

Atlantic Automaton

Canadian Geographic's May/June 2018 issue introduces adventurers Colin and Julie Angus' ambitious plan for an autonomous solar-powered boat to cross the Atlantic Ocean. With your students, use the infographic and the following questions to learn about the voyage and the science and technology needed to accomplish this feat.



Check for understanding

1. What obstacles have stood in the way of other crossing attempts in the past?

2. What considerations did the Anguses take to improve their chances of success?

3. List three types of scientific data that will be collected on this voyage. How could this data be used?

1.

2.

3.

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4. Compare and contrast the Anguses past crossing of the Atlantic Ocean with their upcoming expedition. What are some of the same challenges they will face and what are some different challenges they may encounter?

SIMILAR CHALLENGES	NEW CHALLENGES

Extend your geographical thinking

What is where and why there? The Anguses intend to collect scientific data while on their voyage. Why are our oceans important for scientific study and what kind of information can they provide? What types of data can be collected to improve our life on land, to improve our world's sustainability or to make predictions for the future?

Why care? The United Nations' Sustainable Development Goals include a goal about ocean conservation and the use of our ocean resources for sustainable development. Explore the targets, actions that are being taken, and ways you can become involved in realizing Goal Number 14: Life Below Water on the [Global Goals website](#). Why is this goal so important to our world's sustainability? How can the Anguses' innovative project potentially support the realization of this goal?

Resources

- [Angus Adventures](#)
- [The Ocean Research Project](#)
- [Ocean Networks Canada](#)
- [The Global Goals](#)
- [Atlantic crossing by Mylène Paquette](#)

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Will a Canadian adventure team be the first to send a pilotless boat across the Atlantic?

By Brian Banks

While self-driving, autonomous cars may not be an everyday occurrence on Canadian streets, awareness that they're coming is widespread. But autonomous boats? Who knew, right?

Adventurers Colin and Julie Angus, of Victoria, want to change that. Perhaps best known for being the first to cross the Atlantic Ocean in a rowboat from mainland Europe to North America in 2006, the couple are now vying to repeat a variation of that feat this year with an autonomous, solar-powered boat.

Since 2009, international teams have made 27 attempts — mostly under the auspices of a race called the Microtransat Challenge — and all have failed. "From storms to debris such as discarded fishing gear to technical malfunctions, getting an autonomous boat to travel that far is really challenging," says Julie. The Anguses' efforts will help demonstrate the value of such technology for marine research and environmental management, but the growing field has implications for everything from weather forecasting to seismology to anti-submarine warfare.

Working with a small group of technicians, the pair hopes their first-hand knowledge of "how a boat needs to be built to endure those conditions" will make the difference. Once final testing is completed in early June, they'll ship the craft to Newfoundland, set a course to Ireland in the onboard computer and send it on its way.

Here's an illustrated approximation of the vessel's design and the critical components that the Angus Adventures team are counting on to get it there. 🌀

COMMAND CENTRE

The onboard computer — linked to home base via satellite — controls navigation and collision avoidance. Additional microcontrollers manage the rudder, speed, power consumption and sensor controls. "Previous attempts failed due to the complexity of the systems involved," says Julie. "We wanted to ensure it's as simple as possible."

ENVIRONMENTAL SENSORS & CAMERAS

The vessel will measure water temperature, pH levels and other conditions with sensors mounted in a chamber in the aft hull and in a device lowered into the water using a winch at the stern. The boat will also carry one or two cameras, to capture images on the surface and, potentially, underwater. "On our Atlantic crossing, we were followed by dorado and trigger fish and also saw dolphins, whales, sharks and turtles," says Julie.



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HULL & ROLL TUBE

High winds and potential wave heights of up to 10 metres require the boat to have a robust structure. A long trimaran hull provides stability and a buoyant roll tube enables the boat to right itself should it capsize. The tube doubles as a platform for weather sensors, lights, radar and antennas.

KEEL & RUDDER

Reliable steering control is essential, so the keel is shaped to protect the propeller and rudder from debris while keeping the boat on course as it works against crosswinds and currents.

PROPELLER DRIVE MOTOR

This part of the design went through many phases. Motor systems attached to the hull's exterior lacked power, so the Anguses opted for a larger, internal electric motor. To eliminate the risk of leaks (a drive shaft would require a hole in the hull) they're using a coupling that conveys torque from the motor to the propeller with magnets. It's one of the boat's more "novel components," says Colin.

SOLAR PANELS & BATTERY

The Anguses opted for solar power over sail. It enables the boat to go faster — critical against strong currents and to reduce the chance of being exposed to storms. The deck supports a 1,200-watt solar array capable of producing 100 watts of energy, which translates into an average speed of three to four knots (five to seven km/h). A lithium ion battery stores 1,200 watts for nighttime or cloudy conditions.

A map of the 27 previous autonomous boat Atlantic crossing attempts and the Angus Adventures' planned route from Newfoundland to Ireland. Given their predecessors' failures, the Anguses won't say they are "confident" they will succeed. Even in the first stretch, fog could present a real problem for the solar-powered boat, explains Julie. "Really, once we make the halfway point, we'll have made it farther than most. From there we'll just hope for the best as it moves along."

