

# Actuarial Weather Extreme Series

## Hurricane Beryl

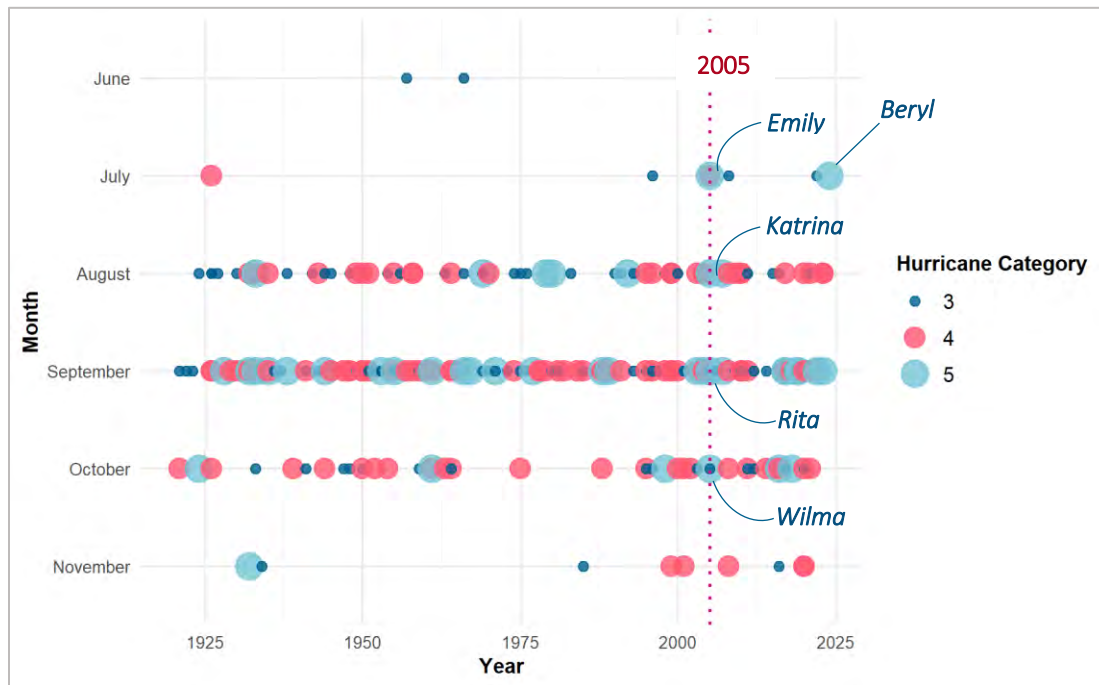
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### Overview

Hurricane Beryl was the first major<sup>1</sup> Atlantic hurricane of the 2024 season and was the earliest-forming Category 5 Atlantic hurricane on record.

FIGURE 1: MAJOR ATLANTIC HURRICANES BY MONTH AND YEAR



Data from NOAA: <https://www.ncei.noaa.gov/products/international-best-track-archive>

<sup>1</sup> Major is defined as Category 3 or higher on the Saffir-Simpson scale.

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Beryl began as a tropical depression on June 28, 2024, and rapidly intensified to a Cat. 4 hurricane at the end of June. At that moment, it was the earliest ever Category 4 Atlantic hurricane to form with the previous record being Dennis when it became a Cat. 4 hurricane on July 8, 2005. Beryl then continued gaining strength as it moved into the Caribbean Sea and became a Cat. 5 hurricane (wind speeds above 157mph or 252kmph) on July 2, 2024. As illustrated in Figure 1 above, Beryl became only the second-ever Cat.5 hurricane to form in the month of July with the previous being Emily in July 2005 (Emily became a Cat. 5 hurricane on July 17<sup>th</sup>, 2005). Per the National Hurricane Center, at its peak Beryl recorded wind speeds of 165mph (266kmph).

To-date Beryl has severely impacted several Caribbean islands along its path as well as the Yucatan Peninsula and finally made landfall in Texas on July 8<sup>th</sup>. In total, Beryl has made three landfalls over eight days.

- After developing through the central tropical Atlantic and the Windward islands, Beryl made its first landfall as a Cat. 4 hurricane on Carriacou Island on July 1<sup>st</sup>.
- Beryl further strengthened as it entered the warm Caribbean Sea to a Cat. 5 hurricane in the Eastern Caribbean and brushed past Jamaica and the Cayman Islands before making its second landfall on the Yucatan Peninsula.
- After weakening to a tropical storm, Beryl then regained hurricane strength in the warm Gulf of Mexico waters and made its final landfall near Matagorda, Texas as a Cat. 1 hurricane

**Table 1**

#### MOST ACTIVE ATLANTIC HURRICANE SEASONS

Year	# of Major Hurricanes (Cat.3, Cat.4, Cat.5)	Names of Cat.5 Hurricanes	Approx. CPI-Adjusted Costs to the U.S.
2005	7 (2, 1, 4)	Emily, Katrina, Rita, Wilma	\$263B
2020	7 (2, 5, 0)	-	\$54B
2017	6 (2, 2, 2)	Irma, Maria	\$337B
1933	6 (1, 3, 2)	(unnamed)	-
2004	6 (2, 3, 1)	Ivan	\$89B

NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2024);

<https://www.ncei.noaa.gov/access/billions/>

## Impacts from Beryl

With the varying intensities of Beryls' landfalls, the economic and livelihood impacts differed between the Caribbean islands and continental USA. The impacts noted below are preliminary and were gathered as at July 11<sup>th</sup>, 2024.

