

BERMUDA TRIANGLE AS A NATURE'S MYSTERIOUS CIRCUMSTANCES IN UNEXPLAINED DISAPPEARANCES OF SHIPS AND AIRCRAFT

¹*Dr. Viral A. Prajapati, ¹Chandni Jaimin Panchal and ²Dr. Dhrubo Jyoti Sen

¹Shree Swaminarayan Sanskar Pharmacy College, Near Zundal Circle, S. P. Ring Road, Between Chandkheda-Adalaj, Zundal, Gandhinagar-382421, Gujarat, India.

²School of Pharmacy, Techno India University, Salt Lake City, Sector-V, EM: 4/1, Kolkata-700091, West Bengal, India.



*Corresponding Author: Dr. Viral A. Prajapati

Shree Swaminarayan Sanskar Pharmacy College, Near Zundal Circle, S. P. Ring Road, Between Chandkheda-Adalaj, Zundal, Gandhinagar-382421, Gujarat, India.

Article Received on 21/04/2025

Article Revised on 11/05/2025

Article Accepted on 01/06/2025

ABSTRACT

The Bermuda Triangle, known for its mysterious disappearances, can be demystified by examining logical explanations. Erratic weather patterns and environmental factors, such as sudden storms and navigational challenges, contribute to accidents. Mechanical failures and equipment malfunctions are also common in the area. Human error, including misjudgment and miscommunication, plays a role in incidents. Sensationalism and hoaxes have added to the mystery. By separating fact from fiction and analysing each incident, a more rational understanding of the Bermuda Triangle can be achieved.

KEYWORDS: Bermuda triangle, devil's triangle, methane clathrates, North Atlantic Ocean.

INTRODUCTION

The Bermuda Triangle, also known as the Devil's Triangle, is a loosely defined region in the North Atlantic Ocean, roughly bounded by Florida, Bermuda, and Puerto Rico. Since the mid-20th century, it has been the focus of an urban legend suggesting that many aircraft, ships, and people have disappeared there under mysterious circumstances. However, extensive investigations by reputable sources, including the U.S. government and scientific organizations, have found no evidence of unusual activity, attributing reported incidents to natural phenomena, human error, and misinterpretation. The Bermuda Triangle is a loosely defined region in the North Atlantic Ocean where

numerous ships and airplanes have reportedly disappeared under mysterious circumstances. While often associated with supernatural causes, experts attribute these incidents to natural phenomena, human error, and equipment malfunctions.

Location and Boundaries: The Bermuda Triangle is generally considered to be located in the western part of the North Atlantic Ocean. It is often depicted as a triangle with points at Bermuda, Florida, and Puerto Rico. However, there is no universally agreed-upon definition of its precise boundaries. The area is notorious for the unexplained loss of ships and planes, with some vanishing without a trace or transmitting distress signals.

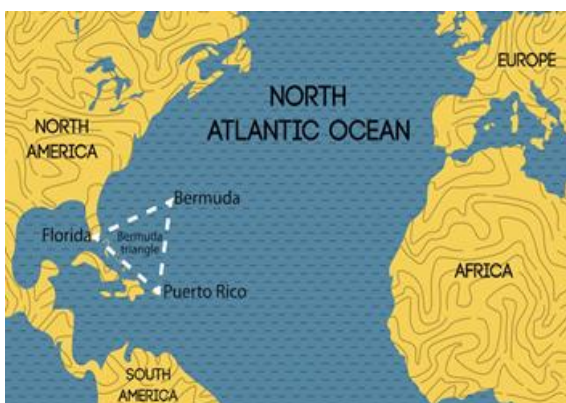


Figure 1: Bermuda Triangle location.

