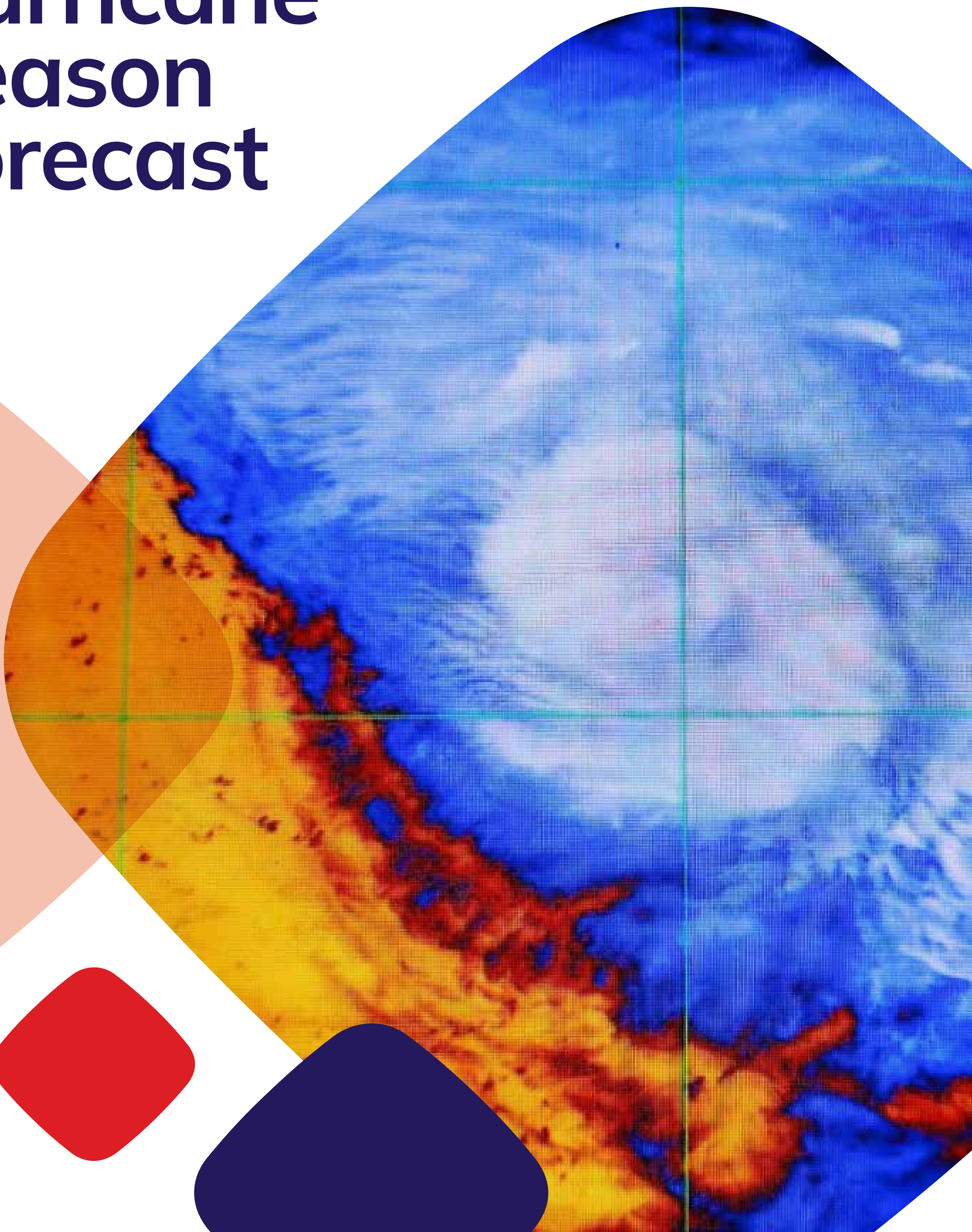
MS Amlin

2025
Hurricane Season Forecast



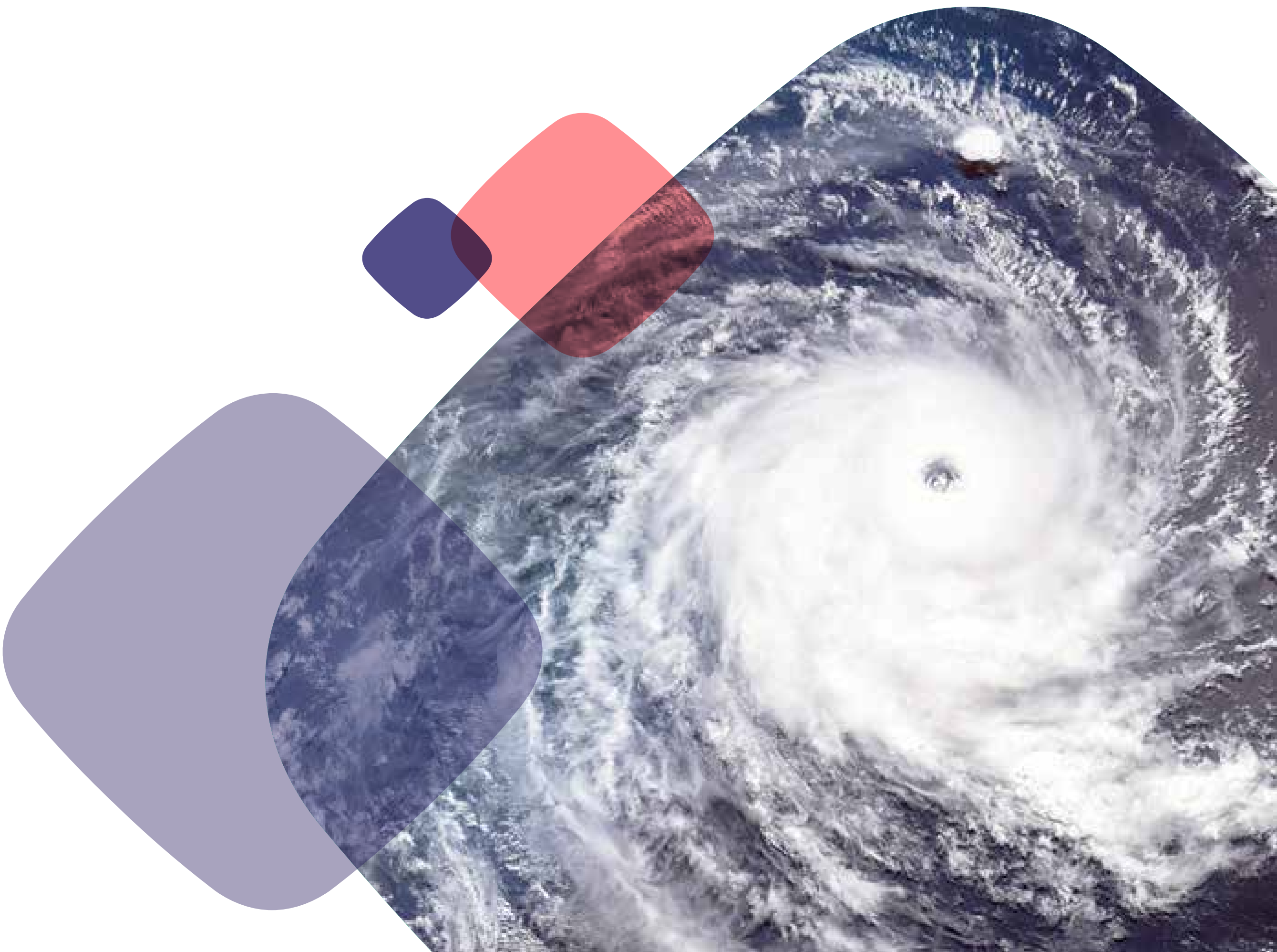
Executive Summary

The current predictions (as at 1st June 2025) suggest an **average to above average season**, with a mean forecast of **16** named storms, **8** hurricanes, and **5** major hurricanes

The North Atlantic hurricane season officially begins on 1st June and ends 30th November, with August, September, and October representing the peak three months. Forecasts this year are for **average to above average activity** in the North Atlantic.

