



Newsletter 7

November 2021

Project carried out by



In partnership with

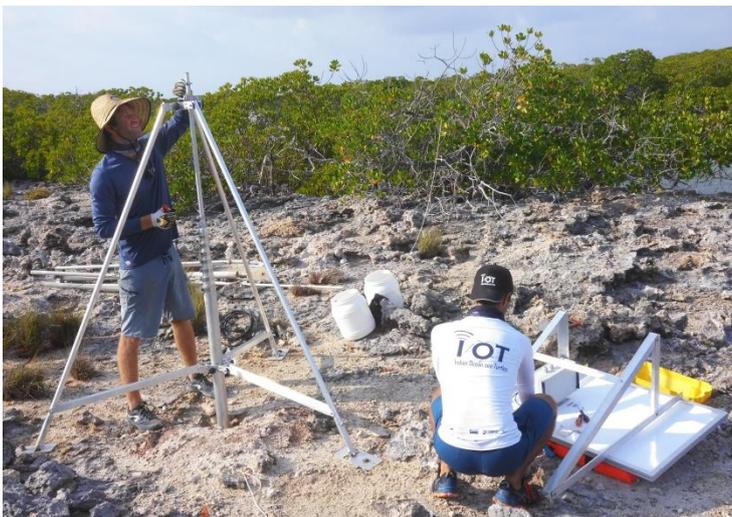




*In this special issue, we would like to present the various **deployments** that have taken place in recent months as part of the IOT project.*

EUROPA 2 MISSION

From September 16 to October 20 2020, a **first deployment mission** (EUROPA 1) took place on the island of Europa, located south of the Mozambique Channel (see newsletter 5) and administered by the French Southern and Antarctic Lands (TAAF). During this mission, three members of Ifremer's Indian Ocean delegation **updated the network of receiving stations** (installed in 2019 during the pilot project pIOT) and **set up a satellite station**, **experimentally tagged** two juvenile green turtles with the new IOT tags, and carried out **bathymetric and photogrammetric surveys** of the seabed using the autonomous USV (Unmanned Surface Vehicle).



Replacement of the pilot project receiving stations (pIOT) with new and more robust structures © IFREMER

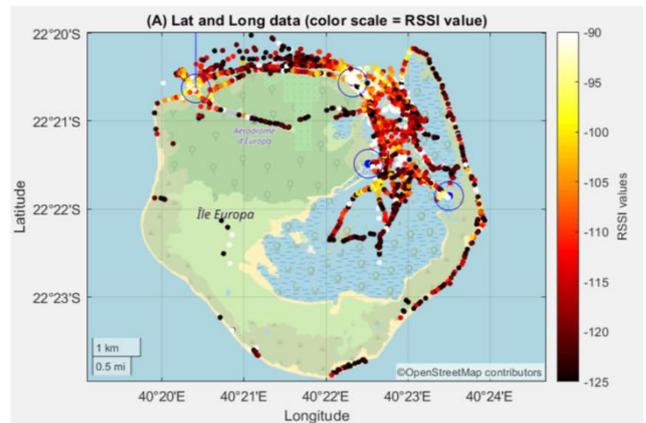


Taking biometric measurements on a juvenile green turtle before attaching the new IOT tag © IFREMER

A **second mission** (EUROPA 2) was organised in 2021 with the aim of **continuing the deployment** of the project on Europa. Two members of Ifremer's Indian Ocean delegation and one person from the Montpellier Laboratory of Computer Science, Robotics and Microelectronics (LIRMM) went to the island from May 17 to June 24 with the support of the Armed Forces in the Southern Indian Ocean Zone (FAZSOI), the French Navy and the French Southern and Antarctic Territories.

During these 38 days, the team carried out **maintenance** and **reactivation of the LoRa network** on the island. Based on the experience gained since the previous mission in 2020 and the analysis of the first data collected during Mission 1, a number of **corrections** were also made on site to the software of the receiving stations.

As part of the work on turtle geolocation via the exploitation of LoRa message metadata, the team deployed a second type of LoRa object called "**GPS tracker**". It is a waterproof box containing a GPS module and a LoRa transmission system and carried by the team during its various journeys (on foot, by boat or kayak). These objects were used to measure the relationship between the position of the tag (in this case the GPS tracker) within the coverage area and the reception level of the LoRa signal received by the stations.



