

# TITANIC

## SURVEY EXPEDITION

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Crewed Submersible Exploration of the  
World's Most Famous Shipwreck



  
OceanGate®  
EXPEDITIONS

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# RMS TITANIC

A century has sailed by since the luxury steamship *RMS Titanic* met her tragic end in the North Atlantic, plunging two miles to the ocean floor after sideswiping an iceberg during her maiden voyage from Southampton to New York.

A legend even before she sailed, her passengers were a mixture of the wealthiest, basking in the elegance of first class accommodations, and immigrants packed into steerage.

The *Titanic* is considered the world's best known shipwreck. Today, more than 100 years after the sinking, the *Titanic* continues to have a large following. The story of the sinking has been the subject of numerous documentary films, several feature films, and countless articles.

The Titanic Survey Expedition will allow a small number of citizen scientists and explorers to investigate the vessel that was once the height of opulence, but whose journey ended tragically with the loss of 1,496 lives.



Cover illustration: ©Andrea Gatti.  
Inspired by Ken Marschall.



Photo taken from the 2021 Titanic Survey Expedition

## THE WRECK

### Discovery & Exploration of the World's Most Famous Shipwreck

After years of fruitless searching by many organizations, the wreck of the *RMS Titanic* was found in 1985.

Since then, several expeditions have been launched to explore the wreck – most using remotely operated or autonomous vehicles, with relatively few expeditions utilizing crewed submersibles. Most notable of these crewed submersible expeditions was led by James Cameron for the production of the film “*Titanic*” that was released in 1997.

Over the last 30 years, *Titanic* dive expeditions have been conducted by some of the world's few deep diving submersibles: *Nautilus* (France), *Alvin* (USA), and the two *Mir* subs (Russia). These expeditions used the best technology available at the time, but *Titanic*'s 4K underwater cameras from SubC Imaging and 2G Robotics' 3D scanner will provide much higher definition imagery and 3D models.

The wreck lies at a depth of 3,800 meters (12,500 feet) approximately 595 kilometers (380 miles) from the coast of Newfoundland.

The famous ship is deteriorating, overwhelmed by the relentless spread of rusticles (named on account of their icicle-like shape) which are a result of a biochemical process that is eating the manganese, iron and sulfur out of the steel and weakening the wreck.

During the sinking, the ship broke into two main sections and many objects and pieces of the hull were scattered across the sea bed. Most of the debris is concentrated near the stern section and appears to consist of thousands of objects from the interior of the ship, ranging from tons of coal spilled from ruptured bunkers to suitcases, clothes, corked wine bottles (many still intact despite the pressure), bathtubs, windows, washbasins, jugs, bowls, hand mirrors and numerous other personal effects.



# THE EXPEDITION

## A Rare View of the Legendary “Unsinkable” Titanic

After the successful inaugural expedition to the wreck in 2021, OceanGate Expeditions will continue to return annually to further document the Titanic and its rate of decay.

Given the massive scale of the wreck and the debris field, multiple missions performed over several years will be required to fully document and model the wreck site. This longitudinal survey to collect images, videos, laser, and sonar data will allow objective assessment of the rate of decay and documentation of the process.

Expeditions will be conducted respectfully and in accordance with NOAA Guidelines for Research Exploration and Salvage of RMS *Titanic* [Docket No. 000526158-1016-02], and comply with UNESCO guidelines for the preservation of underwater world heritage sites.

Qualified explorers have the opportunity to join the expedition as Mission Specialist crewmembers whose Training and Mission Support Fees underwrite the mission, the participation of the science team, and their own training. Each team of 6 Mission Specialists will join the expedition for a 10-day mission (8 Days at Sea). The entire expedition is comprised of 5 mission legs during the summer of 2022.



