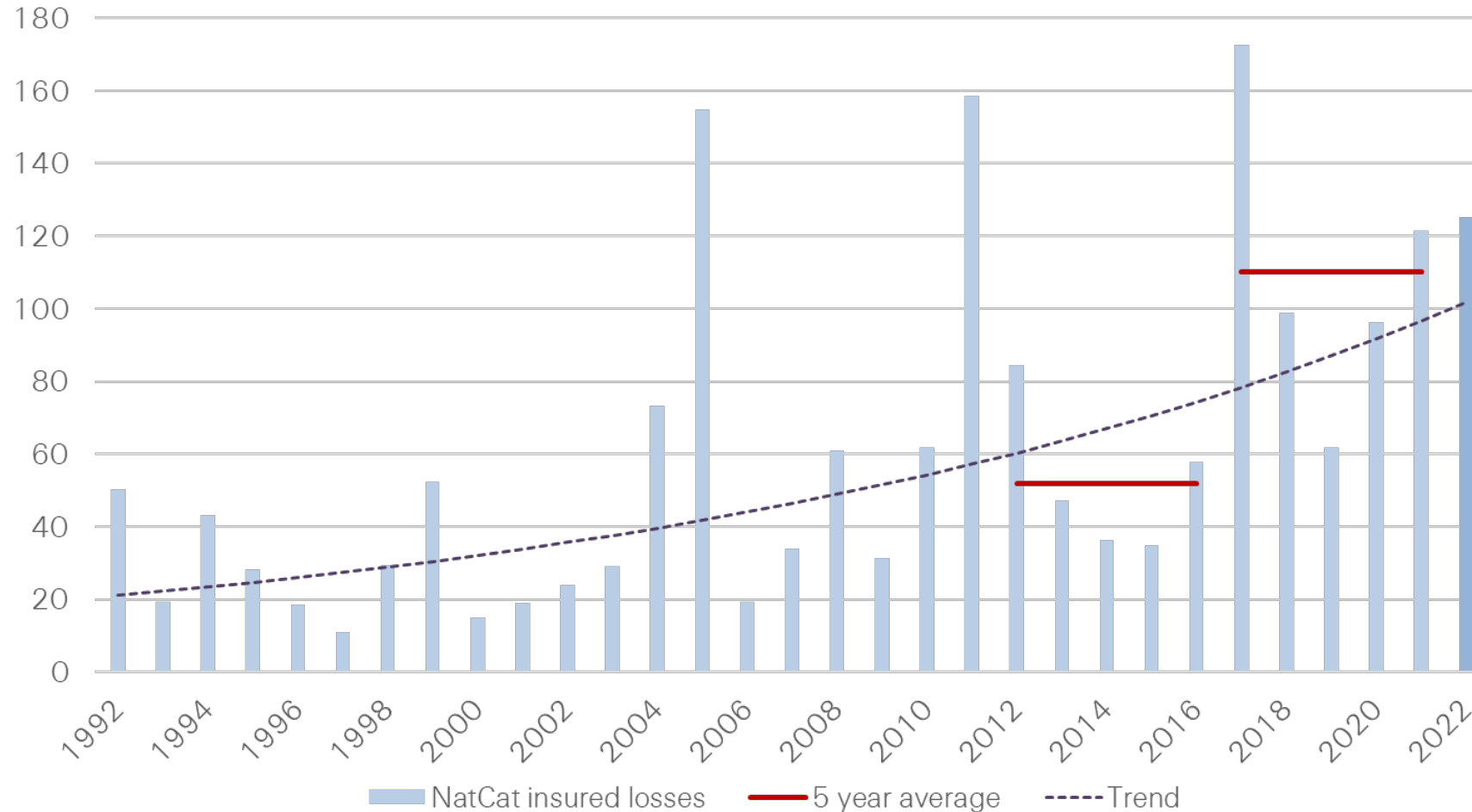
# Overview of hurricane activity

Carl Bernier, Senior Natural Catastrophe Specialist, Swiss Re



# Insured catastrophe losses have increased dramatically in recent decades

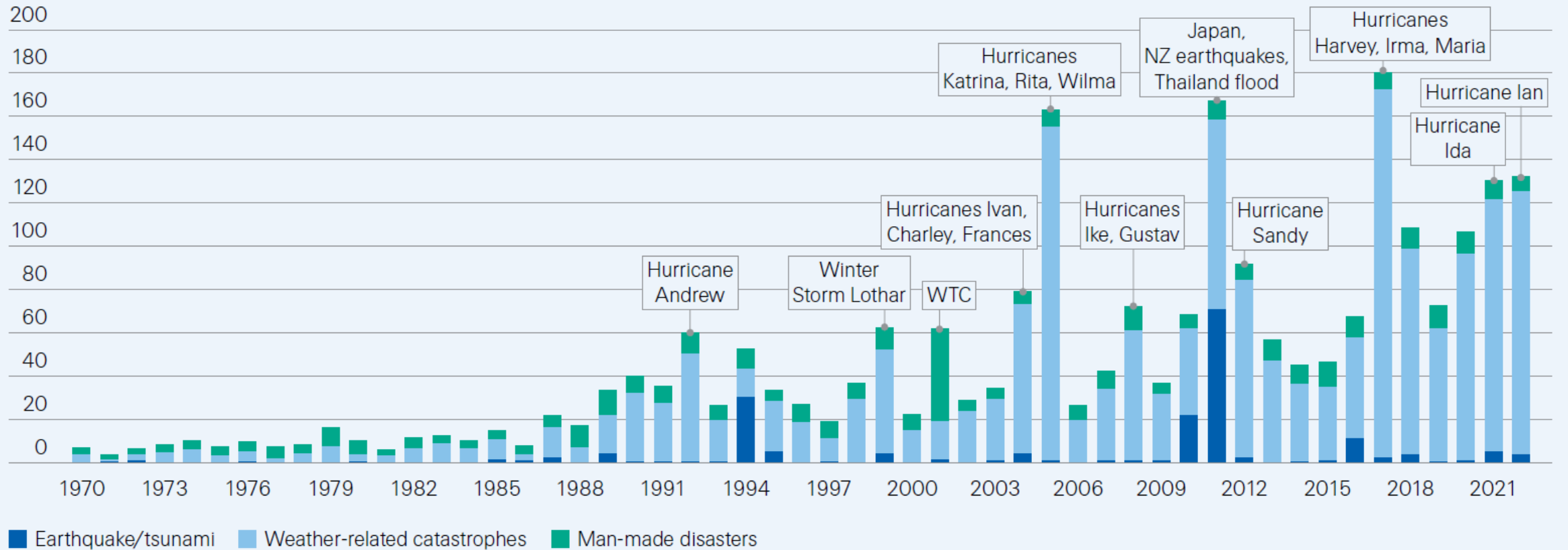
Global natural catastrophe insured losses, in USD billions at 2022 prices



Source: Swiss Re Institute

# Increase largely driven by hurricanes in the Atlantic



Insured catastrophe losses, 1970–2022, in USD billion at 2022 prices









Source: Swiss Re Institute



# What is needed for a hurricane to form?

 **How to Build a Tropical Cyclone** 

Mechanical	Thermodynamic
1) A pre-existing disturbance (vorticity or spin) 	4) Warm sea-surface temperatures (usually at least 80°F) 
2) Location several degrees north of the equator 	5) Unstable atmosphere (temperature goes down as you go up) 
3) Little change in wind speed and/or direction with height (vertical wind shear) 	6) High atmospheric moisture content (relative humidity) 

[http://www.nhc.noaa.gov/outreach/presentations/2013\\_02nhcl311\\_hurricaneLifeCycleHazards.pdf](http://www.nhc.noaa.gov/outreach/presentations/2013_02nhcl311_hurricaneLifeCycleHazards.pdf)