Mysteries and Theories: The area gained notoriety due to numerous stories of unexplained disappearances of ships and aircraft. Some theories propose supernatural explanations, such as magnetic anomalies, time warps, or even extra-terrestrial involvement. However, the U.S. Navy and other experts attribute most incidents to natural causes like bad weather, strong currents, and human error.^[1]

Scientific Explanations: The region experiences frequent and powerful storms, which can lead to shipwrecks and plane crashes. The Gulf Stream, a warm and swift ocean current, can cause navigational challenges and contribute to disorientation. Methane hydrate deposits on the ocean floor could potentially release large quantities of gas, reducing water density and leading to vessel sinking. Methane hydrate, also known as methane clathrate, has the general formula $\text{CH}_4 \cdot n\text{H}_2\text{O}$, where 'n' represents the variable number of water molecules in the crystal structure, typically around 5.75 or 6. A more detailed formula, considering the typical cage structure, can be represented as $8\text{CH}_4 \cdot 46\text{H}_2\text{O}$, which simplifies to $\text{CH}_4 \cdot 5.75\text{H}_2\text{O}$.
 CH_4 : Represents the methane molecule.
 H_2O : Represents the water molecule.

n: A variable number, often around 5.75, indicating the ratio of water molecules to methane molecules.

$8\text{CH}_4 \cdot 46\text{H}_2\text{O}$: Represents the composition within a unit cell of the crystal structure, where 8 methane molecules are surrounded by 46 water molecules.

$\text{CH}_4 \cdot 5.75\text{H}_2\text{O}$: A simplified ratio derived from the unit cell composition, indicating that approximately 5.75 water molecules are associated with each methane molecule. Some experts suggest that compass variations in the area, where magnetic north and true north align, might cause navigational errors. Methane clathrate, also known as methane hydrate or fire ice, is a solid compound where methane molecules are trapped inside a crystal structure of water, resembling ice. These cage-like structures are formed under specific temperature and pressure conditions, typically found in permafrost and ocean sediments. They represent a potentially vast source of natural gas and are also of interest in climate change studies due to their potential to release methane, a potent greenhouse gas, if disturbed.

Structure: Methane clathrates are clathrate compounds, meaning they have a cage-like structure formed by water molecules that encloses methane molecules.



Figure 2: Mystery of Bermuda Triangle.

Formation: They form under specific conditions of low temperature and high pressure, commonly found in Arctic regions and ocean floors.

Composition: The general formula is $\text{CH}_4 \cdot n\text{H}_2\text{O}$, where 'n' varies, indicating a varying number of water molecules surrounding the methane.

Energy Resource: Methane clathrates represent a potential unconventional energy source due to the large amount of methane they contain.

Climate Change: The release of methane from clathrates can significantly impact climate change as methane is a potent greenhouse gas.

"Clathrate Gun Hypothesis": This hypothesis suggests

that rapid warming could destabilize methane clathrates, leading to a large release of methane and accelerating climate change. However, research indicates that clathrate release is slow and complex, and much of the released methane may be consumed by microbes before reaching the atmosphere.

Research Focus: Research on methane clathrates is ongoing to better understand their formation, stability, potential as an energy source, and their role in the climate system.

The Bermuda Triangle is a region in the western part of the North Atlantic Ocean, where a number of ships and aircraft have reportedly disappeared under mysterious circumstances.