## Expedition Objectives

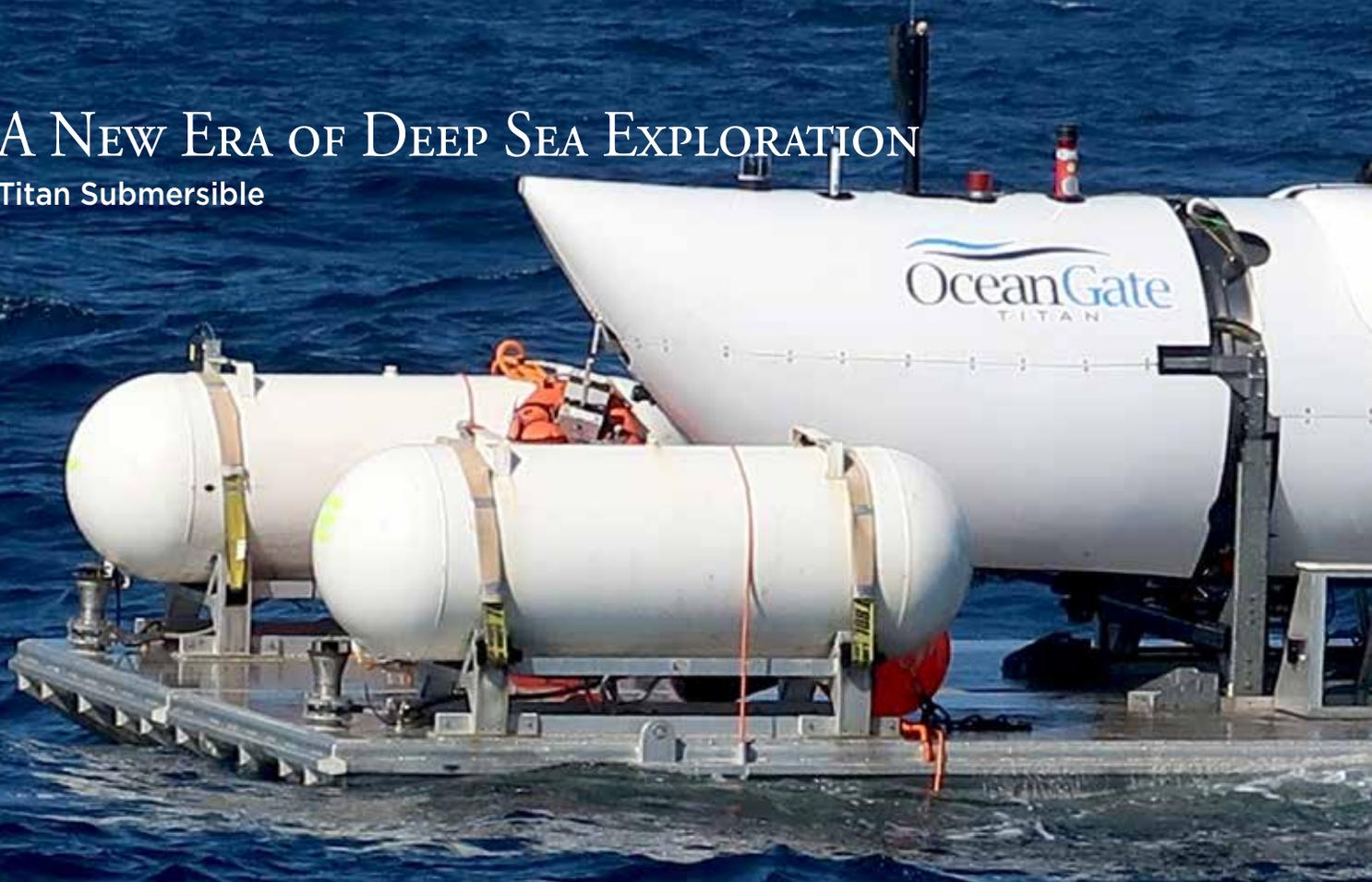
The Titanic Survey Expedition will conduct an annual scientific and technological survey of the wreck with a mission to:

- Scan the shipwreck and portions of the debris field using the latest multi-beam sonar, laser scanning and photographic technology.
- Supplement the work done on past scientific expeditions to capture data and images that are missing from the scientific record.
- Document the condition of the wreck with 4K quality photographs and video.
- Document the marine life inhabiting the wreck site and compare against data collected on prior scientific expeditions to better assess changes in the habitat as the shipwreck decays.



