

An aerial photograph of a white sailboat with a large white sail and a blue and orange stripe on the lower part of the sail, sailing on a dark blue, choppy ocean. The boat is moving from the top right towards the bottom center, leaving a white wake behind it. The sun is reflecting off the water's surface, creating a shimmering effect. In the top left corner, there is a small red rectangular graphic element.

The sailor's journey

by Katherine Lehmmuller and Marco Mozzon

On October 19, 2014, a brave sailor determinedly set out to sea. His goal was to sail around the world alone, without the help of any fossil fuel or additional supplies, other than what he brought with him for the entire 50,000 nautical mile journey. What would a sailor bring along in order to survive such an ordeal? This sailor, the Italian Matteo Miceli, decided on a fishing rod, two chickens, a plot of dirt to grow vegetables, a machine to desalinate drinking water and three Leica Geosystems' GNSS GR25 receivers and three Leica AS10 antennae.

To sail around the world self-sufficiently was Matteo's motivation for undertaking this journey, however he was just one member of a group working together on the project, "Rome Ocean World", and they had other goals as well, such as being the first sailboat to accurately record the water and boat's movement throughout the trip using GNSS technology.

At the end of the journey, Professors Paolo di Girolamo and Mattia Crespi from the University of Rome and Alessandro Pezzoli from Polytechnic Turin, would analyse the data that would hopefully validate the UK-based MET (meteorology) numerical models by calculating wave heights on the Eco40 route; improve the structural design of the Class 40 boat by calculating the dynamic stress and durability of the vessel during the trip and finally, to produce a polar diagram of the boat's speed after recording wave characteristics, which will be especially useful for future Class 40 racing boats.

After setting sail from Rome's nearby Port di Traiano, Matteo had three beautiful days of weather, allowing him to check in with his team back in Rome, with which he was in daily contact. However, he was soon confronted with the first of many tests of seaworthiness when the remnants of Hurricane Gonzalo hit the Mediterranean with heavy rain and gale force winds. After several intense and expectant hours of lost contact, the Eco40 team received an automatic



data transmission on the boat's position, confirming it survived 80km/h (50mph) winds and six metre (20 feet) high waves, and that it was on its way towards Gibraltar.

This storm left the Eco40, the sailor and his chickens in bad shape. The garden was ruined, with its dirt full of salty water and vegetables dead. The chickens had been traumatised and wouldn't lay eggs for some time and the sea was still so stormy that fishing was out of the question.

For just such emergencies, the sailor kept 100 bags of freeze-dried food on the boat and for several days Matteo survived on 100g (0.22lbs) of carbohydrates, a handful of fried fruit and some salted fish he had managed to catch before the storm hit.

After the storm passed, Matteo had time to think. A professional sailor by trade, it was a challenge for him to stop and fix damaged boat parts. Matteo wanted to push the high-performance Eco40 to set

record speeds but instead, he had to wait, either for the repairs to dry, or for wind. The sailor had time on his hands and was confronted with the commitment he had set for himself when agreeing to take part in this adventure. The lack of wind got to him, and even with the daily tasks of running a boat, data collecting or just plain day-to-day survival, he was sometimes lonely and often doubtful. Luckily the chickens, whom he nicknamed Blondie and Brunette, needed encouragement to lay eggs and they became fast companions. He also had daily support from his Facebook fans to cheer him.

Data was collected by the Leica GR25 GNSS receiver and the Leica AS10 antenna and sent via GEO stationary satellites without any problems. And the Eco40's hydro, wind and solar energies supplied as planned. The real problems of this journey were more mundane concerning human nature and the purpose of existence. For instance: The sailor could only get a few hours' sleep before being awakened by gusts of wind, which caused severe jolting of the boat; or the auto-pilot's voice waking him to tell him of some route change. If he could sleep more than 20 minutes at a stretch, he had to nevertheless keep his eye on the barometer since his life depended on knowing if a storm was approaching. Food was of course always a big concern – just to catch a fish or grow bean sprouts on a wet paper towel were major victories. Fish, sprouts or maybe an egg, this was Matteo's diet for months – if he was lucky – and he was happy to have it. The companionship of Blondie and Brunette helped to distract Matteo from loneliness and it was a sad day for the sailor when, for no apparent reason, Blondie passed away. Sometimes he was lucky enough to be accompanied by birds or dolphins, however he was alone on this journey and for him, it was the little things in life that mattered most.