Map illustrating the areas covered during the acquisition campaigns with GPS trackers during the Europa 2 mission
© IFREMER



Kayak towing the GPS tracker through the lagoon and mangroves of Europa during the Europa 2 mission
© IFREMER/CNRS-LIRMM-UM

The second part of the EUROPA 2 mission consisted of **tagging eight juvenile turtles**, given that the IOT project aims to deploy ten new generation tags on each of the study sites and that two individuals had been tagged during the EUROPA 1 mission. Seven green turtles (*Chelonia mydas*) and one hawksbill turtle (*Eretmochelys imbricata*) were equipped with the latest generation of the IOT tag developed by LIRMM and Ifremer (final and corrected version of the tags deployed for the EUROPA 1 mission in 2020). One of the eight tags was even a solar tag equipped with small solar panels on the top.

Some of the tagged turtles were seen again by the team in Europa's inner lagoon during the remainder of the scientific campaign.



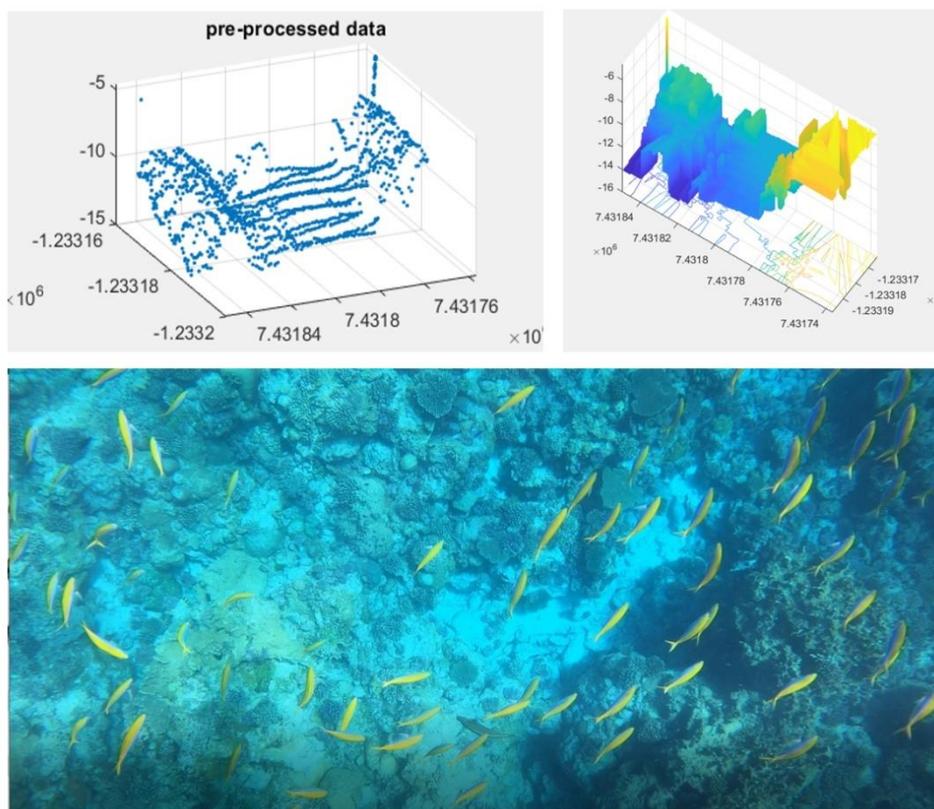
Green turtle named "Kelonito" tagged during the Europa 2 mission
© IFREMER/CNRS-LIRMM-UM

Before each mission, the teams were **trained by Kelonia** at the care centre and at the experimental platform to learn how to handle and tag the turtles.



Training of the team at Kelonia before departure for the Europa 2 mission © Kelonia

The third part of the EUROPA 2 mission was the **continuation of the acquisition of bathymetry and photogrammetry data** with the USV (Unmanned Surface Vehicle). A first series of surveys was carried out in 2020 during the first mission on sites known to be frequented by juvenile turtles, then at the beginning of 2021 on specific sites on the outer reef as part of the monitoring of the state of health of Europa's coral reef (sites monitored within the Global Coral Reef Monitoring Network - GCRMN) at the request of the TAAF (see Newsletter 5).



Example of plots of data from depth measurements (top) and video footage (bottom) taken with the USV board © IFREMER

MAYOTTE MISSIONS

Several deployments then occurred in the following months. **Two missions** took place in **Mayotte**, the first from 17 to 24 July, then the second from August 25 to September 1 2021. A joint team of scientists from the Indian Ocean delegation of Ifremer and the LIRMM implemented the IOT project on this study site.

The objective of the first mission, named Mayotte 1, was to check the **proper functioning** of the **LoRa network** on the two sites identified for marking and monitoring juvenile turtles, namely **N'Gouja**, located in the south-west of Grande-Terre, and the **Badamiers mudflat**, in the west of Petite-Terre. The second objective of this mission was to **tag turtles** with the latest generation of IOT tags.

