A DEEP SEABED OBSERVATORY WITHOUT DISPOSABLE BALLAST:

THE MARHA PROJECT

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IFREMER

WORKSHOP ON SEA OPERATIONS FOR OCEAN OBSERVATORIES

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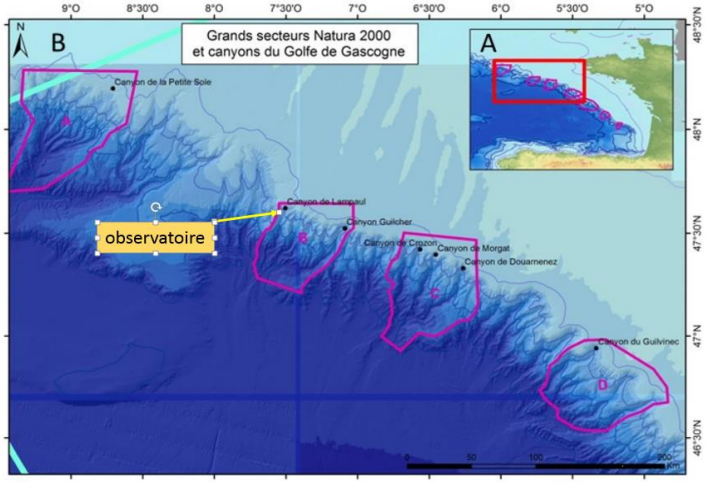
marha marine habitats

« Life » European pilot project

- MARine HAbitat to study marine **Community Interest Habitats** (Natura 2000)
  - Deep « cold » coral reefs in the Atlantic ocean (Bay of Biscay) :
    - Seafloor observatory
    - Lampaul canyon (1000 m)
    - 5 years long data acquisition
    - Annual observatory recovery
    - Non-disposable ballast

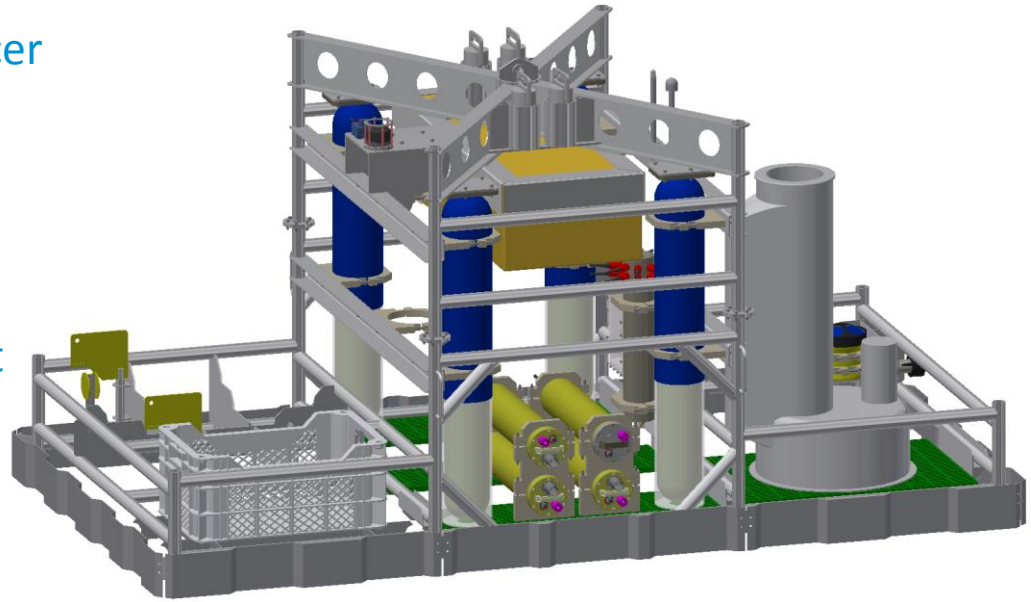


Embedded instruments :