# A NEW ERA OF DEEP SEA EXPLORATION

## Titan Submersible



### Titan Submersible Specifications:

**Capacity:**

5 persons (1 pilot + 4 crew)

**Depth:**

4,000 meters (13,124 feet)

**Dimensions:**

6.7 meters x 2.8 m x 2.5 m  
(22 feet x 9.2 ft x 8.3 ft high)

**Weight:**

11,340 kg (25,000 lbs)

**Speed:**

3 knots

**Life Support:**

96 hours for 5 crew

**Design Specifications:**

- Carbon fiber hull: 12.7 cm (5 in.) thick
- Largest view port of any deep diving submersible: 53cm (21 in.) diameter
- Ascent/descent rate of 35 meters/min. (115 feet/min.)
- Integrated launch/recovery system
- Comfortable dome entry/exit

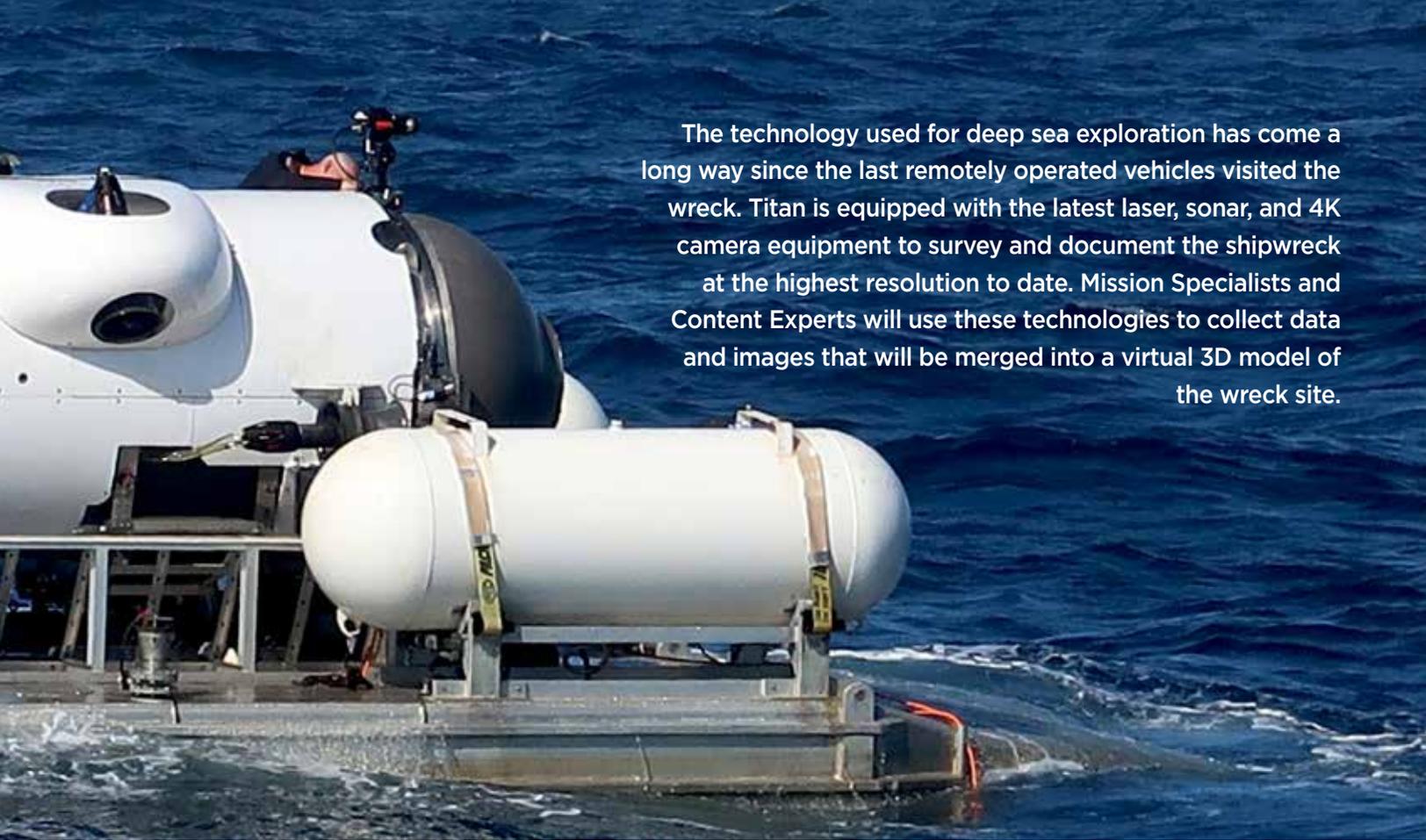
### Titan Submersible

*Titan*, the world's only 5-person crewed submersible capable of reaching 4,000 meters (13,124 feet), will be used for the duration of the five-week Titanic Survey Expedition. Ushering in a new era of deep-sea exploration, *Titan* is making it possible for individuals, researchers, and scientists to observe our planet's most valuable resources from an entirely new perspective. Constructed of titanium and carbon fiber, the innovative vessel was designed in collaboration with NASA provide a safe and comfortable pressure hull which will withstand the enormous pressures encountered at depths of up to 4,000 meters (13,123 feet).

Equipped with state-of-the-art technology, *Titan* provides an unrivaled view of the deep ocean. The crew will use Sonardyne's Ranger 2 Gyro-USBL Underwater Tracking, Dynamic Position and Telemetry system to communicate with the topside support vessel throughout the dive. In addition to its large viewport, *Titan's* exterior cameras provide a constant live view of the outside environment. Crew members can access each external camera view from within the submersible on a large onboard display or crew tablet. With the click of a button, Mission Specialists can select a camera, monitor the sonar, or view preloaded images of deep-sea species, and the *Titanic* as they experience an entirely foreign world that only a handful of people have had the privilege to experience.