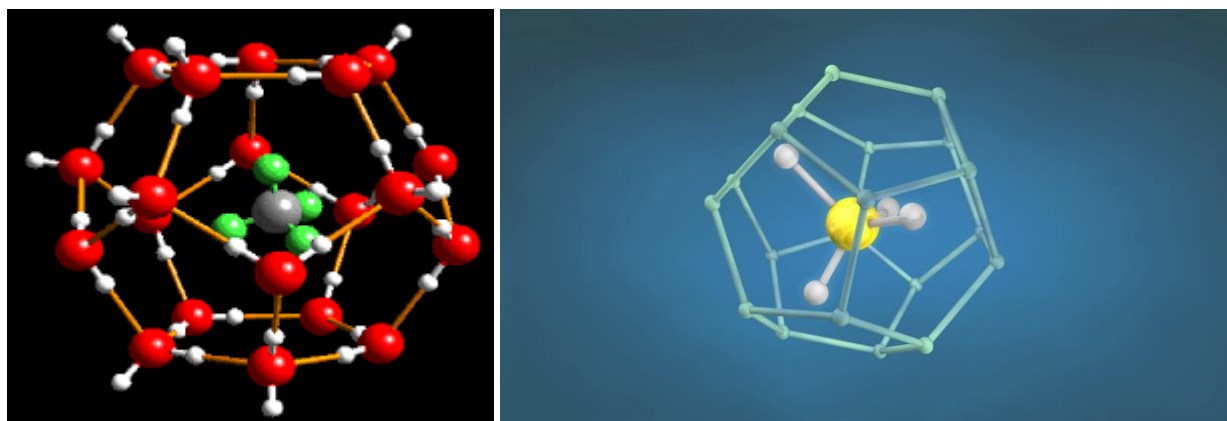


Figure 3: Methane clathrates.

This area, often called the "Devil's Triangle," has captured the public's imagination with stories of unexplained disappearances and speculation about paranormal or supernatural causes. While some attribute these incidents to unusual forces, others cite natural phenomena and human error as more likely explanations.^[2]

Location

Theories: Theories range from the paranormal (extra-terrestrial activity, time warps, etc.) to more grounded explanations like methane gas eruptions, powerful Gulf Stream currents, and bad weather.

No official designation: The Bermuda Triangle is not an officially recognized geographic area, and its boundaries are not clearly defined.

Not statistically unique: While the Bermuda Triangle has a reputation for disappearances, some experts say that the number of incidents is not statistically higher than in other busy shipping and air traffic areas. The "mystery" of the Bermuda Triangle is largely attributed to a combination of natural phenomena and human error, rather than supernatural causes. While the area has seen its share of disappearances, scientific explanations, including unpredictable weather patterns, Gulf Stream currents, and navigational challenges, account for most incidents.

1. Environmental Factors: Unpredictable Weather: The Bermuda Triangle is located in a region where weather patterns can shift rapidly, leading to sudden storms, strong winds, and even waterspouts (mini-tornadoes over water).

Gulf Stream: The powerful Gulf Stream current can cause significant changes in sea conditions, making navigation challenging and potentially affecting vessel stability.

Shallow Waters and Reefs: The area contains numerous islands and reefs, which can pose hazards to ships, particularly in stormy conditions.

Rogue Waves: Large, unexpected waves called rogue waves can also occur in the area, potentially capable of sinking ships and planes.

Methane Hydrates: Some theories suggest that pockets of methane gas trapped beneath the seafloor could be released, reducing water density and causing ships to sink. However, according to the US Geological Survey, large gas releases are not believed to have occurred in the area for a long time. Methane hydrate, also known as methane clathrate, is a cage-like structure of water molecules containing methane gas. It's a naturally occurring solid that forms under specific temperature and pressure conditions, typically found in deep-sea sediments and permafrost regions. Methane hydrate is often referred to as "fire ice" due to its ability to ignite when methane is released from the ice-like structure.

Formation: Methane hydrate forms when methane gas and water molecules come into contact at low temperatures and high pressures. The methane molecules are trapped within a crystal lattice of water molecules, forming a solid, ice-like substance. These conditions are typically found in deep-sea sediments, permafrost regions, and beneath high mountains.

Properties: Methane hydrate is a solid at low temperatures and high pressures. When heated or depressurized, it dissociates into methane gas and water. It's an energy-dense substance, with a large volume of methane stored within a relatively small volume of hydrate. It can be ignited and burned, hence the name "fire ice".

Geological Significance: Methane hydrate deposits are found globally, with significant reserves in marine continental margins and permafrost regions. These deposits are considered a potential future energy resource. Methane hydrate dissociation can impact sediment stability and potentially trigger submarine landslides. The release of methane from hydrate deposits can contribute to climate change, as methane is a potent greenhouse gas.



Figure 4: Bermuda Triangle trap.

Potential Concerns: Climate Change: The release of methane from hydrate deposits can exacerbate global warming.

Geohazards: Dissociation of methane hydrate can weaken seabed sediments, leading to submarine landslides and potential tsunamis.

Resource Extraction: Extracting methane from hydrate deposits is challenging due to its instability outside of its formation conditions.