Unpredictable weather patterns were also a major concern. One night, a sudden wind change caused the boat to do a death roll. Matteo woke to an almost capsized boat, halfway under water. Alone, in the dark and with water rushing into the cabin, the sailor had to think fast. It's a situation many of us wouldn't want to be in. Sometimes the boat sat in fog for days on end. Another time, a massive wave hit the boat while the sailor slept, causing a very bad head injury and severe anxiety. Nonetheless, Matteo had to go on tending the boat in order to survive.





The Eco40 sailing boat

This was no ordinary boat. It was a professional racing class sailboat known as the Class 40, customised and equipped to sail self-sufficiently around the world. Equipped with tread-proof solar panels, two wind generators and two hydro-turbines, the boat was appropriately named Eco40. Generating three kinds of renewable energy, the sailor hoped to have a continuous supply of electricity throughout his journey, and provide enough for the boat's electrical equipment, oven, microwave and hot water kettle as well as supply light for the onboard vegetable garden, for desalinating seawater and for a tiny freezer to store fish the sailor hoped to catch.

He journeyed through cold polar air and icy waters of the Sub Antarctic, with the unseen dangers of icebergs looming ahead. Severe waters for a boat to be in and it was during this part of the trip that the Eco40 lost its auto-pilot. It was damaged along with much of his electrical equipment after being struck by lightning. Luckily, his team (Cecilia Angelelli, Valerio Brinati, Allesandro Farina with Leica Geosystems' technical support Pierpaolo Pecoraro) "walked" him through this part of the journey, restoring his PC software, the boat's instruments and helping with battery problems via satellite calls. This damage needed to be rectified as quickly as possible, even if only temporarily.

With icy rain and freezing temperatures, Matteo remained strong. But stress took its toll on the sailor. At this point, he had been sailing alone for over 100 days. Lack of sleep, too little food and constant cold had its effect. He endured near-fatal storms and heavily damaged electrical equipment – and was very worried. This was certainly a bleak part of his journey – and it was somewhat noticeable in his communications. He started eating chicken feed to survive and had to pull out his own tooth. Yet, he did what he had to – to survive.

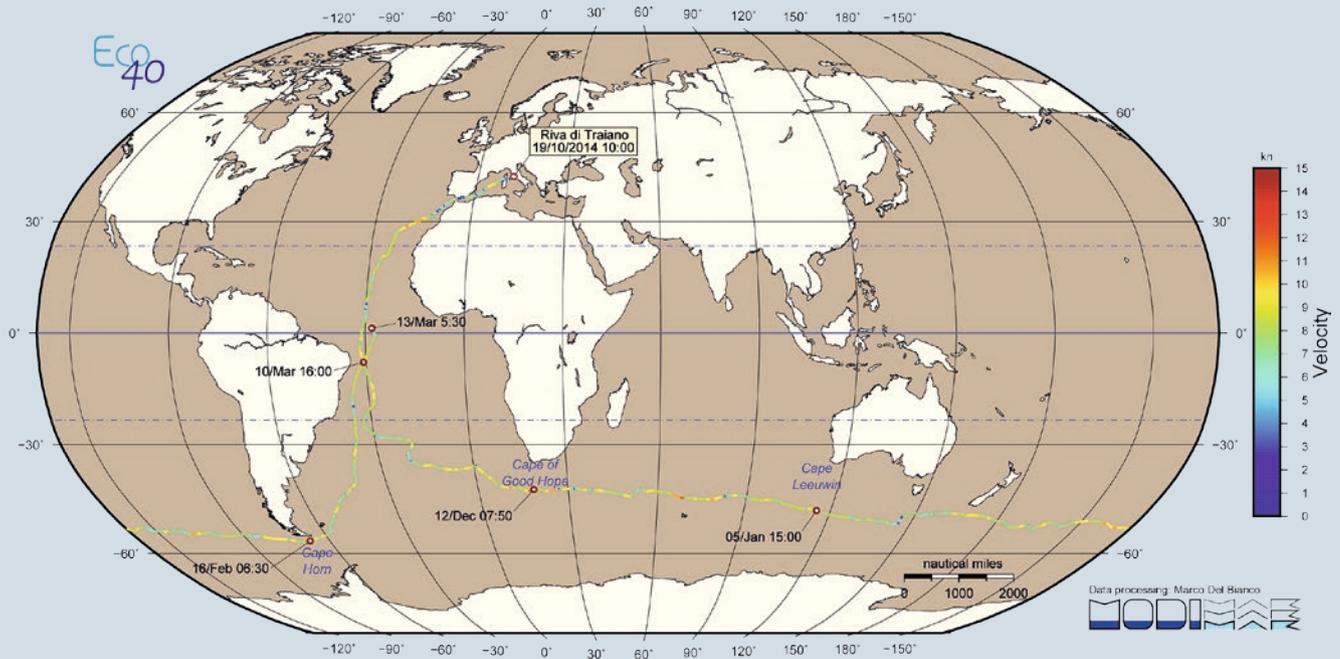
In early March, Matteo discovered the Eco40's rudder under 300 litres (80 gallons) of water. These bushes holding the rudder and almost caused the jour-