Throughout the dive, crew members have the option to rotate seating positions, as well as take turns stretching out. The breathable air onboard the sub is recycled in a manner similar to that used aboard spacecraft. Regardless of the dive depth, the air pressure inside the submersible remains constant and equal to the one atmosphere of pressure we experience at sea level, eliminating the need for decompression during the ascent.

The use of *Titan* for the Titanic Survey Expedition is a monumental milestone in our innovative effort to open the oceans to a wider universe of explorers and scientists.



The technology used for deep sea exploration has come a long way since the last remotely operated vehicles visited the wreck. Titan is equipped with the latest laser, sonar, and 4K camera equipment to survey and document the shipwreck at the highest resolution to date. Mission Specialists and Content Experts will use these technologies to collect data and images that will be merged into a virtual 3D model of the wreck site.

## Laser

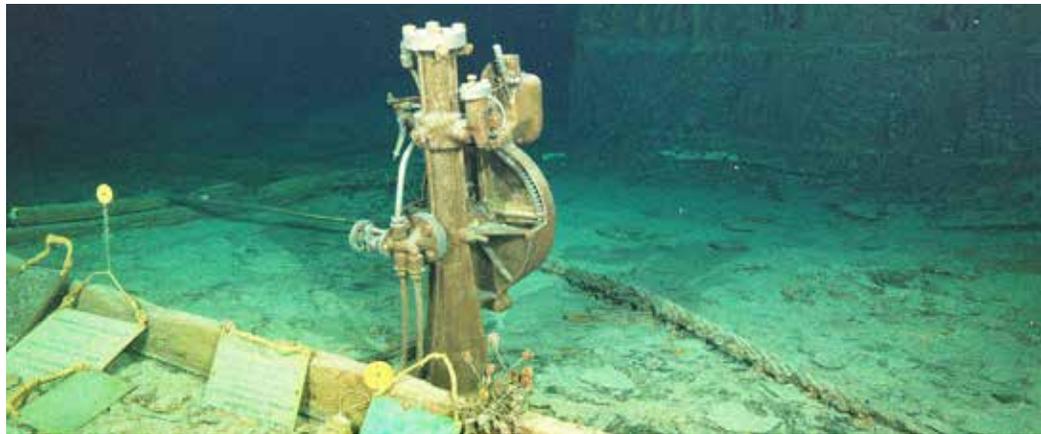
Laser technology uses light beams to survey objects over short distances of approximately 10 meters to capture high resolution point cloud data. Using 2G Robotics hardware and software the crew will conduct laser scans while the sub is in motion and capture 'top down' and side views of the wreck and debris field. As more data is collected, each piece will be added and stitched to reveal a 3D skeleton of the wreck site evolve into a complete view. Using the model, we can identify sections of the wreck that are not fully imaged and then target those areas on subsequent dives.

## Sonar

Titan uses advanced multibeam sonar hardware and equipment for navigation and obstacle recognition. Throughout each dive the sonar will also be used to locate objects up to 300 meters away to aid in navigation – even in conditions with low to zero visibility.