Beryl decimated the islands of Carriacou and Petite Martinique in Grenada, where it destroyed roughly 98% of the buildings on the islands<sup>2</sup>. A UN official noted that Beryl has "flattened" the island of Carriacou and that 100% of the population were affected.<sup>3</sup> In Saint Vincent and the Grenadines, 90 per cent of homes on Union Island were reportedly damaged or destroyed and a significant proportion of the population were evacuated. As Beryl moved along, the powerful winds and intense rainfall created largescale damage to Jamaica's electricity grid and 60% of the country was without electricity<sup>4</sup>.

<sup>2</sup> <https://www.nytimes.com/2024/07/07/us/hurricane-beryl-path-mexico-carriacou.html>

<sup>3</sup> <https://news.un.org/en/story/2024/07/1151811>

<sup>4</sup> <https://www.theguardian.com/us-news/article/2024/jul/04/hurricane-beryl-cayman-islands-jamaica-hurricane>

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While northern Venezuela was spared the brunt of Beryl, the outer bands of the system resulted in overflowing of the Manzanares river causing devastating flooding in Cumanacoa; this left a few dead, missing and affected over 25,000 people<sup>5</sup>.

As Beryl crashed into southeastern Texas and Louisiana, it left nearly 3 million people without electricity from the destructive winds and “life-threatening” storm surges<sup>6</sup>. To aggravate the dire situation, the Houston area was under heat advisory with the heat index reaching 106F (41C) which makes survival without electricity very difficult.

After substantially weakening since slamming Texas, Beryl’s remnants triggered heavy rain and tornado warnings from Texas to northeastern U.S. and Canada. Over 200 tornado warnings were issued by the National Weather Service between July 8 and 10, which is the most ever for any day in July and the most ever for any day in New York state<sup>7</sup>. Despite no significant damage, the remnants from Beryl did bring torrential downpour along central and northeastern U.S. and Canada.

As of July 11<sup>th</sup>, Beryl’s death toll across all affected countries stands at 33<sup>8</sup> with several people injured, missing, and/or evacuated.

Given Houston is a key port and the fourth largest city in the US, AccuWeather has placed a damage and economic loss range between US\$28 and 32 billion to the US<sup>9</sup>. The estimate accounts for direct damages to livelihoods, businesses, and infrastructure as well as indirect losses from extended power outages and travel and business interruptions. For context, the economic loss from last year’s Hurricane Idalia was around US\$18 to 20 billion. According to a catastrophe modeling company, Karen Clark & Co, damage from Beryl may cost insurers US\$2.7B in the US, with total insured losses from Beryl estimated at US\$3.3B<sup>10</sup>.

## The Warming North Atlantic Ocean

Since March 2023, the North Atlantic Ocean Basin has been warming at an unprecedented rate and Figure 2 below illustrates how much warmer the sea surface temperatures have been in 2023 and 2024 compared to historical years. From Figure 2, June 2024 sea surface temperatures were above the historical average September temperatures with September known to be the peak of the Atlantic hurricane season thus inducing Beryl which could be the beginning of an unprecedented hurricane season.

Unfortunately, the warm Atlantic waters fuel more powerful hurricanes as the storms can pick up more energy, increasing the wind speeds. In addition, increasing temperatures aid the atmosphere in holding more moisture and result in more intense rainfall. To exacerbate the situation, sea-levels continue to rise from the melting glaciers and ice sheets thus worsening the impacts from coastal flooding<sup>11</sup>.

Often, coral reefs serve as a critical buffer against extreme storm surges and help mitigate against excessive damage to coastal properties and livelihoods. Research shows that coral reefs help reduce wave energy by an average of

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<sup>5</sup> <https://venezuelanalysis.com/news/venezuela-govt-deploys-emergency-response-as-hurricane-beryl-wreaks-havoc-in-cumanacoa-town/>

<sup>6</sup> <https://www.bbc.com/news/articles/c51y49gwln0o>

<sup>7</sup> <https://weather.com/storms/hurricane/news/2024-07-07-hurricane-tropical-storm-beryl-forecast-texas>

<sup>8</sup> [https://ttweathercenter.com/2024/07/11/hurricane-beryl-death-toll-now-at-33/#google\\_vignette](https://ttweathercenter.com/2024/07/11/hurricane-beryl-death-toll-now-at-33/#google_vignette)

