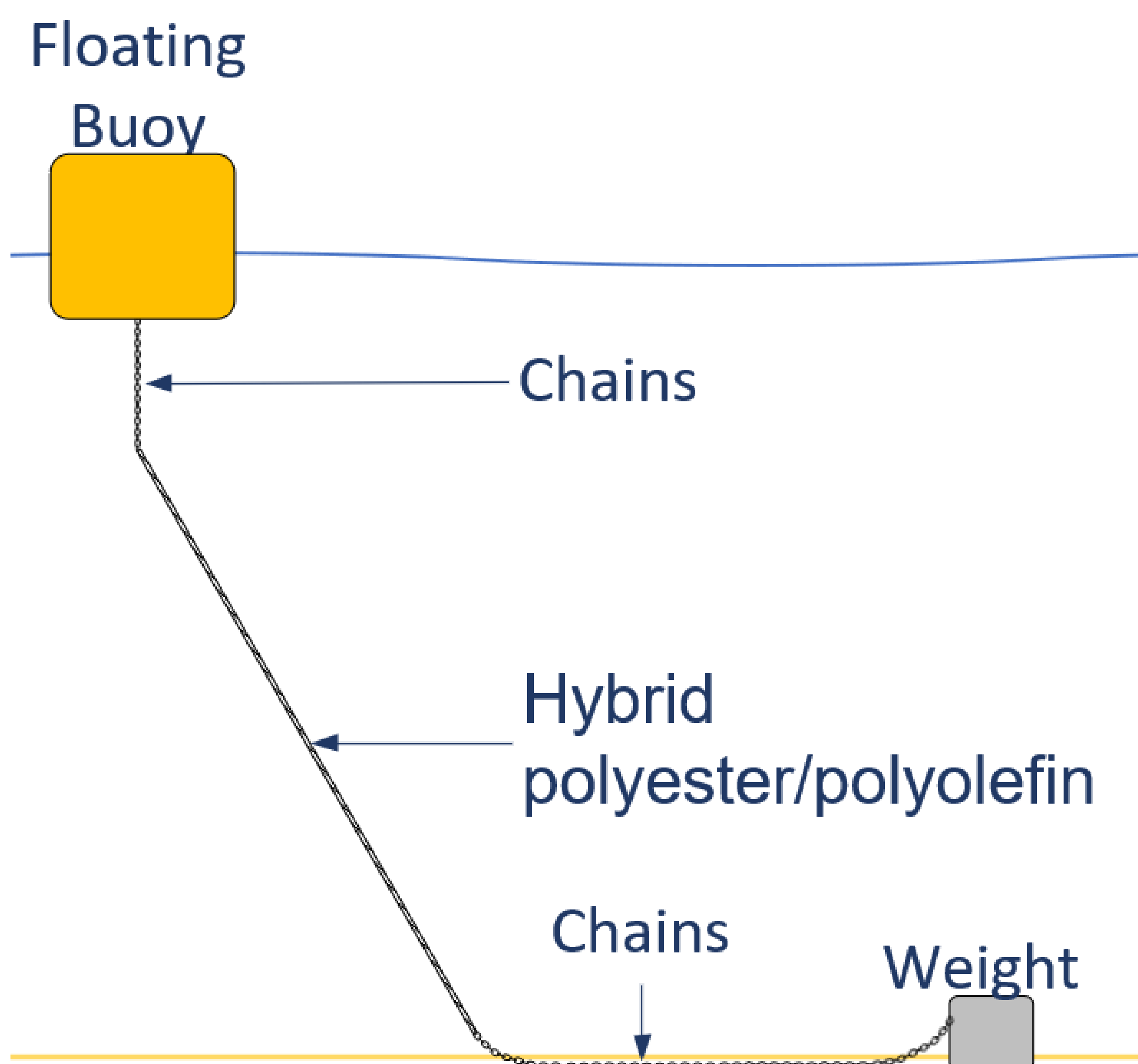


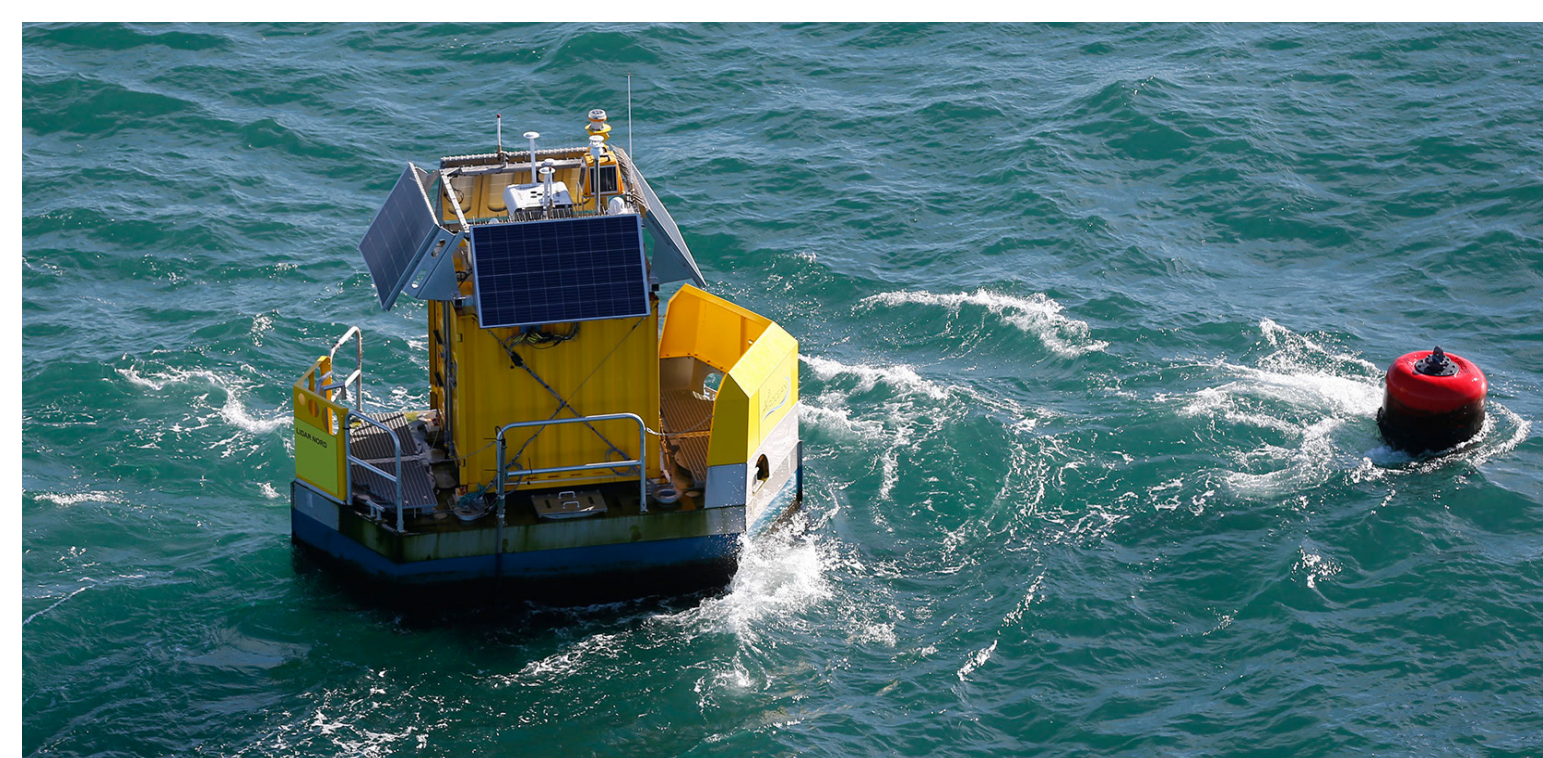
# Residual strength of mooring lines for weather buoys



