

# RRS Sir David Attenborough Completes Antarctic Ice Trials



The RRS *Sir David Attenborough* has completed ice trials during its maiden voyage to Antarctica – a critical milestone in the commissioning of Britain's new polar ship. This is the first in a series of trials to get the ship ready for multidisciplinary science missions.

The purpose of ice trials is to test the ship's capability and performance in ice. The trials team tested the ship's capability over ten days in January by following a set of standard procedures to ensure the ship fulfils its contractual specifications to perform in ice. British Antarctic Survey (BAS) operates the RRS [Sir David Attenborough](#), which is owned by [UKRI-NERC](#).

## Satellites to Locate Suitable Areas

The ship was tested through ice, at every power level, to measure its performance and compare it to the expected, modelled results. The team also performed a range of other manoeuvres including reversing, turning and impact tests at different speeds in areas of sea ice around the Antarctic Peninsula and Bellingshausen Sea.

The team enlisted the help of satellites to locate suitable areas of ice for the trials. Most manoeuvres took place in fast ice – ice that is attached to the coast and not moving. This allowed the team to calculate accurately the amount of energy required to break the ice. Tests in various ice conditions and concentrations, such as open and closed pack ice, give a complete picture of the ship's performance.

## Measurements of the Ice

To fully understand the ship's performance, the trials team took measurements of the ice, including ice thickness and the amount of snow, as well as physical properties of the ice such as temperature and salinity.

BAS' Ralph Stevens, Captain of RRS *Sir David Attenborough*, explained: "Overall, we're really pleased with the ship's performance in ice trials – in some trials it actually performed better than we expected. The trials did highlight some issues with the ship which need to be addressed but this was expected – the SDA is a bespoke ship with a complex design, and the purpose of trials is to find the things that don't work so well.

"The thing that surprised us most was how comfortable the ship was while breaking through the sea ice. The bow breaks the ice in a completely different way to our previous vessels, and is much quieter than expected."

□ RRS Sir David Attenborough has completed ice trials on its maiden voyage to Antarctica. (Photo: Jamie Anderson, British Antarctic Survey)

## Unprecedented Sea Ice Conditions

The ship encountered unprecedented sea ice conditions after the ice trials – second-year sea ice, covered in a thick 1.5 metre layer of snow. This hampered efforts to reach Stange Sound to deliver critical science cargo in support of the [International Thwaites Glacier Collaboration](#).

The RRS *Sir David Attenborough* is a Polar Ice Class 5 (PC5) ship, meaning it can operate year-round in medium, first-year ice. The ship can break through ice one-metre thick at a speed of three knots (5.6km/h). When ice-breaking, the ship rises up on the ice and uses its weight – 15,000 tonnes – to break through.

BAS' John Harper, captain on RRS *Sir David Attenborough* during ice trials, said: "While sailing to the Stange Sound, the ship broke through over 15km of second-year fast ice that was over two metres thick – way beyond the expected ability for a ship of

that polar class. While it was frustrating as we couldn't reach our drop-off point, encountering these conditions has been an incredible learning experience and has given us the opportunity to push the ship to its limits and really see what it can do."

This multidisciplinary research platform will transform how ship-based science is conducted in the Polar Regions, and provide scientists with state-of-the-art facilities to research the oceans, seafloor, ice and atmosphere.

## Forward-looking Sonar

The ship's sensitive acoustic instruments are housed within the hull and covered with a protective material to ensure they are protected when the ship is in ice. Other instruments, such as the farsounder forward-looking sonar, which warns of navigational hazards under the water (such as uncharted rocks), is fitted on a retractable pole and will only be deployed when the ship is not ice-breaking. The ship also has a moon pool – a four-by-four metre hole through the middle of the ship – through which researchers can deploy instruments, even when in ice.

Professor Dame Jane Francis, director of British Antarctic Survey, stated: "This is another significant milestone for the ship and I'm delighted to see it performing well. It's been quite special to see the stunning footage of our big red ship surrounded by snow and ice for the first time. It is something we have all imagined, right from our initial conversations about the ship, and so it's a very poignant moment to finally see it in the ice.

"Following COP26 in Glasgow last year, the world is more aware than ever of the urgent need to understand our changing world, and the RRS *Sir David Attenborough* has a vital role to play in that."

## Complex Science Equipment

The RRS "Sir David Attenborough" will return to the UK in June 2022 at the end of the Antarctic season. The ship will spend several weeks in refit to rectify the issues identified during ice trials, and to finish commissioning science equipment, which was delayed due to Covid-19. The ship will also spend around 30 days at sea conducting initial science trials, testing acoustic and winch equipment. These trials are to ensure all the complex science equipment on board the ship is functioning correctly and will provide the crew and science teams with the opportunity to establish new protocols and ways of working. Further science trials will take place during the 2022/23 Antarctic season.

*Source: British Antarctic Survey*