More than 20 research groups, private companies, universities, and government agencies produce seasonal hurricane forecasts each year. The mean forecast (as at 1st June 2025) is for a season with **16** named storms, **8** hurricanes, and **4** major hurricanes. This is driven by a combination of warmer than average sea surface temperatures and an ENSO neutral phase which is forecast to persist for the entire season.

In the Pacific Basin, **a below-average activity** season is forecast. Here, forecasts indicate **25** named storms, **15** typhoons, and **8** intense typhoons.



2025 North Atlantic forecasts (as at 1st June)

The latest forecasts for the 2025 North Atlantic hurricane season are presented in **Table 1** and **Figure 1**. These predictions are based on a range of data sources, including seasonal weather forecasts, statistical models, and key atmospheric indices such as the El Niño-Sothern Oscillation (ENSO), Sea-Surface Temperatures in the Atlantic and the North Atlantic Oscillation (NAO).

Current predictions are for an above average season, with a mean forecast of **16** named storms, **8** hurricanes, and **4** major hurricanes. Indeed the predicted Accumulated Cyclone Energy, a measure of overall basin activity reflecting the number, intensity, and duration of named storms is predicted to be **148** which is above the long-term climatological average of 123. These are forecasts for basin-wide activity and not landfalling storms. Landfall activity depends on in-season weather patterns, which are often predictable only weeks or days in advance. Accumulated Cyclone Energy also does not necessarily reflect the number/intensities of landfalls. For example, an individual event may generate a substantial proportion of a given season's ACE if it persists at high intensity for a long time, whilst other shorter duration storms actually result in larger impacts as a consequence of their tracks.

These forecasts are based on tropical Atlantic and Caribbean sea surface temperatures remaining elevated compared to historical averages but lower than the record breaking temperatures experienced in 2023 or 2024. ENSO-neutral conditions are also anticipated to persist in the western Pacific through the peak of the hurricane season (August – October), as shown on **Figure 2**. The combined impact of these factors is that forecasts have converged on predicting a season with above average activity, but less extreme than the 2024 season.

Forecast	Named Storms	Hurricanes	Major hurricanes (Category 3+)	ACE Index
National Oceanic and Atmospheric Administration (NOAA 2025)	13-19	6-10	3-5	–
Colorado State University (CSU) (CSU 2025)	17	9	4	155
Tropical Storm Risk (TSR) (Tropical Storm Risk 2025)	16	8	4	146
UK Met Office	16	9	4	154
Average of **21** forecasts	16	8	4	148
NOAA historical mean average (1991 – 2020)	14	7	3	123

Table 1: North Atlantic hurricane season forecasts (as at 1st June) for the number of named storms and accumulated cyclone energy (ACE) index. To date research groups, private companies, universities, and government organisations have released forecasts. Predictions from four well known forecasters are shown. Not all forecasts provide a prediction for ACE. Forecast relative to 1991 – 2020 average shown in brackets.

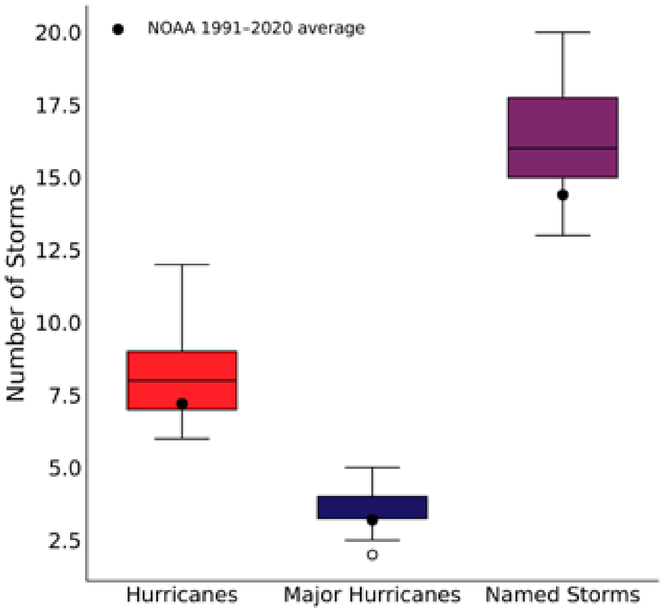


Figure 1: Box plots summarising the central 2025 North Atlantic hurricane forecasts from 21 different research groups, private companies, universities, and government organisations as at 1st June 2025. Historical averages from the National Oceanic and Atmospheric Administration (NOAA) from 1991 – 2020 are also shown.

