





Go with the floe

The Gulf Stream is slowing down but analysis and data collection on the impact remains limited. **Sam Turpin** joined a group of sailors who headed north to help in the gathering of essential information on what is going on

"How well did the probe work? Were you able to record the data?" asks oceanographer Cédric Courson. He has just appeared on the deck of the North About. The 15-metre yacht left Roscoff, in France, for Iceland about three weeks ago. Our crew of six carried a precious cargo of probes and sensors for taking measurements - plus me - the journalist accompanying this summer-long expedition. This is my first journey as far as the waters of the 66th parallel North and I'm making it aboard a legendary vessel: the North About is the only sailing boat to have made two Arctic

LEFT
North About sailing to Narsarsuaq glacier (Greenland)

ABOVE
Captain Tobias Carter takes the yacht into port in the Westman Islands.

circumnavigations via the Northeast and Northwest passage. The first took place over two seasons in 2001 and 2005, then an expedition led by explorer David Hempleman Adams highlighted the alarming manner in which the ice cap had shrunk by making the entire circumnavigation in an astonishing and also alarming seven weeks in 2015.

Now the boat is on a new mission that stays true to the alarm raised by Hempleman Adams. Captain, Tobias Carter and expedition leader Sophie Simonin have set a new mission for the North About for the past two years - operating through their organization UNU Mondo Expedition - that of serving as a logistic platform for scientific missions to the Arctic region and participating in a mission to raise young people's awareness of the effects of climate change.

The wind picks up suddenly and →



changes direction. It's a beam wind. It had been on the nose only five minutes earlier. We had rounded the headland of the Westman Islands and set sail for the Álftanes reefs at Mýrar, near Akranes, and the Bay of Reykjavik, Iceland. These are dangerous waters with a fearsome reputation: French expedition leader Jean-Baptiste Charcot and 39 crew members from the ship *Pourquoi Pas* lost their lives here in 1936, on the return leg of their expedition to Greenland. A chill gust hits the *North About* land she heels to starboard. The topping lift of the mainsail slaps. Ben and Thomas lower the genoa and raise the staysail, which immediately catches the wind and fills. Cédric wraps the sheet around the winch. He is both oceanographer and sailor. Relieved of a bit of pressure in the sails, the *North About* settles back into the groove and we forge on.

This was my first experience at sea. In normal life I'm a war correspondent. During many years reporting in conflict zones, I was used to being anchored to the land. I suffered from seasickness for 36 hours as the boat was rolled and pitched hard as we headed out into the Atlantic. After this period of suffering, I was able to take full advantage of the beauty of the open sea, the sunlights, the moon light, the whistling of the sails, the dolphins and the gulls playing with the wind while they pass between the mainsail and the staysail.

The boat is 14 meters long and seven people live in this small space

which became very cramped after we had taken on board all the food for two months and the scientific equipment. The organisation of community life in a space of about 20 square meters and the harmony of between the crew members are obviously key components for the success of such an expedition. We learned to look after each other, we had to manage our respective fatigue and tensions that could appeared.

Cédric returns to the little electronic control unit attached to the guardrail, with a small solar panel set above it. Every 15 minutes the unit records the temperature of the sea, the salinity of the water and the relevant GPS coordinates, using a probe submerged in the water. He removes the flash drive and takes shelter in the cockpit to process the data on his laptop. "In the long run, this data is going to provide us with information about the stratification and mobility of ocean currents – and this is fundamental in analysing ongoing changes in the Gulf Stream, which flows past here, to the south of Iceland", Cédric explains.



ABOVE LEFT
Mate Benjamin LeBotland collecting seawater samples to measure salinity: samples taken twice daily on the journey between France and Iceland.

ABOVE RIGHT
The yacht *North About* on its way to Greenland.

BELOW
Expedition leader Sophie Simonin takes a compass bearing.

Weakening stream

The Gulf Stream, which carries around 20 million cubic metres of water per second, conveys some of the tropical heat from the Gulf of Mexico to the North Atlantic before dividing in two to the south of Iceland and continuing on its way towards Europe. Recent studies confirm a slowing of its flow during the past 150 year. "It's the Gulf Stream that gives western Europe a temperate climate. If it were to slow or weaken, the current would carry less warm water and the temperature of the Atlantic Ocean could fall. Over the long term, this could have quite serious consequences for the future climate model. We could in fact experience alternating periods of quite intense heat and cold", Cédric explains.

