

The silent sound of SONAR finds San Francisco's most famous shipwreck!

By Matthew McDonald

On 22 February 1901, a ship named *The City of Rio de Janeiro* hit the rocks of Fort Point close to the Golden gate bridge. Unfortunately, the boat flooded and sank within 10 minutes of the crash and 128 of the 210 passengers died. In 1987, a salvage team claimed that the ship's remains were 91 meters down, but this was never proven true. It was not until 2014 that they were able to conclusively detect the remains of the ship using new sonar technology called the echoscope.

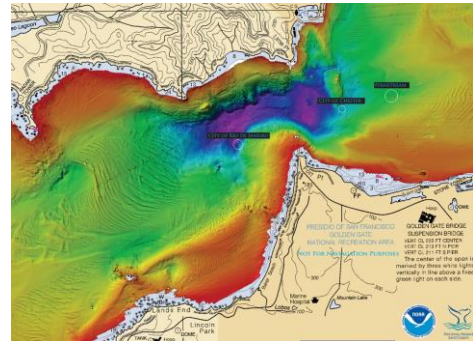


Image showing shipwrecks found near the golden gate bridge.

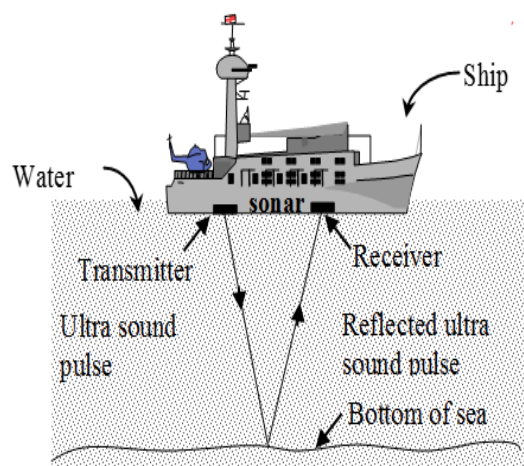


Image describing how SONAR works

Sound navigation and ranging (SONAR) is commonly used in the ocean because sound waves travel further underwater than radio or light waves. Because of this people like the NOAA (National Oceanic and Atmospheric Administration) tend to use SONAR for mapping the ocean floor, where many would not be able to see normally, this is done using Active Sonar. Active Sonar is used to detect objects in the water, where a pulse of sound is released into the water by a SONAR transducer. The time taken for the SONAR pulse to travel to the obstacle and be reflected from the obstacle is measured.

Using the formula $\frac{\text{Distance}}{\text{Time}}$ the distance to the obstacle can be calculated. Active sonars are categorized based on the

frequency of their signals. Low-frequency (less than 1 kHz), mid-frequency (1 to 10 kHz), and high-frequency (10 to 500 kHz). The differences in the frequencies affect the distance to which the sounds will travel, with low-frequency signals usually traveling much farther than high-frequencies. Although humans can hear mid frequencies, we usually use the hard to hear, low and high frequencies for the distance and accuracy of them.

It was the silent sound of SONAR that helped discover the 113-year-old *The City of Rio de Janeiro* at the bottom of the ocean close to the Golden gate bridge. The specific type of SONAR used is called *Active SONAR* and it is used to determine how far away objects are in the water using sound waves that pulse out and return when they have hit an obstacle. The technology used to do this is the echoscope, which at the time revolutionized how much detail could be



Image of *The City Of Rio De Janeiro*.

made with SONAR. This level of detail made it possible to finally find *The City of Rio de Janeiro*.

Sources:

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