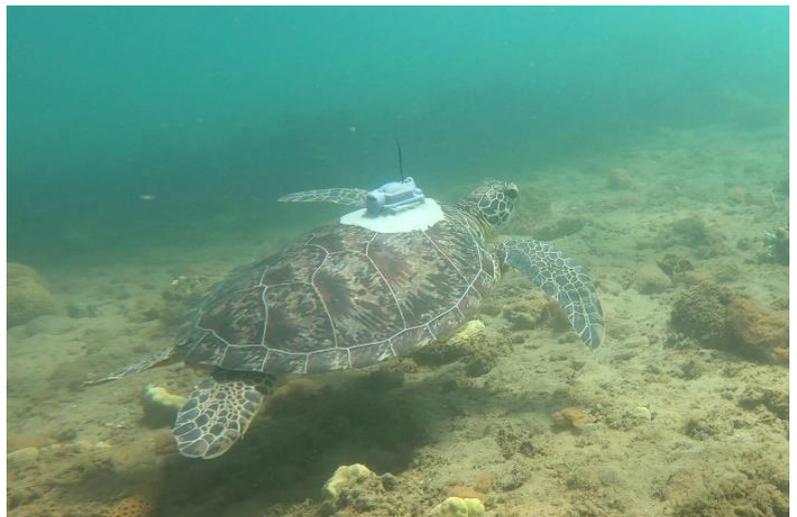
With the support of the Mayotte Natural Marine Park, the Mayotte Departmental Council and the Oulanga na Nyamba association, **six juvenile turtles**, three green turtles and three hawksbill turtles, were captured on the Badamiers mudflat and equipped with tags. Mayotte's partners were also trained by Ifremer in the installation of the tags.



Some of the members present during the Mayotte 1 mission in July 2021 © IFREMER



Cleaning and tagging of turtles by partners during the Mayotte 1 mission © IFREMER



Young green turtle equipped with an IOT tag during the Mayotte 1 mission in July 2021 © IFREMER

During this first mission, a **receiving station** was installed at the Mayotte Marine Natural Park's operations centre, located on the edge of the Badamiers mudflat, which will complete the LoRa network deployed by Orange in Mayotte in early 2021.

During the second mission (Mayotte 2) **two additional receiving stations** were installed, one at the Mayotte Maritime Gendarmerie and the other at the restaurant "Le Jardin maoré" in N'Gouja. A third station could also be installed at the Bouéni College, not far from the N'Gouja site where LoRa network coverage is more difficult.

The second part of the Mayotte 2 mission consisted of **tagging the last turtles** of the project. Indeed, the project plans to deploy ten new generation tags per study site. Four juvenile green turtles were captured and tagged at the **N'Gouja** site. For each of the turtles, photos were taken for photo-identification of the individuals and biometric measurements (weight, length and curvilinear width of the carapace) were recorded. All of this information will subsequently be integrated into the "Turtles of the South West Indian Ocean" (TORSOOI) database.



Installation of a receiving station at the Gendarmerie maritime de Mayotte during the Mayotte 2 mission © IFREMER



Release of a juvenile green turtle tagged at the N'Gouja site during the Mayotte 2 mission © IFREMER/PNMM

The signals transmitted by the turtle tags are well received by the networks installed on each of the two monitoring sites. Some turtles have even been observed again by partners or swimmers who have informed Ifremer and for which we thank them.

ALDABRA MISSION

Located 1,150km southwest of Mahé and 400km north of Mayotte, Aldabra Atoll, which belongs to the Seychelles, is one of the four study sites for the IOT project.

Taking advantage of a supply mission in the Scattered Islands and then a collaboration mission between the French and Seychelles armed forces, equipment and three scientists (two from the Indian Ocean delegation of Ifremer and one from LIRMM) were taken on board the French Navy's multi-mission ship, the "**Champlain**", on 8 September in Mayotte, bound for Aldabra. The main objective of this mission, which lasted only three days on Aldabra, was to **set up the LoRa reception station network** and the **satellite connection**. The satellite station and two of the four LoRa stations were installed by the team with the support of agents from the Seychelles Islands Foundation (SIF), which manages the atoll, and part of the Champlain crew