2. Human Factors: Navigational Errors: The area can be confusing for navigation, with compasses sometimes pointing to true north instead of magnetic north, which could lead to disorientation.

Human Error: Like any busy shipping and aviation route, human error, including poor judgment, equipment malfunctions, and inadequate maintenance, can contribute to accidents.

Exaggeration and Misinformation: The legend of the Bermuda Triangle is fuelled by sensationalized accounts that often exaggerate the number of incidents and downplay natural explanations.

3. No Evidence of Supernatural Causes: Scientific Consensus: The U.S. Coast Guard and NOAA have stated that there is no evidence to support claims of supernatural causes or increased rates of disappearance in the Bermuda Triangle compared to other busy ocean areas.

Focus on Natural Explanations: Most experts agree that the disappearances in the Bermuda Triangle are best explained by a combination of environmental factors and human error.^[3]

The Bermuda Triangle is considered dangerous due to its history of unexplained disappearances of ships and aircraft, coupled with treacherous weather patterns and the influence of the Gulf Stream. While some attribute these incidents to paranormal or supernatural causes, scientific explanations often point to the convergence of natural phenomena like hurricanes, strong currents, and shallow areas that can cause navigational challenges.

Dangerous Weather: The Bermuda Triangle is prone to frequent and powerful storms, including hurricanes, which can quickly turn dangerous for ships and aircraft. The Gulf Stream, a strong ocean current, also passes through the area, contributing to unpredictable and rapidly changing weather conditions.

Navigational Challenges: The area's complex underwater topography, with shallow areas and deep trenches, can pose navigational hazards, especially for older or less-equipped vessels.

Historical Incidents: Numerous unexplained disappearances of ships and planes have occurred in the Bermuda Triangle over the years, fuelling its mysterious reputation.

Scientific Explanations: While the mystery surrounding the Bermuda Triangle persists, some scientific explanations focus on the natural forces at play, such as powerful storms, rogue waves, and the influence of the Gulf Stream, which can affect navigation and communication systems.

No Scientific Evidence of Paranormal Activity: There is no scientific evidence to support claims of paranormal or supernatural explanations for the disappearances. The Bermuda Triangle is considered dangerous primarily due to the potential for sudden, violent weather changes and the presence of methane gas deposits on the sea floor. Methane, when released as large bubbles, can drastically reduce the buoyancy of ships, causing them to sink rapidly, and can also interfere with aircraft engines. While other factors like strong currents, human error, and inaccurate reports also contribute, the methane hypothesis is a significant scientific explanation for some of the disappearances.

1. Methane Gas

Formation: The Bermuda Triangle region has large deposits of methane hydrates (methane trapped in an ice-like structure) on the seabed.



Figure 5: Bermuda Triangle disasters.

Rupture and Release: These hydrates can become unstable and rupture, releasing large quantities of methane gas into the water.

Impact on Buoyancy: Methane gas is less dense than air and water. When released in large quantities, it can significantly reduce the buoyancy of ships, causing them to sink quickly.

Aircraft Interference: Methane bubbles can also disrupt the airflow around aircraft, potentially causing engine failure or loss of lift, though this is less substantiated.

2. Violent Weather

Sudden Storms: The Bermuda Triangle is known for its unpredictable weather, with thunderstorms and strong winds appearing suddenly, even when conditions seem calm nearby.

Microbursts: These intense downdrafts of air can create hurricane-force winds near the surface, posing a serious threat to both ships and aircraft.

Hexagonal Clouds: Some research suggests that hexagonal-shaped clouds, which are unusual, may be linked to turbulent air and strong winds in the area.

3. Other Factors

Strong Currents: The region has powerful currents that can disorient vessels and lead to unpredictable navigation.

Human Error: Inexperience, poor navigation, and overconfidence can all contribute to accidents, particularly in challenging weather conditions.

Equipment Failure: Mechanical failures, such as engine trouble or steering problems, can also play a role in disappearances.

