

Night of the Titanic

Quote on Dome as Audience Enters

“The big icebergs that drift into warmer water melt much more rapidly under water than on the surrounding surface, and sometimes a sharp, low reef extending two or three hundred feet beneath the sea is formed. If a vessel should run on one of these reefs, half her bottom might be torn away. [If that happened]. some of us would go to the bottom with the ship.”

Edward J. Smith, Captain, RMS Titanic

During his command of the White Star Line's Adriatic in 1910

Scene 0: 2007

Ocean currents define the habitats of marine animals, the courses of ships, and the paths of icebergs. One of the most famous is the Gulf Stream, a warm current flowing Northward, and then Eastward off the North American coast. Sea captains sailing Westward set courses North of the Eastward flowing gulfstream, while hopefully staying south of the dreaded icebergs each spring.

Far to the South in the tropical Caribbean, the equatorial sun warms the ocean surface and supports life in shallow coral reefs. In this tropical marine food chain, phytoplankton convert solar energy and carbon dioxide into organic matter to feed a hungry ocean. Swimming animals nourished by the phytoplankton, then contribute to the stirring of the ocean, bringing cold deep ocean water toward the surface. This cold water replaces the warm water flowing Northward in the Gulf Stream.

This warm water eventually contributes to the melting of icebergs for to the North off the Newfoundland coast.

Many marine animals including whales, ride along the Gulf Stream as it moves northward near the coast of the Carolinas and then out into the open Atlantic. As early as the 1700's whaling captains knew about the Gulf Stream because whales feed on squid swimming along the current's edge.

The Gulf Stream carries warm water to the current that circles Greenland's southern coast, warming the air as it cools. Gradually, this cool salty water drops to the ocean depths and moves Southward in the deep ocean, completing the conveyer current in the Atlantic.

About a hundred years ago this Gulf Stream circulation and it's interaction with icebergs in the North Atlantic played a critical role in the greatest ocean tragedy of the 20th century. Today this river in the ocean is poised to play another critical role as the planet copes with the realities of global climate change.

Our first story begins in April 1912 in the cold North Atlantic.

Scene 1: April, 1912 The North Atlantic

The Royal Mail Steamer Titanic was built in Belfast, Ireland, by Harland and Wolff Shipbuilders. Nearly the length of three football fields, she is the largest moving object ever created. She has twenty lifeboats on board, more than required, but only enough to carry half of her passengers to safety. The Titanic is divided into sixteen watertight compartments by watertight bulkheads containing electric doors. In June 1911, Shipbuilder Magazine claimed that this design made the ship “practically unsinkable”.

This unsinkable ship now lies on a gentle slope, over 3 kilometers below the surface of the cold North Atlantic. The wreckage is in two parts: the bow, which is virtually intact with its hull buried in silt on the ocean floor, and the stern, a mangled heap of wreckage far behind the bow. With submersibles, we can explore this high-pressure hostile ocean environment that has become the grave of over 1500 passengers and crew. The ship's violent impact with the ocean floor, and decades submerged in the corrosive ocean have left few clues about the cause of the tragedy, or the exact sequence of events that led to the fatal impact with the iceberg. To recreate conditions leading to this disaster, we will begin at dawn on April 14, 1912 – the last sunrise for the RMS Titanic.

Scene 2: 5:00 AM

Today begins Titanic's third full day at sea. The ship's luxury surpasses all expectations and the weather has been incredible – calm and clear, without any hint of a storm. On this beautiful Sunday morning Captain Smith will hold a religious service in the first class dining room.

Both the waning crescent moon and Venus rise just before the sun. These are the brightest natural objects in the night sky. Their light will be missed in the freezing darkness less than 24 hours from now.

Scene 3: 9:00 AM

A radio message warning of icebergs ahead has just arrived, but Captain Smith assures us that the Titanic's construction makes it virtually unsinkable. Bruce Ismay, chairman of the White Star Line, seems even more confident. Each day he urges the engineers to increase our speed through the calm seas. Passengers are all in high spirits. Any danger seems trivial when we stand on a deck over 5 stories above the water and look around at tons of steel protecting us.

There is a real danger associated with clear calm weather. Without clouds to absorb heat, air and ocean temperatures drop below freezing at night and help preserve icebergs. Also calm seas without waves slow melting and make it more difficult to spot a distant iceberg at night. Slight changes in the sun's energy output also cause changes in global climate. This graph shows the sun's variable brightness, with an eleven year sunspot cycle on top of more gradual long term variations.

The sun produced less energy at the beginning of the 20th century than it has in any later year of the century. The Gulf Stream had less effect than normal in warming the air and April 1912 had more sea ice off the east coast of Newfoundland than any other April of the century.