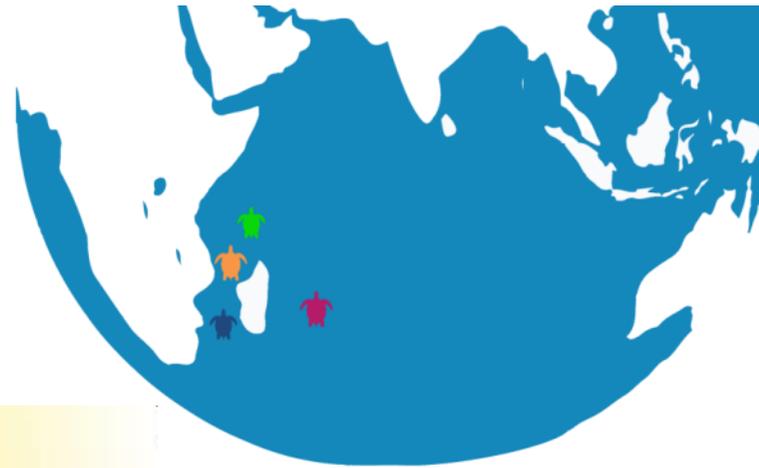
The members of the SIF on the island have also been **trained to install** the stations and have done it for the two remaining stations. The tagging of the ten juvenile sea turtles with IOT tags will be carried out directly by the SIF, which is used to and authorised to carry out this type of operation (see Newsletter # 4).



Assembly of the mast and tripod of the main antenna during the mission in Aldabra
© FAZSOI



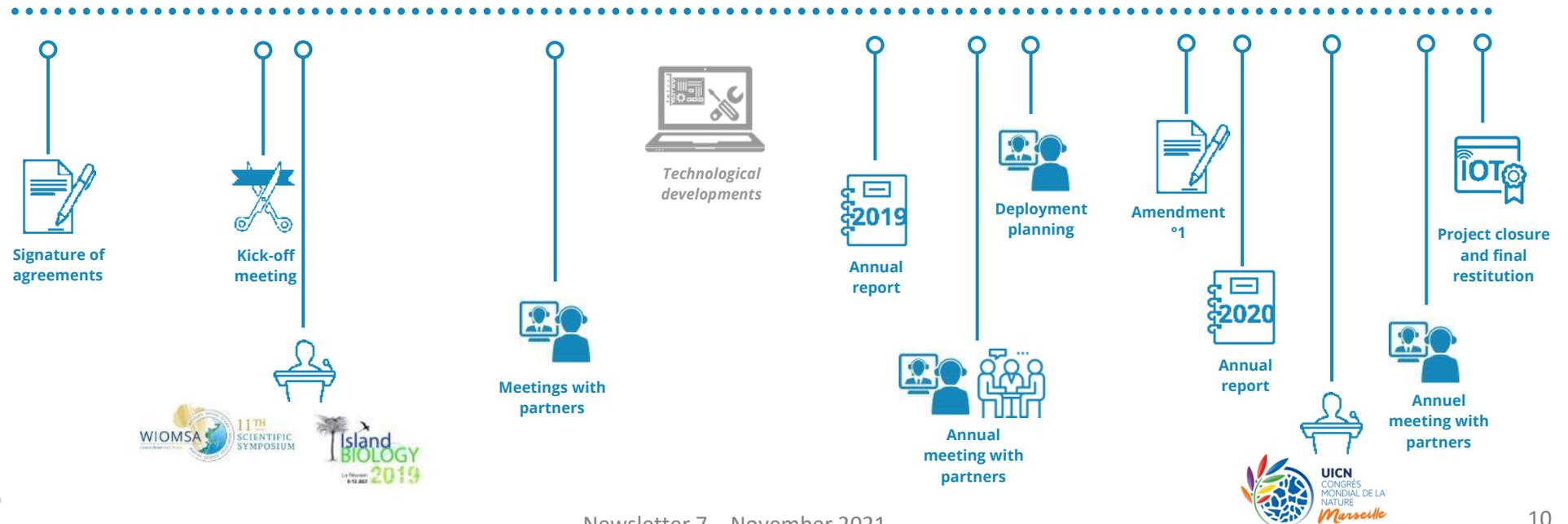
Commander of the Champlain accompanied by the Operations Officer, members of the SIF and the IOT team
© FAZSOI



Test and deployment sites and periods:

- Reunion Island:**
 - ■ ■ tests
 - deployment
- Mayotte Island:**
 - ● ● prospecting
 - deployment
- Scattered Islands (TAAF):**
 - deployment
- Aldabra Island (Seychelles):**
 - deployment

PROGRAMMING AND PROGRESS





To know more about it, visit the web site :

https://www.ifremer.fr/lareunion_eng/Projects/Technological-innovations/piOT-2018-2020-IOT-2018-2021

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