## Context and objectives

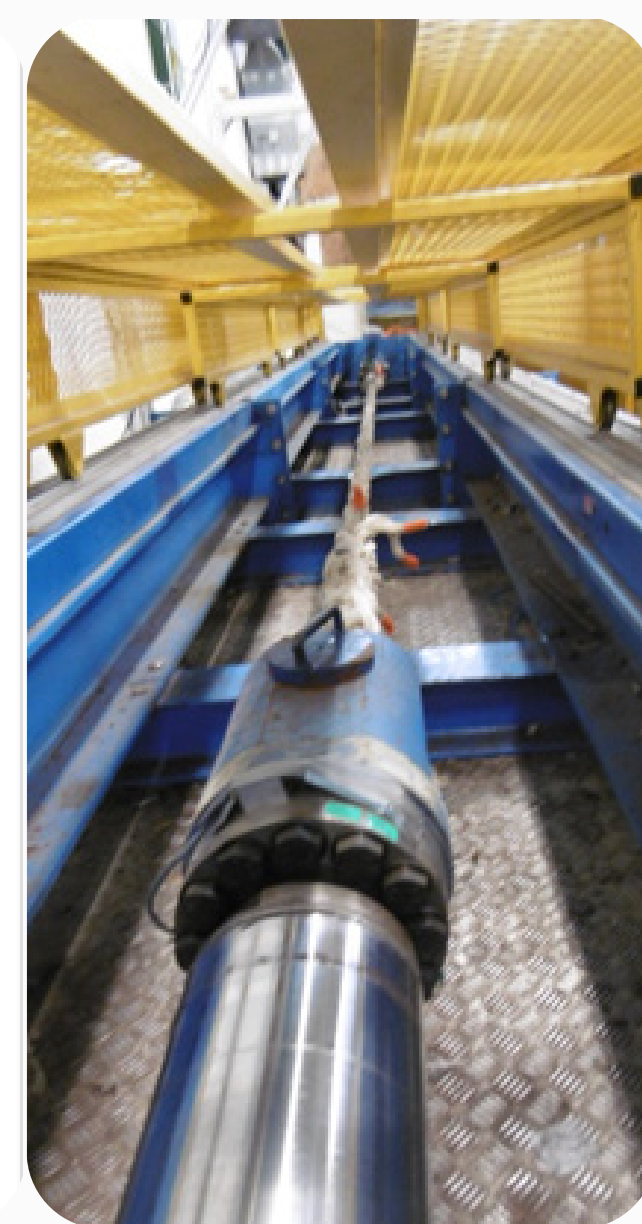
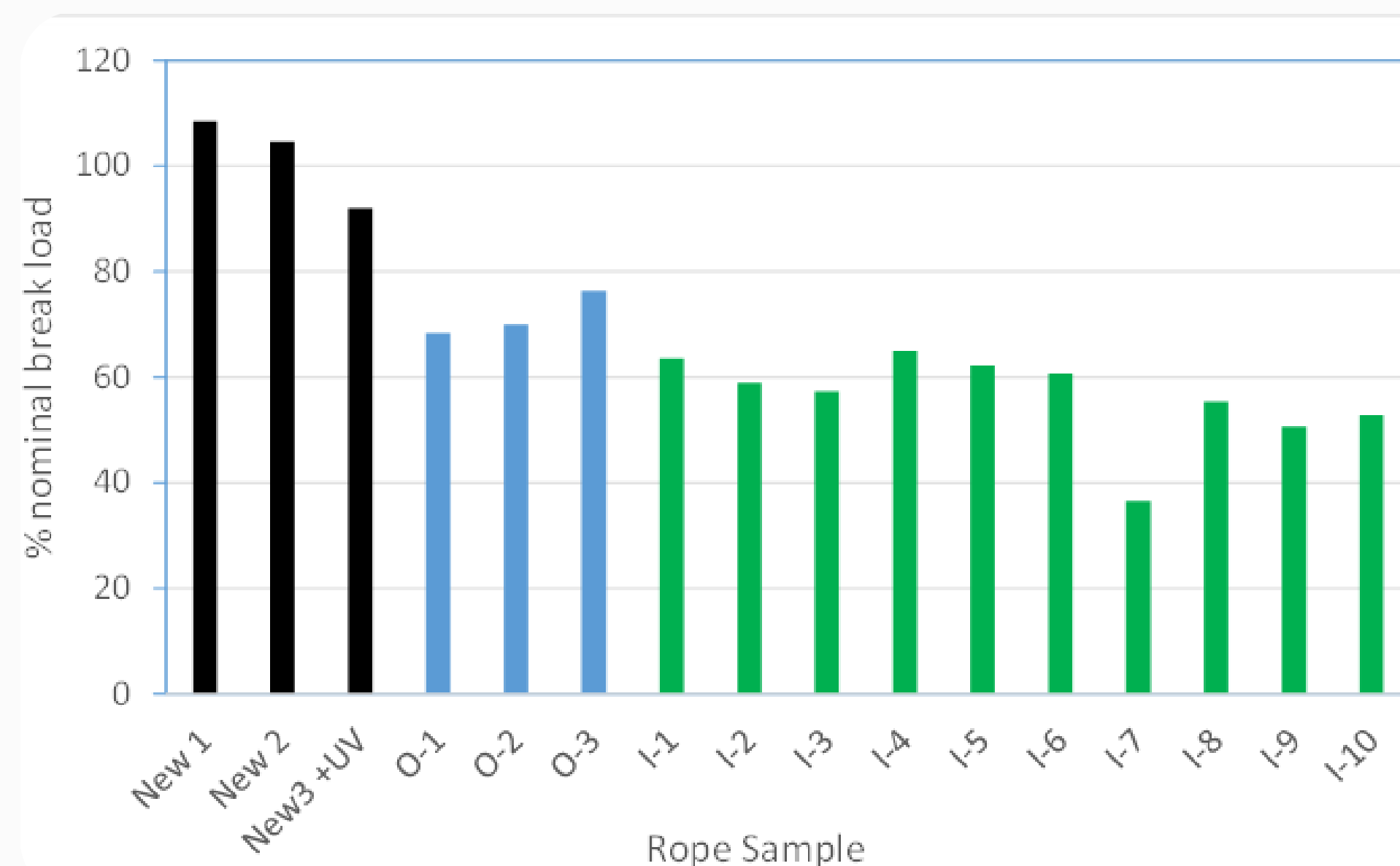
Quantify mechanical property loss of hybrid polyester/polyolefin mooring lines in order to know their lifetime and study their potential reuse:

- | Mooring lines of weather buoys: Prepare wind farm installation, measure wind & waves.
- | Ropes with 8 strand braid, with 500kN of breaking load, polyester fibers around polyolefin fibers.
- | Ropes recovered after 1 to 2 year campaigns at sea.  
2 sites: Oleron & Irish Sea = 16 lines.

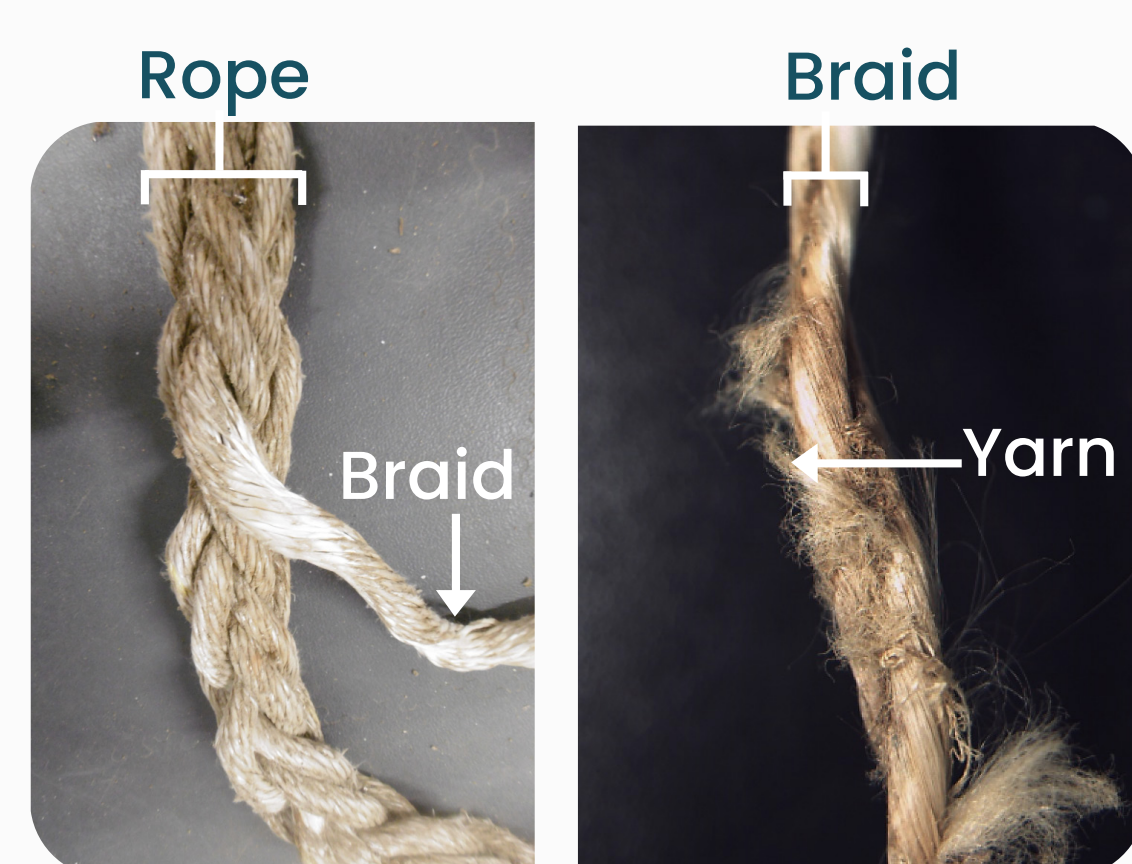
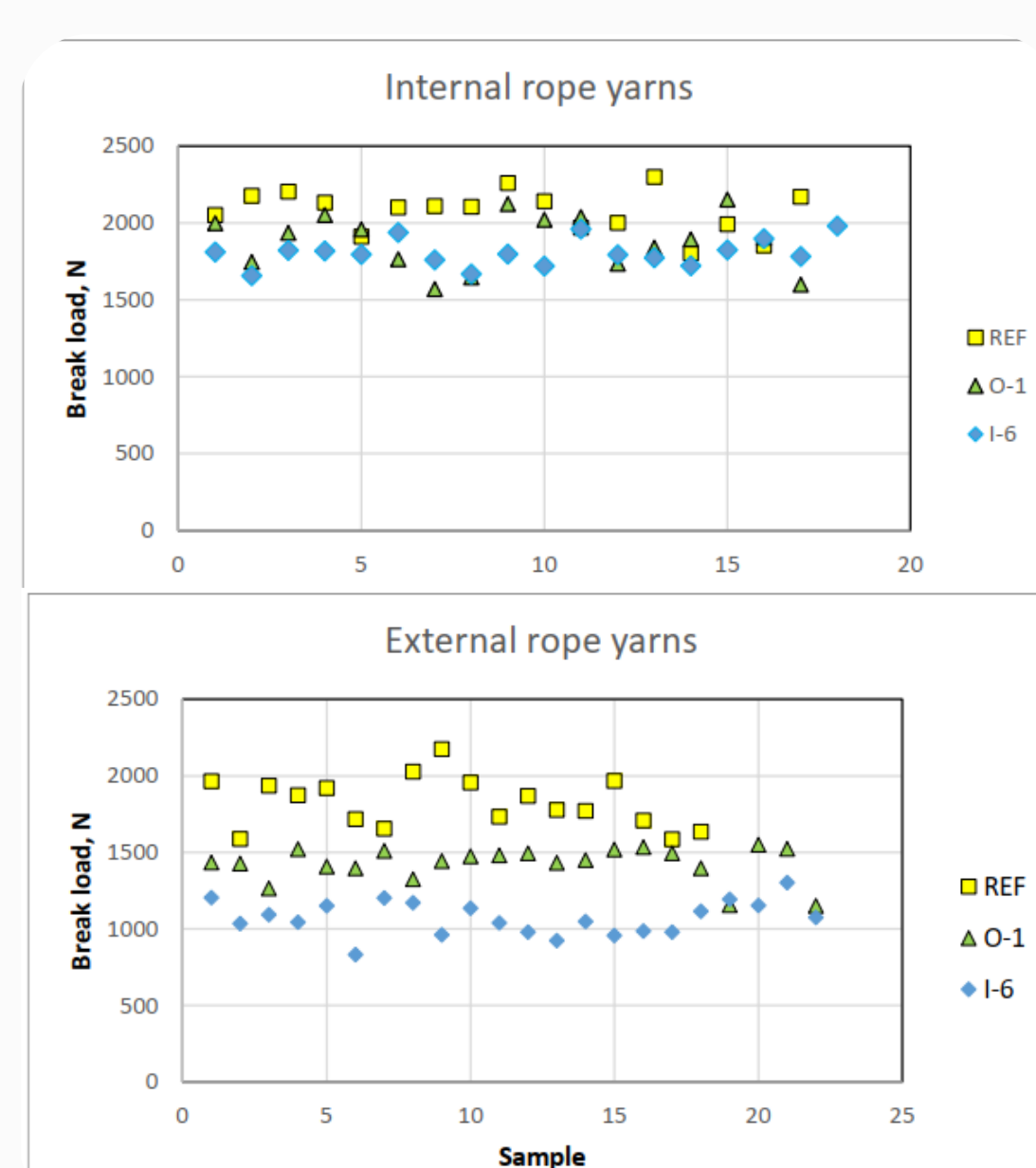