Inaccurate Reports: Some disappearances may be due

to inaccurate or exaggerated reports, or misidentification of events. While the Bermuda Triangle has a reputation for the mysterious and unexplained, scientific explanations like methane gas releases and severe weather patterns offer plausible reasons for the dangers associated with the area. The majority of Atlantic tropical storms and hurricanes pass through the Bermuda Triangle, and in the days prior to improved weather forecasting, these dangerous storms claimed many ships. Also, the Gulf Stream can cause rapid, sometimes violent, changes in weather. It has been hypothesized that periodic methane eruptions (sometimes called "mud volcanoes") may produce regions of frothy water that are no longer capable of providing adequate buoyancy for ships. If this were the case, such an area forming around a ship could cause it to sink very rapidly and without warning. Planes go missing in the Bermuda Triangle primarily due to a combination of natural hazards and, in some cases, human error, rather than supernatural causes. The area is prone to severe weather, including hurricanes and rogue waves, and has complex navigational challenges. These factors, combined with potential mechanical failures and navigational errors, can lead to accidents and disappearances.

1. Weather and Environmental Factors

Hurricanes and Storms: The Bermuda Triangle is located in a region where hurricanes and other severe storms frequently develop, bringing strong winds, heavy rain, and turbulent seas. These conditions can cause significant problems for aircraft, leading to crashes or forcing pilots to make emergency maneuvers that result in loss of control.

Rogue Waves: The area is also known for rogue waves, which are unusually large and powerful waves that can appear suddenly and without warning. These waves can easily overwhelm and sink ships and aircraft, especially if they are caught off guard.

Gulf Stream: The strong currents of the Gulf Stream can

affect navigation and make it difficult for pilots to maintain accurate headings, potentially leading them off course and into dangerous situations.

2. Human Error and Navigation Challenges

Navigational Errors: The Bermuda Triangle's magnetic anomalies can interfere with compass readings, making it challenging for pilots to maintain accurate bearings. These magnetic anomalies, combined with other factors like poor visibility or spatial disorientation, can lead to navigational errors and accidents.

Mechanical Failures: Like any other area, mechanical failures can occur in the Bermuda Triangle. Engines, navigation systems, and other critical components can malfunction, leading to loss of control or the need for an emergency landing.

Pilot Error: In some cases, pilot error, such as poor decision-making or misjudgement of weather conditions, can also contribute to accidents.

3. The Role of Methane Hydrates: Methane Gas Bubbles: Some theories suggest that methane gas released from the ocean floor could reduce the water's density, causing ships to lose buoyancy and sink rapidly. While this theory is debated, it could potentially explain some disappearances.

4. The Bermuda Triangle's Reputation

High Traffic: It's important to note that the Bermuda Triangle is a busy shipping and air traffic lane, so the sheer volume of vessels passing through the area means there's a higher statistical probability of accidents occurring there, even if the frequency is not unusual.

Sensationalism: The mystery of the Bermuda Triangle has been amplified by sensationalized stories and media portrayals, leading to a perception that disappearances are more frequent or unusual than they actually are.

Bermuda Triangle incidents: The Bermuda Triangle, a region in the North Atlantic, is infamous for the unexplained disappearances of ships and airplanes. While the area is often associated with mystery and supernatural explanations, investigations suggest that natural phenomena, human error, and mechanical failures are more likely causes.

What is the Bermuda Triangle? The Bermuda Triangle is a loosely defined region in the North Atlantic Ocean, roughly bounded by Florida, Bermuda, and Puerto Rico. It is also known as the Devil's Triangle. Its boundaries are not universally agreed upon, and its total area is estimated to be between 500,000 and 1,510,000 square miles. The area has been the subject of numerous stories and legends about unexplained disappearances, dating back to the mid-19th century.

What are some of the famous incidents?

Flight 19: In 1945, five Navy bombers disappeared during a training mission in the Bermuda Triangle, along with a rescue plane and its crew.

USS Cyclops: This Navy cargo ship vanished in 1918 with over 300 men and a large amount of manganese ore onboard.

What are the possible explanations?

Natural Phenomena: The region experiences frequent storms, strong currents, and unpredictable weather patterns, which could contribute to accidents.

Human Error: Mistakes in navigation, communication, or pilot error can occur, especially in a busy area like the Bermuda Triangle.