# Why are some hurricanes more damaging than others?

## Wind:

- Lower central pressure → faster winds
- Right side of system → faster winds
- Lower surface friction (e.g. over water) → faster winds

## Surge:

- Faster wind → more surge
- Larger system → more surge
- Landfall at right angle → more surge
- Shallow sea → more surge


## Rainfall:

- Larger storm → more rain
- Slower storm → more rain
- Passage over mountains → more rain
- Cold front → more rain

## Hurricane-caused tornados:


- Lower pressure → more tornados/hail
- Right front quadrant → more tornados

## Hurricane Hazards



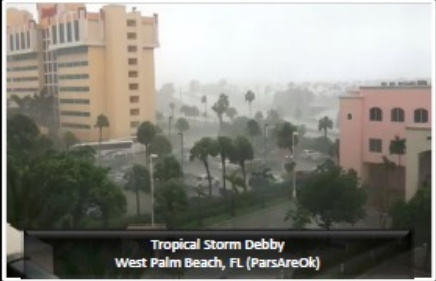
Hurricane Charley  
Ft. Myers, FL (YouTube/moviemagg)

**Wind**



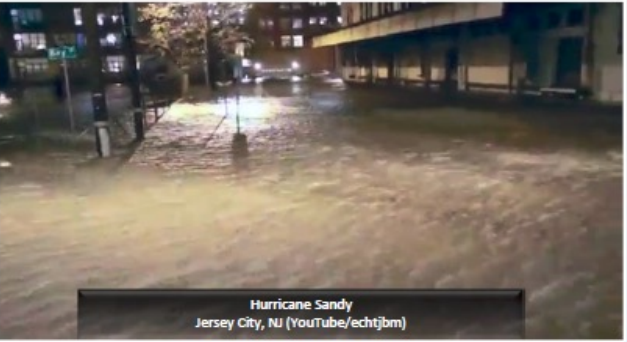
Hurricane Sandy  
Ft. Lauderdale, FL (YouTube/mmatch)

**Waves / Rip Currents**



Tropical Storm Debby  
West Palm Beach, FL (ParsAreOk)

**Tornadoes**



Hurricane Sandy  
Jersey City, NJ (YouTube/echtjbm)

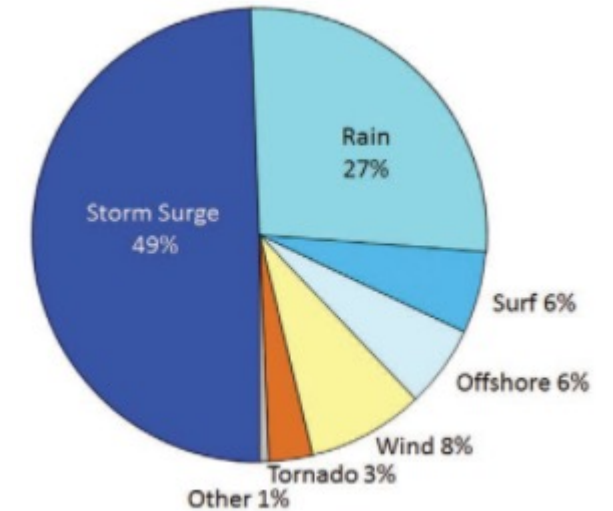
**Storm Surge**



Tropical Storm Debby  
Anclote River, FL (NYRAPTOR6)