<sup>9</sup> <https://corporate.accuweather.com/newsroom/severe-weather-advisories/severe-weather-advisory-july-9-2024/>

<sup>10</sup> <https://www.reinsurancene.ws/hurricane-beryl-3-3bn-in-insured-losses-estimated-by-kcc/>

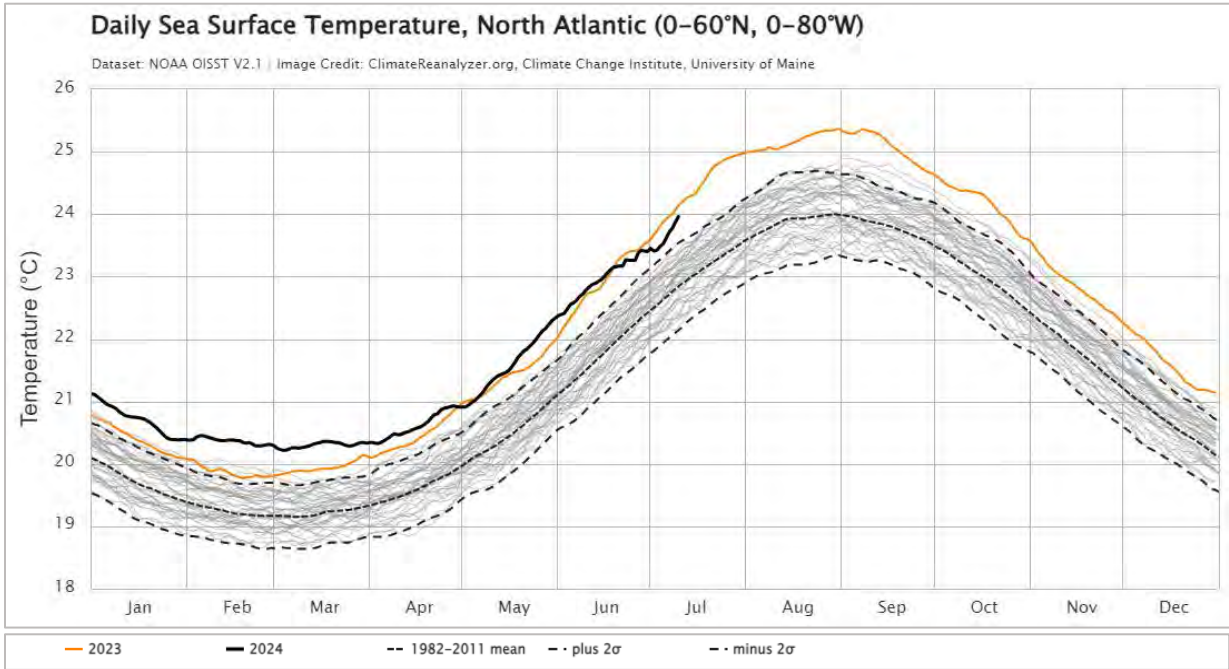
<sup>11</sup> <https://www.bbc.com/news/world-us-canada-42251921>

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97%<sup>12</sup>. However, the increased ocean temperatures are driving the bleaching of the coral reefs, which is putting coastal communities in the Caribbean at higher risk.

FIGURE 2: RECORD LEVELS OF NORTH ATLANTIC SEA SURFACE TEMPERATURE



Source: [https://climatereanalyzer.org/clim/sst\\_daily/](https://climatereanalyzer.org/clim/sst_daily/)

Earlier in May this year, NOAA predicted an above-normal and “extraordinary” Atlantic hurricane season with around 8 to 13 hurricanes and 4 to 7 major hurricanes (average number of hurricanes and major hurricanes are 7 and 3 respectively). Aside from the warmer temperatures noted above, NOAA attributes the potentially extreme 2024 season to the expected La Niña weather conditions. NOAA expects La Niña conditions to develop by the peak of this year’s hurricane season and the tendency to reduce the strength and prevalence of wind shear across the ocean basin makes for a friendlier environment for hurricanes to form<sup>13</sup>.

In the words of Grenada’s PM, Beryl’s level of destruction in some Caribbean islands was “Armageddon-like”<sup>14</sup>. Beryl’s timing, speed and intensity provides a scary outlook for the 2024 hurricane season.

<sup>12</sup> Ferrario, F., Beck, M., Storlazzi, C. *et al.* The effectiveness of coral reefs for coastal hazard risk reduction and adaptation (2014). <https://doi.org/10.1038/ncomms4794>

<sup>13</sup> [How does NOAA see the 2024 Atlantic hurricane season shaping up?](https://www.noaa.gov/news/how-does-noaa-see-the-2024-atlantic-hurricane-season-shaping-up/)

<sup>14</sup> <https://www.cbsnews.com/news/hurricane-beryl-grenada-destruction-communication-system-destroyed/>

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