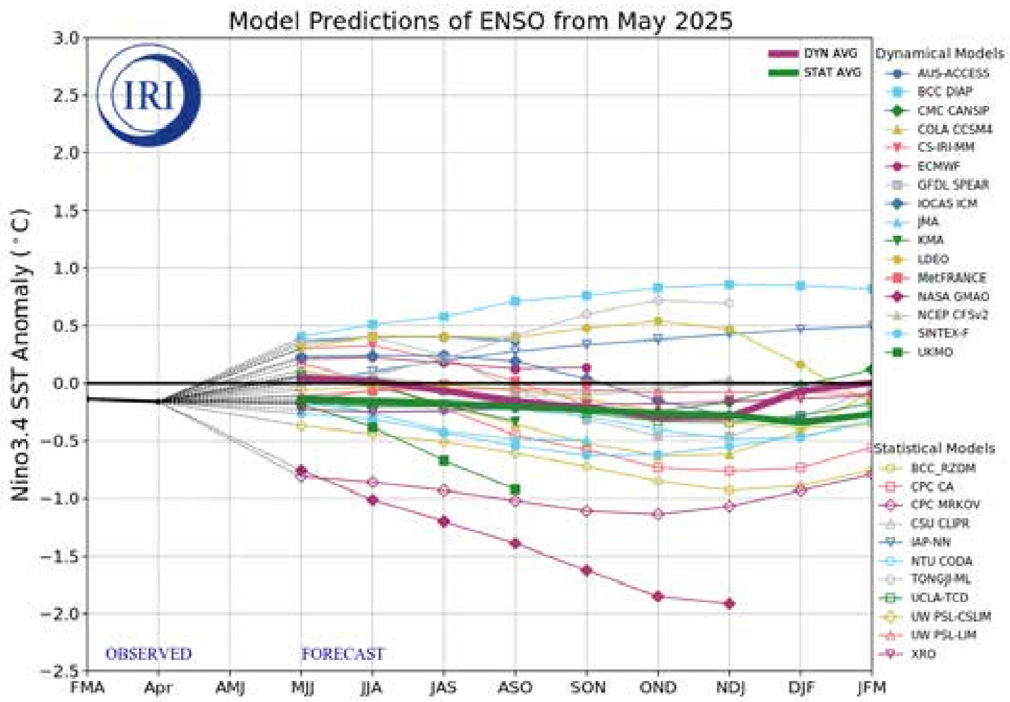


Figure 2: 2025 ENSO forecasts (sea surface temperature deviation from average) from 28 forecast models (for the NINO 3.4 region) as-at 1st June 2025. La Niña conditions are declared when the SST anomaly is more than -0.5°C. Forecasts are for three month rolling blocks (i.e., May-June-July; June-July-August). Graph shows forecasts from May-June-July period onwards (IRI 2025).

Pacific Basin

Pacific basin tropical cyclone forecasts are also dependent on the state of ENSO. During ENSO-neutral and La Niña years, a smaller number of tropical cyclones from in the central Pacific as a consequence of surface waters being cooler. Storms that do form also tend to be less intense and have shorter durations. This year, with the current ENSO-neutral forecasts, Tropical Storm Risk has forecast a **less active season** for 2025 (Tropical Storm Risk 2025). With neutral to weak La Niña conditions persisting through August-October, **25** tropical storms, **15** typhoons, and **8** intense typhoons are forecast compared to the historical average of 26, 16, and 9, respectively for the period 1991 – 2020.

What Happened Last Year?