**Rainfall / Inland Flooding**

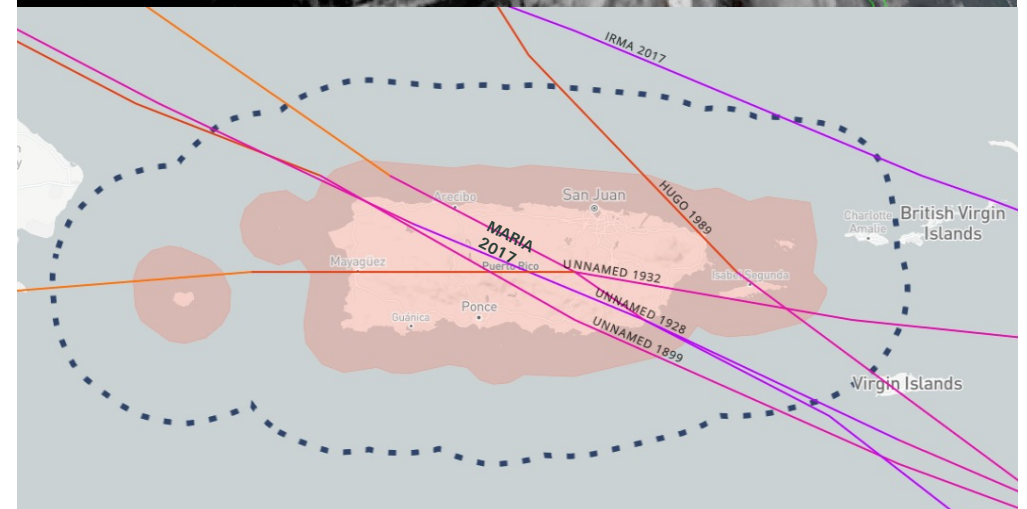
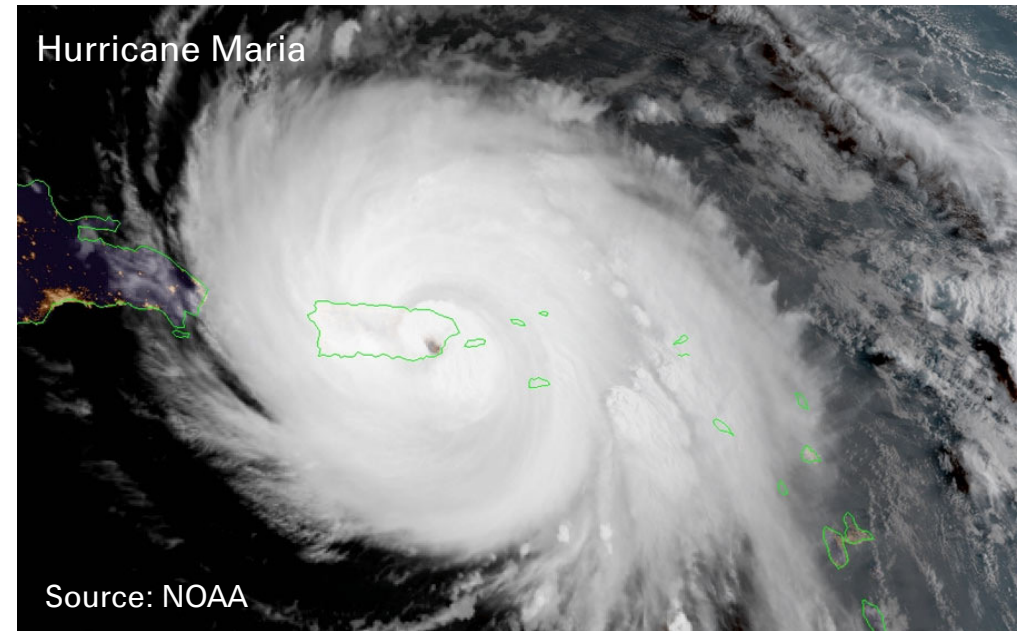
## U.S. Atlantic Tropical Cyclone Deaths 1963-2012