Scene 4: 11:40 AM

The Marconi Wireless Telegraph Company has installed its best radio transmitter and receiver on the Titanic. Its operators spend most of their time sending messages for passengers, but they also receive navigation warnings as needed. A second warning from the Dutch liner Noordam has just reported much ice ahead.

The iceberg ahead of the Titanic probably calved in Greenland's Ilulissat Icefjord in 1909 -- about the same time as work began on the Titanic in Belfast. At birth, it was probably a mega-berg, over a kilometer long and displacing a billion tons of sea water. Each year the Jakobshavn glacier releases thousands of icebergs and one of two of these monster bergs. In the open ocean, the deep keels of mega-bergs catch the cold Greenland current and ride it westward and northward to the Arctic where they wait in floating arctic ice fields for one or two years. Eventually the cold Labrador Current picks up these icebergs and carries them southward along the Canadian coast, past Newfoundland's Grand Banks. Many melt here, but a few drift farther from shore and into shipping lanes. Icebergs finally melt in the warm Gulf Stream.

In the cold clear calm of April 7-13, 1912, as many as 20 ships reported seeing ice in North Atlantic shipping lanes.

Scene 5: 1:42 PM

The radio room has received two more warnings of ice ahead. One also describes a ship that has run out of coal and is floating in shipping lanes. This story seems to upset Captain Smith more than the ice warnings. In fact he has shared this story with Mr. Ismay.

Captain Smith was probably far more worried about running out of coal than running into an iceberg. Because of a coal strike in Great Britain, the Titanic left port with its bunkers half full. As Bruce Ismay pushed the ship's speed, he also consumed critical coal reserves.

Even more significant was a coal fire caused by spontaneous combustion, smoldering in the forward bunker of boiler room 5. By April 14 all of the smoldering coal had been stoked into the boiler, but the hot coal had buckled and weakened the half-inch thick metal bulkhead between boiler rooms 6 and 5, a critical bulkhead in the impending tragedy. This distraction from the real iceberg danger would prove fatal in the hours to come.

Scene 6: 5:20 PM

Our ship follows a great circle course from the Fastnet Light off the tip of Ireland to a point in the empty ocean. Here the ship turns and steams straight for the Nantucket Shoal off the Massachusetts Coast. We were supposed to make this course change at 5:20 PM, but the Captain delayed the turn for almost half an hour. This delay takes us a bit farther south than planned.

Modern sea captains still use great circle courses, but they know far more about ocean conditions. Satellites provide images of cloud cover, wind speed, temperature, and sea ice. Thousands of automated buoys in all the Earth's oceans beam information to satellites about the condition of the ocean beneath. Ice Tethered Profilers monitor conditions below the ice while riding on Arctic ice flows. SeaBED underwater robotic vehicles explore conditions near the ocean floor. Most importantly the International Ice Patrol provides maps showing the exact location of known icebergs every day during iceberg season. A modern Captain Smith would have had satellite weather maps to predict the cold night to come and iceberg maps that showed a field of pack ice about 5 kilometers wide and over 50 kilometers long extending across Titanic's path.

But as darkness approached, Captain Smith had only a few iceberg warnings transmitted in terse Morse Code and not routinely carried from the radio room to the bridge.

Scene 7: 6:42 PM

Sunset is a beautiful time at sea, but tonight few passengers are willing to abandon their warm lounges for a cold stroll outside. By 7:10 PM Captain Smith left the bridge to join first class dinner festivities. He asked to be called if anything unusual developed. At 7:30 the freighter Californian sent a message describing three large bergs 8 kilometers to the south. These icebergs are only 80 kilometers ahead of the Titanic. At 9:40 a message from the SS Mesaba reported heavy pack ice and many large icebergs lying just west of the Titanic. This message was never delivered to the bridge.

Tonight there are only two lookouts, both in the crow's nest, far above the bridge. Throughout the evening they observe the clear dark sky and the surrounding ocean. The ship creates a piercing 22 knot wind in their faces as they look forward. Due to an oversight, they have no binoculars to help their vision and to shield their eyes from the cold wind.

Scene 8: 10:55 PM

Titanic lights up the sky like a modern city, with its 10,000 glowing bulbs. Passengers who venture outside from Titanic's bright rooms have trouble seeing the brightest stars and cannot see unlighted objects, like ice floating in the water or along the horizon.

To the North, the Californian has stopped for the night in a large ice field. At about 11:00 PM, the ship's wireless operator sends a message to the Titanic. "Say, old man, we are stopped and surrounded by ice." The Titanic operator's reply – "Shut up, shut up, I am busy".

