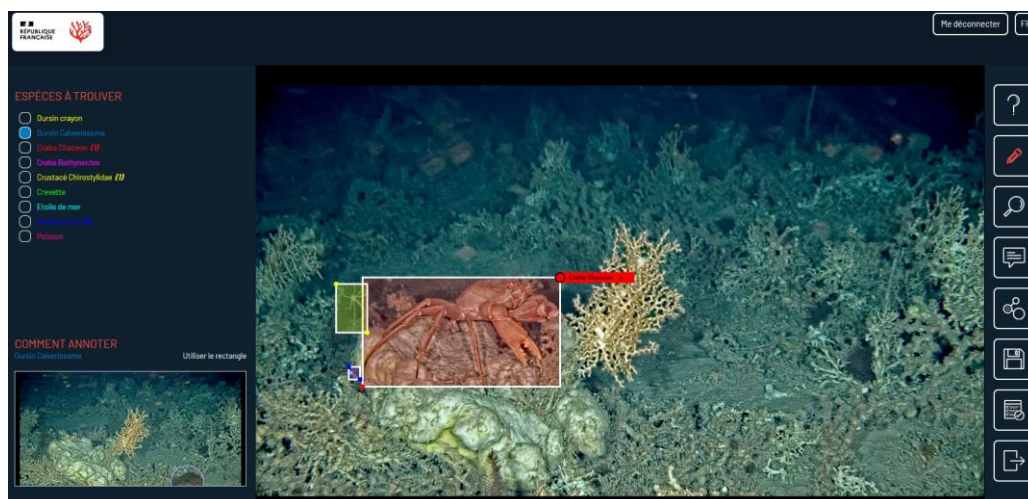


# Ocean spy: a new citizen science app to explore the seabed biodiversity and boost research

Ifremer is launching a new participatory science platform, “Ocean Spy”, inviting citizens to take part in research on marine ecosystems. Anyone can analyse photographs of the seabed, from the Bay of Brest (France) to deep-sea hydrothermal vents, to help scientists identify the species that live there.






The application teaches the users how to analyze images just as scientists would, to identify each of the species that inhabit the seabed. — crédit Ocean spy. Ifremer.

To better understand the seabed, scientists use observatories and underwater devices to record images of benthic fauna and habitats, sometimes continuously. A large quantity of photos and videos must then be analyzed to identify the species appearing in the images. To speed up this task, Ifremer researchers are launching this summer a [participatory science platform, "Ocean Spy"](#). Users from all ages discover images collected from four ecosystems in the Atlantic and Pacific Oceans, from 6 to 2,200 meters below the surface. As scientists would do, they can inspect and annotate the images to describe the fauna present, and contribute to Ifremer’s research.

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“In 2016, we launched our first app, “Deep Sea Spy”, on deep-sea hydrothermal vents. It was an initial success, with over 1,500 users taking part and annotating more than 50,000 images. Without their help, analyzing this volume of images would take scientists almost 78 days of uninterrupted work,

**comments Catherine Borremans, imaging biologist and coordinator of “Ocean spy”.** With “Ocean Spy”, we want to extend this project to other environments.”

Scientists and platform users then work together to build collections of commented images, which are used to train artificial intelligence algorithms. An initial tool for automating species identification has already been built and is currently being refined. A future evolution of the platform will enable citizens to verify the annotations proposed by the algorithm.

## HIDDEN ECOSYSTEMS MADE ACCESSIBLE TO ALL

Since 2017, Ifremer teams have also set up mediation actions to raise awareness among a wider public about the existence of these hidden ecosystems and the need to study them to better protect them. School booklets adapted for classes from pre-school to elementary school and presentations of the “Deep Sea Spy” application to middle and high school teachers were offered to introduce children to the exploration and knowledge of the deep sea. More than 20 classes, from first to high school, have already been able to experiment with the project and exchange ideas with scientists from Ifremer’s “Deep Sea Environment” laboratory.

To accompany the launch of “Ocean Spy”, a new training module will be offered to help teachers get to grips with participatory science programs of the new platform. The addition of two new environments – cold-water corals and the bay of Brest – will also enable teachers to tackle new scientific and societal issues, to adapt to their teaching projects.




### Discover “Eiffel tower”, a hydrothermal vent at a depth of 1,700 meters

The “Deep Sea Spy” section takes the users on a journey into the depth of the ocean, over 1,700 meters deep, alongside scientists from the [Momarsat](#) oceanographic campaign. This annual campaign ensure the maintenance of the [observatory installed on the hydrothermal vents of the Mid-Atlantic Ridge, off the Azores coast](#). Since 2010, the system has been filming the rich fauna of the “Eiffel tower” vent, adapted to the extreme conditions of this environment.

The platform also integrates images collected by Ifremer’s “Tempo-mini” observation module on the hydrothermal springs of the Juan de Fuca Grotto ridge (Endeavour site, 400 kilometers off the Canadian coast), as part of an international collaboration with Ocean Networks Canada. Users can observe the fauna of Pacific and Atlantic hydrothermal vents, to better understand the similarities between these sites, even though they are thousands of kilometers apart.

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« Every year, these observatories provide around 780 hours of images of the fauna of hydrothermal springs: shrimps, crabs, snails, abyssal fish, mobile or tubicolous worms, but also underwater cousins of terrestrial spiders, and many other species unique to these environments, **explains Marjolaine Matabos, researcher at the “Deep Environment” laboratory and leader of**

**the MoMARSAT 2023 mission.** These images are invaluable, as we still have a lot to learn about these species, such as their behavior and population evolution. »

### **Spying on cold-water corals in the underwater canyons off Brittany**

With the “Deep Reef Spy”, aspiring explorers join the “Marley” observatory installed since 2021 in the Lampaul canyon off the coast of Brittany, to observe [cold-water corals](#) at a depth of 780 meters.

« The station will remain on the seabed for 5 years, with a camera placed in a coral garden that films a colony for 15 minutes every day, **says Julie Tourolle, research engineer in deep-sea habitat mapping and co-leader of the ChEReef missions.** This allows us to follow the behavior and growth of these corals, but also to discover the fauna associated with coral reefs in the Bay of Biscay. »

New images will be added to the application's collection next September, when the ChEReef 2023 mission returns. The scientists are currently aboard the oceanographic vessel *Pourquoi Pas?* to maintain the observatory and recover the videos recorded since last year. They will also be bringing back live corals, which will be installed in [aquariums at bottom pressure and atmospheric pressure, to study their adaptation to climate change.](#)

### **Observe the fauna hiding at the bottom of the bay of Brest**




Underwater photography is also widely used by scientists to monitor the biodiversity of coastal environments. In the bay of Brest, scientists have been using the “Pagure 2” instrumented sled since 2016, making straight-line passes several hundred meters long to collect a mosaic of photographs of the seabed, from 6 to 30 meters below the surface. So far, they gathered almost 3,000 photos, but other habitats could be visited in the future.

With “Shore Spy”, users can discover these images and describe numerous species of mollusks, crustaceans, echinoderms (starfish) and marine worms that are characteristic of these environments. By taking part in the analysis this benthic fauna, they also contribute to measuring the relative abundance of these species, including certain invasive species, and thus to assessing the state of health of coastal ecosystems.

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