

## PROLIXE, a versatile long-term profiling mooring

Jean-Romain Lagadec<sup>1</sup>

<sup>1</sup> PROLIXE project manager (IFREMER, Plouzané France, +33 2 98 22 41 27, [jean.romain.lagadec@ifremer.fr](mailto:jean.romain.lagadec@ifremer.fr))

**Abstract** – Within the framework of the innovation thematic of its ScInObs<sup>1</sup> project, IFREMER is designing an innovative wire-guided profiler capable of long-term deployment and addressing various use scenarios.

**Keywords** – Profiling, mooring, spatial coverage, versatility, fixed-point.

### I. CONTEXT

The IFREMER<sup>2</sup> (French research institute for ocean exploration and exploitation) has launched the ScInObs project in 2021. This project aims to develop and deploy multidisciplinary and innovative ocean observation systems, addressing both scientific and societal questions on two sites: Mayotte and New-Caledonia. ScInObs' Work package 2 is dedicated to designing innovative ocean observation systems adapted to these sites' particularities and scientific questions, but also sufficiently versatile to be used on other locations and for different uses scenarios.

The profiling mooring called PROLIXE (PROfiLiNG on FIXEd-point) is one of these systems.

This type of observation system, composed of a profiler with its embedded sensors and linked to an anchored cable, allows to extend the vertical spatial coverage at a fixed point and the number of observed parameters at each depth level with a single set of sensors

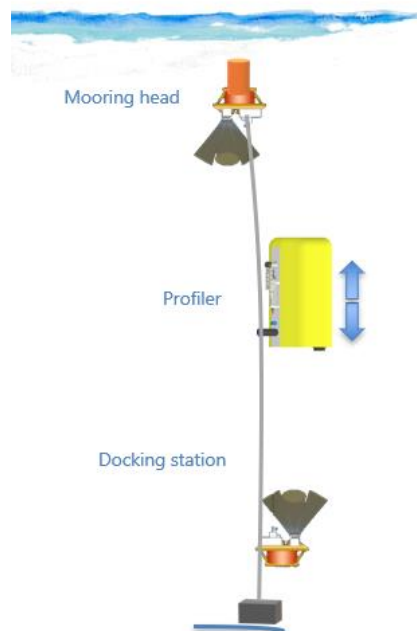


Fig 1. Scheme of the profiling mooring PROLIXE

<sup>1</sup> Sciences and Innovation for subsea observatories

<sup>2</sup> <https://www.ifremer.fr/fr>

## II. USE SCENARIOS

PROLIXE is designed to address the following Use Scenarios submitted to the IFREMER scientific community:

- Characterization of internal tidal variability, by measuring hydrostatic pressure variations and horizontal velocity fields
- Characterization of the geochemistry of the water column, by measuring the concentration of O<sub>2</sub>, CO<sub>2</sub>, CH<sub>4</sub> and the water pH
- Characterization of plankton and mesopelagic biological communities' distribution with a planktonic camera, an echo-sounder and an eDNA sampler

In order to study the semi-diurnal tide, PROLIXE must be able to perform a maximum of twelve two-way profiles per day at a given water depth, and to acquire data at a sample frequency of 15 seconds. Lastly, the system must be deployed for a one-year period, to study the effect of the seasons.

## III. SPECIFICITIES OF PROLIXE CONCEPT

Because the scientific requirements are challenging, PROLIXE must be innovative.

Firstly, embedding a battery powerful enough to power the profiler for one year would greatly impact its payload and its overall dimensions.

For that reason, the design team<sup>3</sup> chose to give PROLIXE the capacity of recharging its battery on a seafloor docking station, when not profiling. This docking station can be fitted with battery packs and work in a standalone mode, or be linked to a cable allowing power and data exchange.

Secondly, following a non-evolutive profiling schedule, even when no particular event happens, would not be energy saving, nor scientifically relevant.

The capacity of PROLIXE's electronic core to analyse in real-time the data sampled by the embedded sensors, or in near real-time the data acquired by the sensors of the docking station (an ADCP for example), gives it the possibility of adapting its profiles to the events encountered.

## IV. CONCLUSIONS

The PROLIXE detailed design phase has begun in February 2024, with the design of the mooring line and the docking station. The next phases will deal with the motorization of the profiler and its link with the cable.

The first tests in open water are scheduled in 2026, for a first deployment at the beginning of 2027.

<sup>3</sup>Jean-Romain Lagadec (PROLIXE Project manager), Bertrand Moreau (electronics and software engineer), Jean-Yves Coail (electronics developments), Matthieu Laurent (mechanics engineer), David Le Piver (mechanics developments), Michel Peleau (mechanics developments), Hervé Lintanf (mechanics developments), Gilbert Damy (hydrodynamics developments), Kevin Mehring (hydrodynamics developments)