## Photography

Using SubC Imaging's externally mounted Rayfin 4K camera and 40,000 lumens of multiple deep sea lights, we will capture images of the wreck and debris field at this resolution. The team will then use these images to create a photo mosaic of the wreck by overlaying the images onto the 3D digital skeleton created from laser scans resulting in a photographic quality 3D model.



*Photos from the 2021 Titanic Survey Expedition*

# YOUR DIVE

## Titanic Explored

Following a pre-dive brief, your team of up to four crew members and one sub pilot will board *Titan*. After conducting a check of life-support, navigation, and communication systems, the dive begins.

During the 2.5 hour decent through the water column, you will traverse the least explored habitat on the planet. During this phase of the dive, crew members will be on the lookout for bioluminescent creatures, will help the pilot monitor the navigation system to vector *Titan* toward the wreck, and monitor the sonar system for the first reflections of the wreck. Finally, the wreck will come into view through the acrylic viewport and the exterior cameras.

The submersible crew will spend three to five hours exploring the wreck. The area of focus will change depending on the interest of the crew and the scientific mission for that dive, but most will want to begin with a view of the bow. Your team might focus on the cavern where the famous grand staircase once stood, the debris field, the stern, or the marine life on the wreck. Our powerful exterior lights will illuminate the area of study and help you search for landmark features like the giant boilers and enormous propellers.

# DIVE SUPPORT SHIP

## The Horizon Arctic



The team will depart from St. John's, Newfoundland aboard the Dive Support Ship *Horizon Arctic* at the start of each mission, with *Titan* and its launch and recovery platform on deck.

This ship boasts 60 berths to comfortably house the OceanGate Expeditions team, Mission Specialists, researchers and ship's crew. This working ship offers amenities such as a modern and spacious mess deck, comfortable lounges, as well as a workout center.

The *Horizon Arctic* is Canadian-owned and operated by Horizon Maritime. The 93.6 meter vessel has the environmentally-friendly CLEAN DESIGN class notation, a hybrid propulsion system, and improved low resistance design for high speed and crew comfort.



# JOIN THE EXPEDITION



Participation in the expedition at sea is limited to selected individuals who provide content expertise, technical skills, financial support, or educational outreach including:

## Mission Specialists

Mission Specialists are explorers, adventurers, and citizen scientists whose Training and Mission Support Fees make the expedition possible. Mission Specialists receive training in a variety of roles such as submersible navigation and piloting, tracking and communications, and submersible maintenance and operations. They make one submersible dive and assist on the surface when other teams dive.

## Content Experts

Credentialed or accomplished experts in shipwreck exploration, *Titanic* history, film making, sea floor mapping, marine biology, microbiology, marine archaeology or technical fields who are selected to provide expertise or equipment necessary to achieve the mission objectives.

## Technical Advisors

Technical Advisors are experts in deep sea technology. Their knowledge of the instruments used aboard *Titan* provide operational assistance and guidance for the interpretation of the data captured throughout the mission.

## Requirements for all expedition participants:

- Able to live aboard ship at sea for up to one week
- Able to board small boats (Zodiacs) in rough seas
- Have a valid passport and can enter Canada
- Be at least 18 years old when the mission begins
- Comfortable in dynamic environments

## Become a Mission Specialist

Only six mission specialist crew positions are available on each mission. Mission Specialists receive training and hands-on coaching from the operations crew for all support roles, including:

### During a Dive

Sonar Operation  
Photography  
Communications  
Observation  
Navigation  
Laser Scanning

### Abord Support Ship

Submersible Service  
Dive Image Review  
Sonar Analysis  
Dive Planning  
Science Support  
Communications & Tracking

## Mission Specialist Training and Support Fee

\$250,000 per person

## Learn How to Join

Please visit:

<https://oceangateexpeditions.com/how-to-join>

Or call 425-595-6343 for up-to-date mission schedule and availability.





“ I am looking forward to working with the OceanGate Expeditions team to demonstrate the cutting-edge submersible technology that has the power to change the way humans explore our deep oceans, understand our planet, and investigate other planets. ”

*~ Dr. Scott Parazynski  
NASA Astronaut, Physician and  
OceanGate Expeditions Mission Specialist*



  
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