ney's end however Matteo had managed to repair them. This time bolts holding the boat's keel in place caused Matteo to lose the keel in March, on Friday the 13th, and wind capsized the Eco40. Alarm systems warned Matteo and alerted the Italian Coast Guard, who then sent word to the nearby merchant ship, Aramon, to pick up the sailor, who patiently waited in an inflatable raft he managed to fish out of the Eco40 before it sank.

The sailor also tried to rescue Brunette but sadly, he was too late.

Yet Matteo was lucky. The area where the boat capsized was known for its calm waters and he had, eight hours earlier, closed the double-crossing of the equator. He accomplished what he had set out to do. He rounded the Cape of Good Hope, Cape Leeuwin and Cape Horn; crossed the equator twice and crossed all the meridians he planned to. The Eco40 travelled, from start to its tragic finish, roughly 25,000 nautical miles (approx. 46,000 km/28,600 mi) and at the time of its capsizing, was approximately 965 kilometres (600 miles) from the Brazilian Coast.

Matteo also succeeded in accomplishing his goal to sail non-stop, all alone, around the world, from point of departure to point of arrival and maneuvered the Eco40 several times across oceans for 112.4 days at an average speed of 7.4 knots.



■ The green line displays the global route Matteo sailed on the Eco40.

After being rescued by the Aramon, Matteo was pampered by its crew. He had lost more than 30 kilograms (66 pounds) and spent his time relaxing, eating and making use of the ship's gym.

Matteo Miceli arrived back in Italy on March 19th at Rome's Fiumicino Airport. Upon seeing the professors for the first time since he left Rome, the sailor presented them with the all the SD cards containing the data that the receivers collected during the trip with the exception of the very last cards that were still in the GR25 receivers as the ship went down. These cards were last exchanged on February 28, when the Eco40 was off the Argentinian Coast.

Almost immediately, the professors and the sailor began planning how to recovery the boat. A satellite tracker was still sending out signals from the boat, which was drifting with underwater currents. The tracker's batteries would soon be empty so with little time to spare, the team flew back to Brazil and organised a boat for the rescue, while also planning the stabilisation, and transport of the Eco40 once it resurfaced. Unfortunately some 30 hours before reaching the recovery area, the tracker stopped sending a signal. The area was too large to search and on April 4th, the search was suspended and the team went home.

However, the journey is not over yet. Just seven days ago, word reached the professors that a Spanish

fishing vessel spotted what was thought to be the Eco40 floating off the coast of Brazil, 350 nautical miles from where the team expected to find the boat. A photo was taken and posted on Twitter.

Unfortunately since then, no one kept track of its position, but according to the professors' calculations, it was headed out to sea ...

What next? The journey continues. Stay tuned ... ■

Good winds to all!

You can read the entire 10-part series of *The Sailor's Journey* at: <http://www.leica-geosystems.com/sailor>

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