The western coast of Europe, from Great Britain to Spain, and including France and Portugal in between, would experience a drop in temperature of 1 to 3°C on average over the year, with great contrasts between colder winters and hotter, drier summers. London might alternate between scorching hot summers and long rainy periods over the rest of the year. Further east, Hamburg could experience drops in temperature of 10 degrees in winter. Meteorological phenomena such as storms and cyclones could become more frequent and more severe, affecting agriculture and biodiversity. On the other side of the Atlantic, the eastern coast of the United States would be under increasing threat from a rise in sea levels, because the



weakening of the Gulf Stream current would prevent it from being able to carry such great quantities of water.

The ocean conveyor belt

The Gulf Stream is part of an incredible ocean water circulation mechanism known as AMOC (Atlantic Meridional Overturning Circulation), which could be likened to a central heating system of the

Earth. Warm, less dense surface salt water travels back up to more northern latitudes, where it cools down. It then becomes denser and sinks down to the depths, as it makes its return journey back to the Equator and the southern hemisphere, eventually reaching the Antarctic. This "ocean conveyor-belt" system, causes a heat transfer from the ocean to the atmosphere, thus contributing to

BELOW
North About heading into the Prince Christian Sund fjord (Greenland)

ABOUT THE BOAT:

Northabout is a Chatham 47 designed by the famous French naval architect, Gilbert Caroff, she was custom built by adventurer Jarlath Cunnane from County Mayo. She features a swing keel with internal ballast and was designed to be built in either aluminium or steel. In 2016, in order to highlight the rapid melting of the ice pack, renowned adventurer Sir David Hempleman-Adams purchased Northabout and sailed around the entire Arctic in one season. This was the second time the yacht had achieved this feat; the first undertaken over two seasons in 2001 and 2005. On the second time around, the yacht completed the trip in an unprecedented seven weeks, illustrating just how much the icecap has melted.

Designer: Gilbert Caroff

LOA: 49' (14.95m)

Beam: 14'6" (4.45m)

Draft: (min) 3'3" (1m),
(max) 8'2" ft (2.50m)

Displacement: 33,731lb (15,300kg)

Construction: reinforced aluminium





the creation of atmospheric disturbances.

The AMOC has weakened by 15 to 20% during the past 150 years, according to studies published in the scientific journal *Nature* by Niklas Boers and Stefan Rahmstorf.

While the Gulf Stream did in fact undergo slowdowns of this kind during the Ice Age and the Little Ice Age, which last plummeted the northern hemisphere into an Arctic climate 8,000 years ago, what concerns research scientists today is the pace at which the Gulf Stream appears to be slowing down today.

"It's likely that the increase in rainfall and the influx of cold freshwater from the melting of Greenland's glaciers and the Arctic pack ice – such meltwater being attributable to human activity – is seriously disrupting the ocean currents and could affect the entire thermohaline circulation cycle", Cédric continues. The Greenland ice sheet alone has been losing an average of 290 billion tonnes of ice

each year since 1996. The cold freshwater is believed to be forcing the warm waters of the Gulf Stream to sink down to the depths and then to stagnate further south. The surface waters of the North Atlantic are consequently growing colder, a phenomenon which has already been seen for a number of years now around Labrador and Newfoundland, and to the south of Greenland. This cooling effect could, notably, be the reason behind the harsh winters experienced by the northeast of the United States and Quebec during the past few years.

"The oceans are the places that we know the least. We are better acquainted with the Moon and will soon be more familiar with the planet Mars than with our own oceans", notes Cédric, "and yet, out of three sources of the air that we breathe, two-thirds of the oxygen that is essential to us comes from the oceans, and only one third from plant cover". The oceans cover two thirds of the globe and are in fact the

ABOVE LEFT
Mate Benjamin LeBotland checks the condition of the mainsail

ABOVE RIGHT
North About on its way to Greenland.