<https://journals.ametsoc.org/view/journals/bams/95/3/bams-d-12-00074.1.xml>

## Caribbean back in the spotlight in terms of hurricane activity

- Hurricane activity has, from a historical point of view, been very high in the Caribbean in recent years
  - Matthew (2016)
  - Irma (2017)
  - Maria (2017)
  - Dorian (2019)
  - Fiona (2022)
- Elevated hurricane activity expected to continue in the near future
- Significant events affecting Puerto Rico
  - Hugo (1989)
  - Georges (1998)
  - Maria (2017)





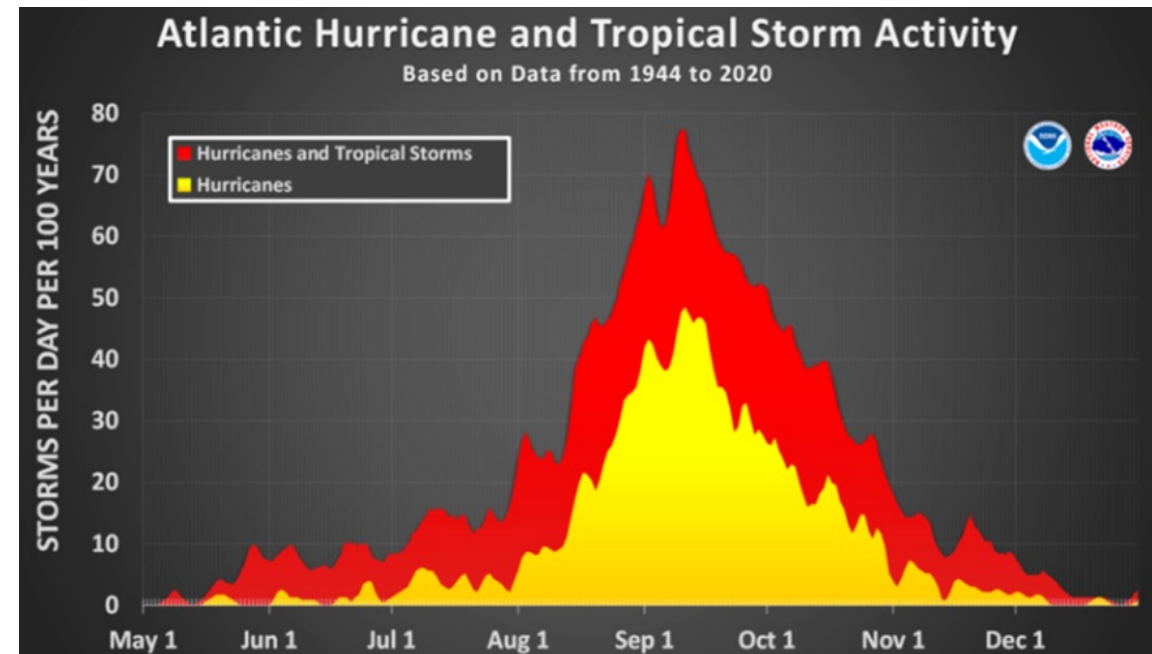
# What can we expect for 2023?

- Hurricane names:

Arlene	Bret	Cindy	Don	Emily	Franklin	Gert
Harold	Idalia	Jose	Katia	Lee	Margot	Nigel
Ophelia	Philippe	Rina	Sean	Tammy	Vince	Whitney

- Hurricane activity forecast

- First forecasts from various research entity available since April
- Named storms: 11-15
- Hurricanes: 6-8
- Major hurricanes: 2-3
- Forecasts suggest activity will be around average
- Above average ocean temperatures in the Atlantic basin could yield greater activity



## Hurricane forecasts don't always give the full picture

- Forecast have large uncertainties
  - No indications on where the storms will be or where they will make landfall
  - No indications on potential damage
- Regardless of forecasts, adequate insurance cover should be kept at all time

*All it takes is one storm making  
landfall in an exposed area*



In summary

Hurricane activity has been high in recent years

All it takes is one storm and where it makes landfall

Adequate insurance coverage is the best way to prepare and recover

Any  
questions?



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