Mechanical Failures: Ships and aircraft are susceptible to mechanical malfunctions, which can lead to disasters.

Methane Hydrates: Some theories suggest that large deposits of methane gas on the ocean floor could cause sudden shifts in buoyancy, leading to sinkings.

Rogue Waves: Extremely large and powerful waves can occur in the ocean, potentially capsizing ships.

Is there a mystery to solve? While the Bermuda Triangle has a reputation for the unexplained, reputable sources, including the U.S. government and scientific organizations, have found no evidence of unusual activity. Many of the reported incidents can be attributed to natural causes and human error. Despite the stories, boats and planes safely travel through the area every day.

Aircraft incidents

1945: July 10, Thomas Arthur Garner, AMM3, USN, along with eleven other crew members, was lost at sea in a US Navy PBM3S patrol seaplane, Bu. No.6545, Sqd VPB2-OTU#3, in the Bermuda Triangle. They left Naval Air Station, Banana River, Florida, at 7:07 p.m. on July 9, 1945, for a radar training flight to Great Exuma, Bahamas. Their last radio position report was sent at 1:16 a.m., July 10, 1945, with a latitude/longitude of 25.22N 77.34W, near Providence Island, after which they were never heard from again. An extensive ten-day surface and air search, including a carrier sweep, found nothing.

1945: December 5, Flight 19 (five TBF Avengers) lost with 14 airmen, and later the same day PBM Mariner BuNo 59225 lost with 13 airmen while searching for Flight 19.

1947: July 3, a Douglas C-54 crashed off the Florida coast after the pilot lost control in turbulence.

1948: January 30, Avro Tudor G-AHNP Star Tiger lost with six crew and 27 passengers, en route from Santa Maria Airport in the Azores to Kindley Field, Bermuda.

1948: December 28, Douglas DC-3 NC16002 lost with three crew and 36 passengers, en route from San Juan, Puerto Rico, to Miami, Florida.

1949: January 17, Avro Tudor G-AGRE Star Ariel lost with seven crew and 13 passengers, en route from Kindley Field, Bermuda, to Kingston Airport, Jamaica.

1965: June 9, A USAF C-119 Flying Boxcar of the 440th Troop Carrier Wing missing between Florida and Grand Turk Island. The last call from the plane came from a point just north of Crooked Island, Bahamas, and 177 miles from Grand Turk Island. On July 18, 1965, debris from the plane was found on the beach of Gold Rock Cay just off the northeastern shore of Acklins Island.

1965: December 6, Private ERCO Ercoupe F01 lost with pilot and one passenger, en route from Ft. Lauderdale to Grand Bahamas Island.

2005: June 20, A Piper PA-23 disappeared between Treasure Cay Island, Bahamas and Fort Pierce, Florida. There were three people on board.

2017: February 23, The Turkish Airlines flight TK183 (an Airbus A330-200) was forced to change its direction from Havana, Cuba to Washington Dulles airport after some mechanical and electrical problems occurred over the triangle.

2017: May 15, A private MU-2B aircraft was at 24,000 feet when it vanished from radar and radio contact with air traffic controllers in Miami. Plane wreckage was found later.

Incidents at sea

1800: USS Pickering, on course from Guadeloupe to Delaware, lost with 91 people on board. (Possibly lost in a gale)

1814: USS Wasp, last known position was the Caribbean, lost with 140 people on board. (Possibly lost in a storm)

1824: USS Wild Cat, on course from Cuba to Tompkins Island, lost with 14 people on board. (Lost in a gale with 31 on board)

1840: Rosalie, found abandoned. (Possibly the "Rossini" found derelict)

1881: According to legend, a sailing ship, the Ellen Austin, found a derelict vessel and placed a crew to sail the vessel to port. Two versions of what happened to the vessel are: the vessel was either lost in a storm or was found again without a crew. Lawrence David Kusche author of "The Bermuda Triangle Mystery-Solved" found no mention in 1880 or 1881 newspapers of this alleged incident-he did trace the legend to a book by Rupert Gould "The Stargazer Talks" published in 1943. The Ellen Austin did exist; a check from Lloyd's of London records proved the existence of Meta, built in 1854, and that in 1880, Meta was renamed Ellen Austin. There are no casualty listings for this vessel, or any vessel at that time, that would suggest a large number of missing men were placed on board a derelict that later disappeared although one website includes the alleged derelict vessel incident it does find that Rupert Gould talked about the legend on radio in the 1930s; likewise the website traces the derelict story to a June 1906 newspaper story-which claims the derelict ship incident took place in 1891; however the 1906 story does not give a reference of where this story came from.