North Atlantic basin

The 2024 Atlantic hurricane season generated an above-average number of named storms (**18**). Of the 18 storms in 2024, **11** became hurricanes and **5** became major hurricanes (Category 3+). The five major hurricanes were Beryl, Helene, Kirk, Milton, and Rafael. The season reached an accumulated cyclone energy (ACE) index of **162** which is **132%** of the long-term climatic average (1991 – 2020).

The pre-season forecasts for the 2024 hurricane season predicted a 'hyper-active' year across all storm attributes. This was a consequence of record sea surface temperatures persisting across the main development region of the North Atlantic prior to the start of the season, and the probability of ENSO-negative conditions (La Niña) being in place at the most active stage of the season (August-September-October). La Niña conditions would normally be expected to increase the likelihood of hurricane development as they commonly results in weaker vertical wind shear, weaker trade winds, and greater atmospheric instability.

The season started strongly at the end of June with Hurricane Beryl which became the earliest category 5 storm on record and caused an estimated $3.7bn in insured losses. This was followed in early August by Hurricane Debbie which only reached category 1 but caused $3.9bn in insured losses as a consequence of flooding.

The season entered an unexpected lull in August when storm formation in the Main Development Regions was supressed by factors including extreme northward shift of the monsoon trough. In September these conditions reversed leading to increased activity and two notable landfalls.

First, Hurricane Helene ($20bn private insured loss) made landfall on 27th September tropical-storm force winds extending 350 miles from its centre. However, most striking impact was the substantial inland flooding across Tennessee and the Carolina's. Rainfall preceding the hurricane magnified the severity of flooding. Small number of properties in hardest hit areas impacted by flooding had flood insurance due to insurance being non-mandatory. Notwithstanding this the National Flood Insurance Program (NFIP) estimate Helene caused $7Bn in publicly insured flood losses on top of the $20Bn private insured losses.

Then Hurricane Milton (shown on **Figure 3**) made landfall on 10th October caused insured losses of $20bn and ranks as 5th strongest hurricane ever in the North Atlantic by minimum central pressure. The impact was lower than feared as a combination of strong wind shear weakened the hurricane on approach to landfall and the landfall location south of Tampa meant that large exposure concentrations in Tampa did not suffer a direct hit. Milton provides

Figure 3: Hurricane Milton in the Gulf of Mexico approaching Florida. Source: CSU / CIRA & NOAA / NESDIS.

Ocean basin	Named storms	Hurricanes	Major hurricanes	ACE Index
North Atlantic	18 (14.3)	11 (7.2)	5 (3.2)	162 (123)
Eastern North Pacific	13 (16.6)	5 (8.8)	3 (4.6)	82 (133)
Western North Pacific	23 (25.3)	15 (15.9)	9 (9.2)	204 (299)

Table 2: 2024 tropical storm statistics by basin compared to 1991 – 2020 climatology. Historical averages are displayed in brackets (Aon 2025).

a natural "what if scenario", had landfall been ~100km farther North the loss impact would have been much higher.

Overall, the forecasts were broadly accurate and 2025 was hyper-active, albeit less than forecast. Likewise the impact on the insurance industry was notable, but not record breaking. At 5 U.S. landfalls 2024 ranks as the season with the (tied) 2nd most landfalls in the U.S. and was 4th costliest by insured losses (Gallagher Re 2025).

Pacific Basin

Eastern Pacific

A below-average activity season consistent with the neutral conditions which persisted throughout the entire season. Major hurricane John was the only landfall of the season as a Category 3 storm. Additionally, Kirsty, became the first category 5 to form in non-El Nino conditions since Hurricane Celia in 2010.

Western Pacific

The overall basin wide activity of the season was lower than average in the Western Pacific, this is the 5th consecutive year of below average activity within the basin. However, the 2024 season ranks as the deadliest since 2012. Losses were driven by Yagi which, while only reaching a maximum intensity of Category 2 on the Saffir Simpson scale, caused flooding across China, the Philippines, Vietnam, Laos, Thailand and Myanmar with estimates of insured losses sitting at around $1bn. Additionally, Luzon in the Philippines was impacted by four typhoons each of Category 4 strength on the Saffir Simpson scale within the span of 30 days.

