

# THE REFINE SCIENTIFIC PROJECT

to shed light on the Twilight Zone



The Twilight Zone is the zone penetrated by the Sun's furthest-reaching rays. Located between 100 and 1000 metres deep, it is an Ocean zone that is little known and yet essential to our planet's equilibrium. New-generation profiling floats deployed as part of the REFINE\* project are being sent to explore it.

\*REFINE: Robots Explore plankton-driven Fluxes in the marine twilight zone

## The importance of the Twilight Zone

The Twilight Zone is a key component of the oceanic ecosystem. It plays an important role in carbon capture, in marine food chains, and supports the natural functioning of numerous planetary processes.



### For humans

It stores the Ocean's largest and least exploited fish stocks. **The Twilight Zone is a sustainable food source** as long as its reserves are consumed moderately.

### For biodiversity

Life abounds there. **It is home to most of the world's fish, alongside a broad variety of crustaceans, cephalopods and zooplankton.** There are, for example, nearly 250 lanternfish species that populate these depths.

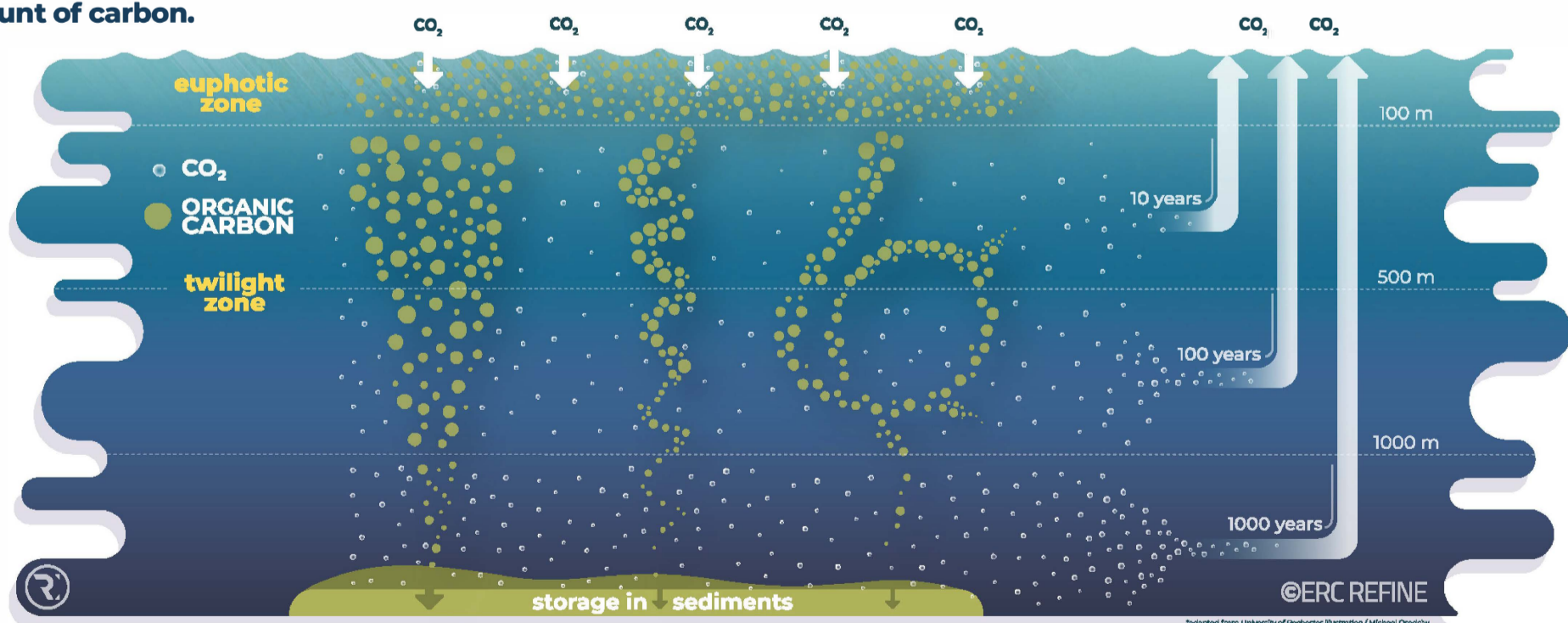
### For the climate

It is central to the planet's climatic system. **Due to the action of a phenomenon called the "biological carbon pump"**, part of the atmospheric CO<sub>2</sub> absorbed on the Ocean's surface transits through the Twilight Zone before eventually descending to greater depths where **this carbon is trapped for hundreds of years.**



## When the Ocean captures carbon

Near the surface (the euphotic zone), phytoplankton use sunlight to transform CO<sub>2</sub> into organic carbon (living matter): this is photosynthesis. **When animals consume this phytoplankton, and are consumed in turn, they produce fecal pellets, rich in organic carbon, which sink to the depths of the ocean, trapping a significant amount of carbon.**



Organic carbon is transported by a range of processes which the profiling float lets us study...

#### GRAVITATIONAL PUMP

Vertical MIGRATIONS of animals at different temporal scales (day/night and seasonal)

TRANSPORT by physical mechanisms (currents or mixing)

... For this purpose, REFINE profiling floats are equipped with new sensors to expand our understanding of the Ocean.

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