1918: USS Cyclops, collier, left Barbados on March 4, lost with all 306 crew and passengers en route to Baltimore, Maryland.

1921: January 31, Carroll A. Deering, five-masted schooner, Captain W. B. Wormell, found aground and abandoned at Diamond Shoals, near Cape Hatteras, North Carolina.

1925: December 1, SS Cotopaxi, having departed Charleston, South Carolina two days earlier bound for Havana, Cuba, radioed a distress call reporting that the ship was sinking. She was officially listed as overdue on 31 December. In 1985 an unknown shipwreck was found off St Augustine, Florida; in 2020 it was identified as the remains of the SS Cotopaxi.

1941: USS Proteus (AC-9), lost with all 58 persons on board in heavy seas, having departed St. Thomas in the Virgin Islands with a cargo of bauxite on 23 November. The following month, her sister ship USS Nereus (AC-10) was lost with all 61 persons on board, having also departed St. Thomas with a cargo of bauxite, on 10 December. According to research by Rear Admiral George van Deurs, USN, who was familiar with this type of ship from their service in the USN, the acidic coal cargo would seriously erode the longitudinal support beams, making these aging and poorly constructed colliers extremely vulnerable to breaking up in heavy seas. They were both sister ships of the USS Cyclops.

1958: Revonoc. A 43-foot racing yawl was lost with owner Harvey Conover and four others aboard, between Key West and Miami in a hurricane. The only trace found was the Revonoc's 14-foot skiff, near Jupiter, Florida.

1967: December 22, Miami hotel owner and yachtsman Dan Burack set out on his cabin cruiser Witchcraft with a priest named Patrick Horgan. The ship was taken one mile off the Miami coastline so that Burack and Horgan could view the Christmas lights visible from the shore. That night, Burack radioed a distress call to the Coast Guard, informing them that the boat's propeller had struck something underwater, and that the vessel would need to be towed in. The Coast Guard requested that he send up a flare in roughly 20 minutes so that the boat could be more easily located. The official who received the call reportedly later noted that Burack did not seem too concerned about the Witchcraft, a boat that Burack had fitted with a special floatation device in its hull. When the Coast Guard arrived at the location from which Burack called, he, Horgan, and the Witchcraft were nowhere to be found. Over the following days, a search was conducted over hundreds of square miles of ocean, but the boat and its passengers were never found.

2015: Late July, two 14-year-old boys, Austin Stephanos, and Perry Cohen went on a fishing trip in their 19-foot boat. Despite the 15,000 square nautical mile wide search by the Coast Guard, the pair's boat was found a year later off the coast of Bermuda, but the boys were never seen again.

Incidents on land

1969: August, Great Isaac Lighthouse (Bimini,

Bahamas), during a hurricane, two keepers disappeared and were never found.

CONCLUSION

While the Bermuda Triangle remains a subject of fascination and speculation, scientific explanations provide more plausible reasons for the reported disappearances than supernatural theories. It's important to note that the area is heavily travelled, and the number of accidents is not significantly higher than in other similarly busy shipping lanes. While the Bermuda Triangle has a reputation for mystery, the disappearances that occur there are likely due to a combination of natural hazards, navigational challenges, and, in some cases, human error, rather than any supernatural phenomenon. Over the past several centuries, more than 50 ships and 20 planes are said to have disappeared in the area now referred to as the Bermuda Triangle. In more recent history, two incidents stand out. In 1918, the U.S.S Cyclops, a Navy supply ship with 306 crewmembers on board, disappeared in the Bermuda Triangle.

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