Flooding in Mae Sai district of Chiang Rai has eased after the Sai River overflowed its banks.
Credit: Getty Images

Uncertainty / How should we think about changing risk?

Seasonal hurricane outlooks are a valuable indicator of potential risk, but multiple layers of uncertainty need to be interpreted to turn them into useful decisions.

There is considerable uncertainty in basin-wide forecasts, especially before the season begins, because the two key modulators of Atlantic activity—ENSO and main-development-region sea-surface temperatures (SSTs)—are themselves hard to predict. ENSO has a well-known "spring barrier" preventing long-term forecasting. In a world where we could know the upcoming seasons ENSO and SSTs there would remain a limit on forecast skill as a consequence of underlying chaotic nature of the atmosphere. Recent work by (Zhang, et al. 2021) and (Murakami, et al. 2025) show idealised dynamic forecasts with knowledge of the ENSO / SST state can achieve a correlation coefficient of ~0.65 with tropical cyclone numbers when run before the start of the hurricane season. That said, seasonal forecasts have shown notable improvements in recent years with April forecasts showing some skill for basin wide measures, giving risk managers at least a first-order sense of activity.

For insurers, the key measure for a season is if hurricanes strike land. On average about since 1990 one in five storms that become hurricanes in the Atlantic hit the U.S. mainland, but the proportion has varied between 0 % (e.g., 2010) and 67 % (2004). Such landfall ratios have no demonstrable seasonal-scale predictability. Therefore knowledge of the overall seasons basin activity may not translate into insured losses, although on average more active seasons have more landfalls. There is also the additional uncertainty on whether a hurricane will hit a concentrated area of exposure.

Long-term context further provides us with some qualitative assumptions to apply when thinking about hurricane hazard, especially when putting a season into a historical context. The changing pattern of losses from climate change is one element. The potential impacts of climate change are discussed in detail in the next section, while there is a lot of uncertainty climate change has made hazard worse to the best of our knowledge (Sobel and Emanuel 2025). Additionally, other human action has likely tipped the scale of the historical record, notably the low hurricane rates in the 70's and 80's likely caused be atmospheric aerosols which damped hurricane formation. The reduction of which as a consequence of clean-air acts in U.S. and Europe are associated with increased hurricane frequency.

What does all this mean? Even with improved hurricane forecasts there are substantial uncertainties. Human induced changes have likely weighted the dice toward more severe hurricane hazard.

Homes destroyed by
Hurricane Milton 2024
St Petersburg Florida
Credit: Getty Images

But what about climate change?

At MS Amlin climate change and its impact on hurricane frequency and severity is an active area of research and our work has recently been published in the Journal of Catastrophe Risk and Resilience (Pope and Phibbs 2025). What do we know:

- **Climate change will alter the risk profile.** The latest scientific evidence tells us that tropical cyclones are likely to increase in intensity, cause increased rainfall, and have larger storm surges (Knutson, et al. 2020). The frequency of the strongest storms (Category 4+) is expected to increase. Indeed, previous contentions that overall frequency (Category 1 – 5) might decrease are now also being challenged for a number of basins. This suggests that the overall frequency of storms may therefore also increase. However, beyond hurricanes alone, changes in relative sea level resulting from glacier and ice sheet melting, the steric effect (thermal expansion of the ocean as it warms), and local subsidence also have the potential to increase the severity of impacts (Camelo, Mayo and Gutmann 2020) (Lin, et al. 2012).
- **Damages are rising due to other factors.** Since 1990 economic losses have increased by around $22 billion USD per decade, primarily due to population growth and the increased value of coastal assets.

MS Amlin have evaluated our in-house view of risk to ensure that it adequately represents present-day conditions to enable risks to be priced appropriately. We have also produced an in-house view of different climate change scenarios on potential hurricane related losses. This research suggests that insured average annual losses could increase by ~40% under a 2°C climate warming scenario.

What is ENSO?