BELOW LEFT
Crewman Thomas Bour checks the condition of the electronic unit and the probes used to record the temperature and salinity of the sea water. The unit records the data and the relevant GPS coordinates every 15 minutes.



greatest emitters of the world's oxygen, ahead of even the "planet's lungs" that are the forests of the Amazon and the Congo Basin. They are also the biggest carbon sinks. They have been absorbing a third of our excess output since the beginning of the Industrial Age, thanks to a combination of two processes. The one is physical, and the other, biological. A quarter of the carbon dioxide gas present in the atmosphere dissolves naturally before being absorbed by the ocean surface waters – a physical process facilitated at low temperatures – then spread throughout the water column before being stored in the depths, driven by the ocean currents. "Then you have the phytoplankton – the hero of the sea!" Cédric enthuses. The phytoplankton, like other microscopic plant organisms, absorb the CO₂ and store it within their skeleton. Part of it is released in the form of oxygen, while the rest is deposited on the ocean floor when they die. Studies carried out over the past few decades have highlighted the effects of the increase in temperatures in relation to the expansion of oceans and threats to marine biodiversity, such as loss of species and coral reefs. They have





ABOUT THE PROJECT

UNU Mondo's aim is to raise awareness of the shrinking polar ice cap both by gathering data and also putting faces to the people on the frontline of this climate crisis. Their 2021 expedition, which I took part in, had the following itinerary: Depart Roscoff in France and head to the Westman Islands (Iceland)

First scientific mission: Monitoring temperature and salinity in the Westman Islands. From there we headed to Reykjavik.

Second scientific mission to investigate isostatic rebound and the risk of increased seismic activity. From there we headed to Reykjavik to Husavik (Iceland) –

Third scientific mission monitor the effects of pollution and its consequences on whales in Husavik, especially during the feeding season before migration.

After completing these assignments the boat headed back to Roscoff to prepare for the next voyage.

Find out more about the project by going to: unumondo.org

also helped to establish the correlation between the heat transfers from the oceans and from the atmosphere, which modify the winds and give rise to phenomena such as El Niño. Many scientific researchers are now focussing on the oceans' carbon-storing and recycling role, for the purpose of climate modelling. Today, their behaviour is one of the main issues in the fight against global warming. The rise in temperatures is making it increasingly difficult for CO2 to dissolve in the ocean waters, thus reducing their capacity for absorption and causing ocean acidification. The most pessimistic of scenarios even allow for the possibility that the oceans could themselves become emitters of

carbon, as the forests of the Congo Basin have been for five years now. "If we want to know the precise role the oceans could play over the coming decades, we need to collect data on a grand scale", Cédric explains. "The problem at present is that scientific missions have expensive requirements in terms of logistics and equipment, which considerably limit the number of samples we can collect and measurements we can take. There are fewer than 50 scientific vessels in the world equipped for collecting this type of data. This considerably reduces the opportunities to fine-tune our analyses. That's why projects such as Unu Mondo Expedition are very valuable to us as researchers. But this is not enough in

ABOUT THE AUTHOR

Samuel Turpin is a journalist, photographer, and Gamma Agency contributor. Since 1998 he has lived in conflict zones and humanitarian emergency zones (in Southeast Asia, Central Africa, West Africa and the Middle East). His work has been published in the press and broadcast on international radio stations. Since 2016, his work has focussed on environmental issues, notably in the form of the multimedia project Humans&Climate Change Stories, the aim of which is to follow 12 families suffering from the effects of climate change over a period of 10 years. This article was translated by Karena Keeley

For further information, please refer to the website www.samuelurpin.com. photography

itself, and we can go further, notably by developing participatory science opportunities."

This means developing durable, autonomous, self-monitoring and auto-diagnosing measuring instruments that are easy to install, reliable and affordable, which could be used to equip any type of ship or boat, as desired. "We are going to launch a trial involving 3,500 volunteer sailors, who will take light equipment on board, like that carried by the North About – but there are 14,000 yachties who travel the seas every year and could collect data during their journeys. The very fact of taking on an active role in the project also helps to increase the scale of public involvement in saving the planet", the oceanographer notes. In this same spirit, the data collected is then shared, as open data, with all researchers. "This data is not intended to replace the readings collected by scientific expeditions but to complement them, to be able to map the changes taking place in the oceans more comprehensively", Cédric concludes.

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