Mechanical loads + Marine environment

## Mechanical tests

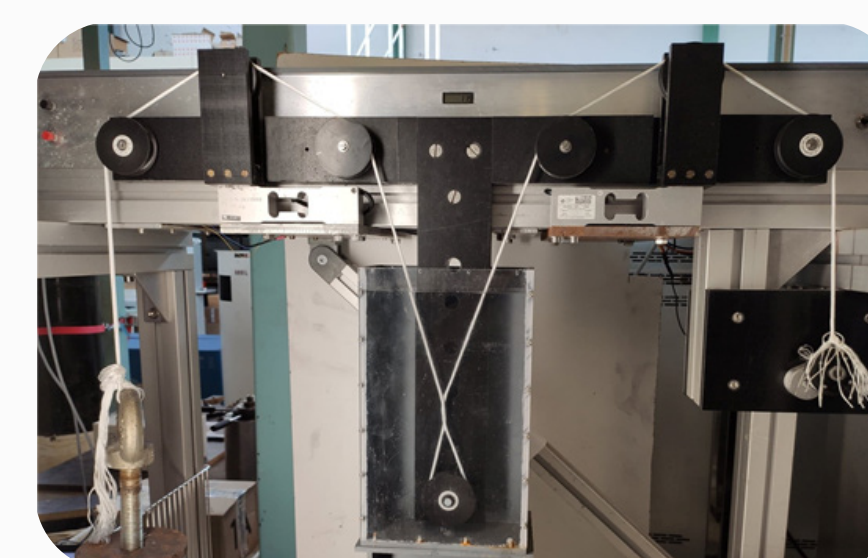


Full scale tests : ropes tested in tension to break on 1000kN test bench at Ifremer center, Brest  
**Large strength loss, up to 50%**



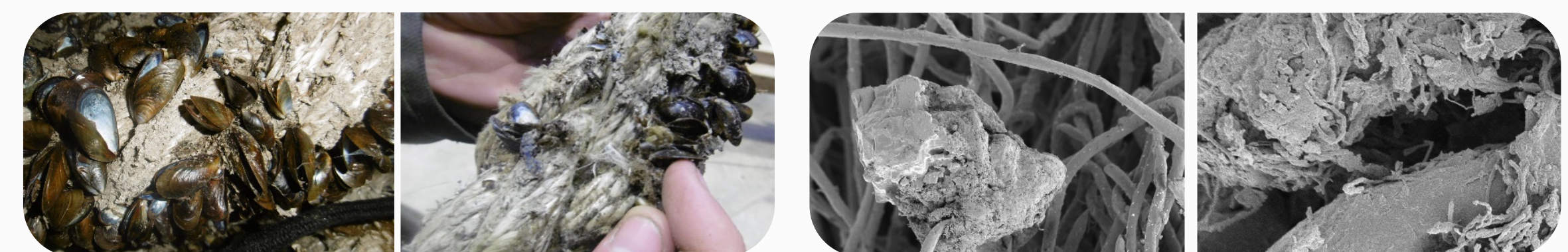
Yarns tested in tension to break on 10kN test bench  
**External degraded, not internal**

## Physico-chemical analyses



Calorimetry (DSC) : no evolution on polymer microstructure  
Abrasion : strong loss in Yarn on Yarn abrasion resistance for polyester fibers.

Optical and Scanning Electron microscopy



Strong adhesion of mussels, byssus

## Hypothesis

Immersion in shallow water (<30m) → more mussel colonization.  
Results in local fibre disorientation and damage.  
Weak points accentuated when mussels removed.  
**Limits possibilities for re-use of mooring lines.**

## Perspectives

- 1 - Find a solution to extend the lifetime of the textile rope for the mooring of weatherbuoy.
- 2 - Carry out a similar analysis with a protected rope to avoid detrimental effects of colonisation by mussels.