The El Niño-Southern Oscillation (ENSO) is a periodic climate pattern, which involves changes to the temperature of waters in the eastern and central tropical Pacific. Over timescales of three to seven years, the surface waters across the Pacific Ocean warm or cool, with temperature changes ranging from 1°C to 3°C compared to average sea surface temperatures. The oscillating pattern of warming and cooling impacts rainfall distributions across the tropical Pacific and can influence weather patterns across the world, including tropical cyclone activity.

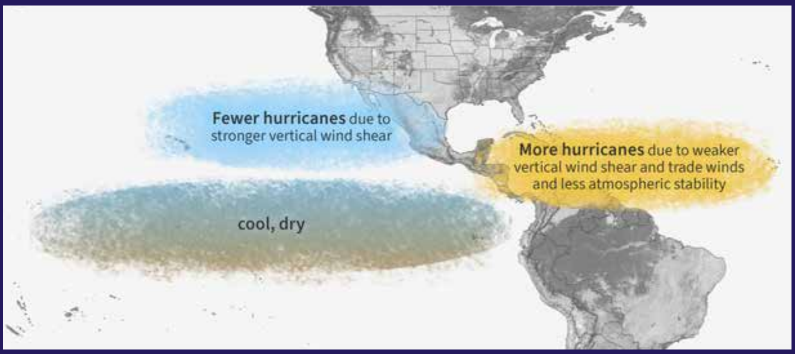
There are three phases of the ENSO phenomenon. The two opposite phases are 'El Niño' and 'La Niña'. During El Niño surface waters are warmer than average. During La Niña surface waters are cooler than average. The third 'neutral' phase is where sea surface temperatures are close to the long-term average in the Pacific Ocean.

ENSO influences tropical cyclone activity primarily through its impact on wind shear. Wind shear refers to the change in wind speed and direction in the atmosphere between 1,500 and 10,000 meters above the surface. Strong vertical wind shear leads to reduced tropical cyclone activity as storm energy is dissipated reducing the likelihood of storm development.

El Niño (ENSO-positive) is when above-average sea surface temperatures occur in the central and eastern tropical Pacific Ocean. El Niño favours **above average** hurricane activity in the central and eastern Pacific basins due to lower wind shear. In contrast, activity is ***supressed*** in the North Atlantic basin due to higher wind shear (**Figure 4** lower panel).

La Niña (ENSO-negative) is when below-average sea surface temperatures occur in the central and eastern tropical Pacific Ocean. La Niña favours **below average** hurricane activity in the central and eastern Pacific basins due to higher wind shear. In contrast, activity is enhanced in the North Atlantic basin (**Figure 4** upper panel).

ENSO-neutral is when sea-surface temperatures within 0.5 degrees Celsius of average in the central and eastern tropical Pacific Ocean. Neutral conditions do not exhibit a strong influence on hurricane activity and other weather patterns play a stronger role in modulating hurricane activity (such as North Atlantic Oscillation (NAO) and Madden-Julian Oscillation (MJO).



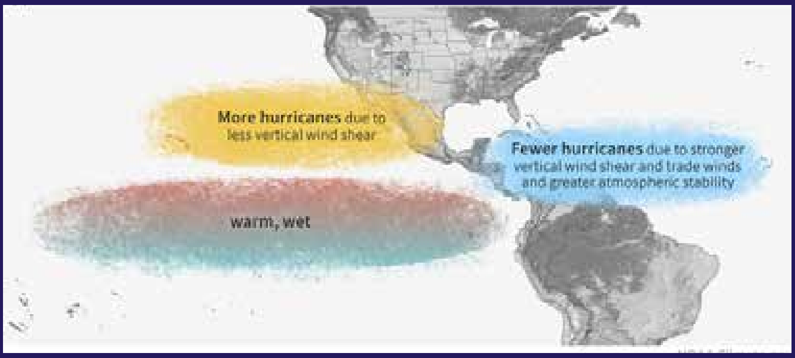


Figure 4: Typical influence of El Niño (bottom) and La Niña (top) on the east Pacific and North Atlantic hurricane activity. Map by NOAA Climate.gov based on originals by Gerry Bell.

What Happens Next?

The major research groups and universities will release updated forecasts in July/August. If there are any material changes to the outlook the MS Amlin Exposure Management team will release an updated forecast summary.

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