This is one of the most costly errors in peacetime radio history, because this critical message contained information about pack ice directly in front of the Titanic. After the rebuke from the Titanic, the radio operator of the Californian, the closest ship, turned off his radio for the night.

Scene 9: 11:33 PM

The air temperature is now below freezing and totally calm seas produce no waves to splash on icebergs and make them easier to see.

Lookouts in the crow's nest report seeing a dark mass. After seven minutes they ring the alarm bell three times and yell, "Iceberg right ahead"

Without moonlight or waves crashing into the ice, it is difficult to see an iceberg along the horizon. Also older icebergs that have capsized often have trapped liquid water which appears dark, especially on a clear moonless night. Without binoculars, radar, or search lights, the lookouts could not identify the dark mass until it was about 3 ship lengths away.

Scene 10: 11:41 PM

First Officer Murdoch has ordered an ALL STOP and nine decks down, engineers scramble, turning valves and pulling levers to stop the reciprocating engines and cut steam to the center turbine. Officer Murdoch then tries to turn the huge ship, hoping to avoid a collision. With the ship losing speed, it is much harder for the Titanic's small rudder to change the ship's direction and the collision is inevitable.

However, the actual impact happened below the water level where 7/8ths of the iceberg was hidden. Perhaps the Titanic went aground on an underwater ice shelf. The impact would have been relatively gentle, slowing the ship gradually as deeper sections of the hull moved onto the ice. We know that many passengers slept through the impact. The Titanic stayed afloat two and a half hours, indicating that the area open to the ocean was less than a doorway in a home.

The impact pushed against steel plates and rivets weakened by water below freezing. Today the steel in ships is more uniform and has fewer impurities. Welded hulls also have fewer seams to pull apart. The hull damage was so great that it opened forward holds 2 and 3 to the ocean and caused flooding in adjacent boiler room 6 and a smaller leak developed in boiler room 5.

Scene 11: 11:50 PM

Captain Smith and Bruce Ismay have returned to the bridge and the engines are coming back to life. The ship is moving forward again, but at

reduced speed. Groggy passengers, reassured by the engine noises, turn over in their beds.

Captain Smith and Mr. Ismay may have underestimated the amount of damage to the hull and decided to move slowly to the nearest port, Halifax, Nova Scotia. Moving forward scooped water into the forward holds and then into boiler room 6. Soon the bulkhead damaged earlier by fire, gave way and flooded the neighboring boiler room 5. As the bow tilted down, water rose above the tops of the bulkheads, and adjacent compartments were flooded from above. The ship was doomed. The freighter Californian was trapped in the ice field less than 20 miles away from the sinking ship. Lookouts on deck might have seen the brightly lit Titanic because of an optical illusion called towering.

At 12:45, they reported the first of 8 rockets in the distance. Without a radio operator on duty, they did not know that they were watching the sinking of the Titanic.

Scene 12: 12:25 AM

To avoid panic and thus save lives, the Captain has NOT given the abandon ship order. Instead the orchestra plays waltzes, ragtime, and music hall tunes to calm the crowd. As a result the first lifeboats leave half full – few people want to abandon their warm unsinkable ship for the cold Atlantic. There have been no lifeboat drills since there are no lifeboats for half of the passengers. Wealthier passengers with cabins on higher decks reach lifeboats first. Many third class passengers arrive after all the boats are gone. The last lifeboat leaves over 1500 passengers behind on the sinking ship.

Scene 13: 2:20 AM

ship sinking, no narration

Scene 14: 3:30 AM

For just over an hour Titanic's survivors huddled together in lifeboats and waited. At 3:30 they saw rockets from the rescue ship Carpathia. By 8:10, the last of the 705 Titanic survivors climbed on board – still in shock and mourning loved ones lost.

Scene 15: 1985

On September 1, 1985, scientists and the crew of the Woods Hole Oceanographic Institution's Research Vessel Knorr used a new automated deep water robotic camera to discover the wreckage of the RMS Titanic. Image by image they saw the luxury liner -- its boilers, bow, anchor chains, crows nest and railings. This is the burial site for passengers and crew trapped and entombed in the sunken ship. -- all dying because Captain Smith, who lies among them, did not prepare for the danger in his path.

Scene 16: The Legacy

In response to the Titanic tragedy, the International Ice Patrol charts the locations of icebergs in the North Atlantic. Sonar and radar now tell modern captains of danger ahead. Radio rooms must always be in operation and ships now sail with enough life boats to save everyone on board. We also know that icebergs and the currents that carry them play a critical role in predicting global climate change. We now recognize that the Earth's ice caps are dynamic and monitoring Arctic ice today may once again be the key to avoiding a tragedy tomorrow.