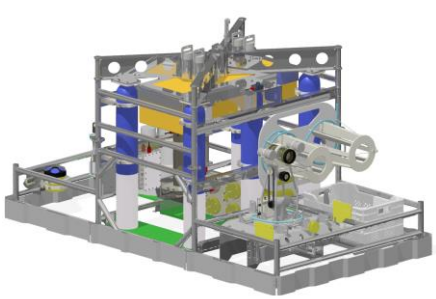
- Data acquisition
  - Camera + spotlight
  - Essential Ocean Variables (EOVs) (CTD, turbidity,ADCP,O2)
  - Particulate trap
- Power tanks
- COSTOF 2
- Communication
  - Acoustic transducer
  - Wifi

Buoyancy :

- Syntactic foam
- Non-disposable ballast



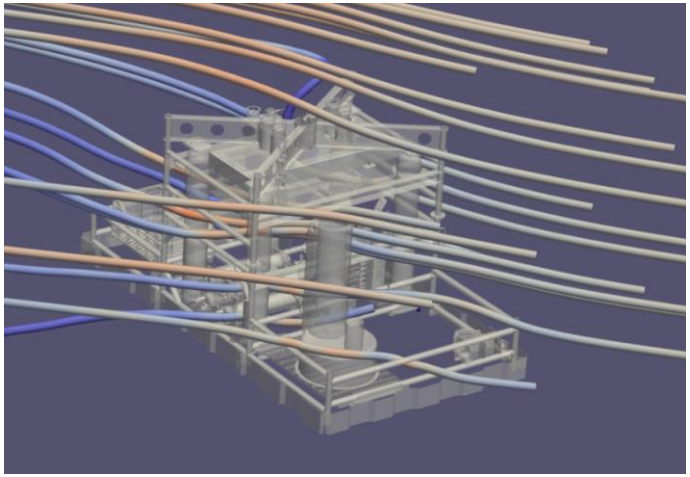
Deported Camera module

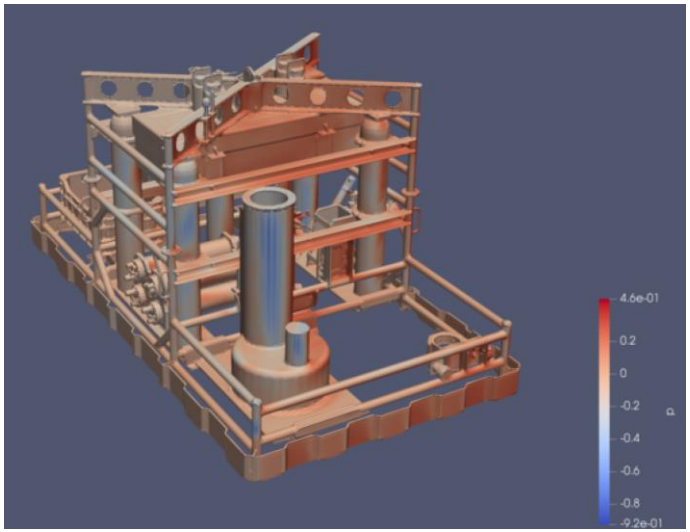


Optimizing the weight and size

Limit the buoyancy volume to create

- Pre-design of a compact structure
- Calculation of drag forces on the stucture according to current speed (worst case scenario)
- Determination of weight needed to insure stability and to avoid drifting (calculation and tests in real conditions)
- Determination of the amount of buoyancy needed





The reversible oil ballast

To meet project requirements and more…

Advantages

- Mature technology (profiling floats)
- Robust (no seawater contact)
- From shallow waters to deep sea
- Adjustable and reversible buoyancy
- No discharges
- No high-pressured gas (safety)

Drawbacks

- Energy needed (no pressure difference)
- Slow oil transfert for low current consumption (moto-pump yield)
- Wider and more expensive than disposable ballast

MarHa's ballasts

From 4 to 8 ballasts of 16 L

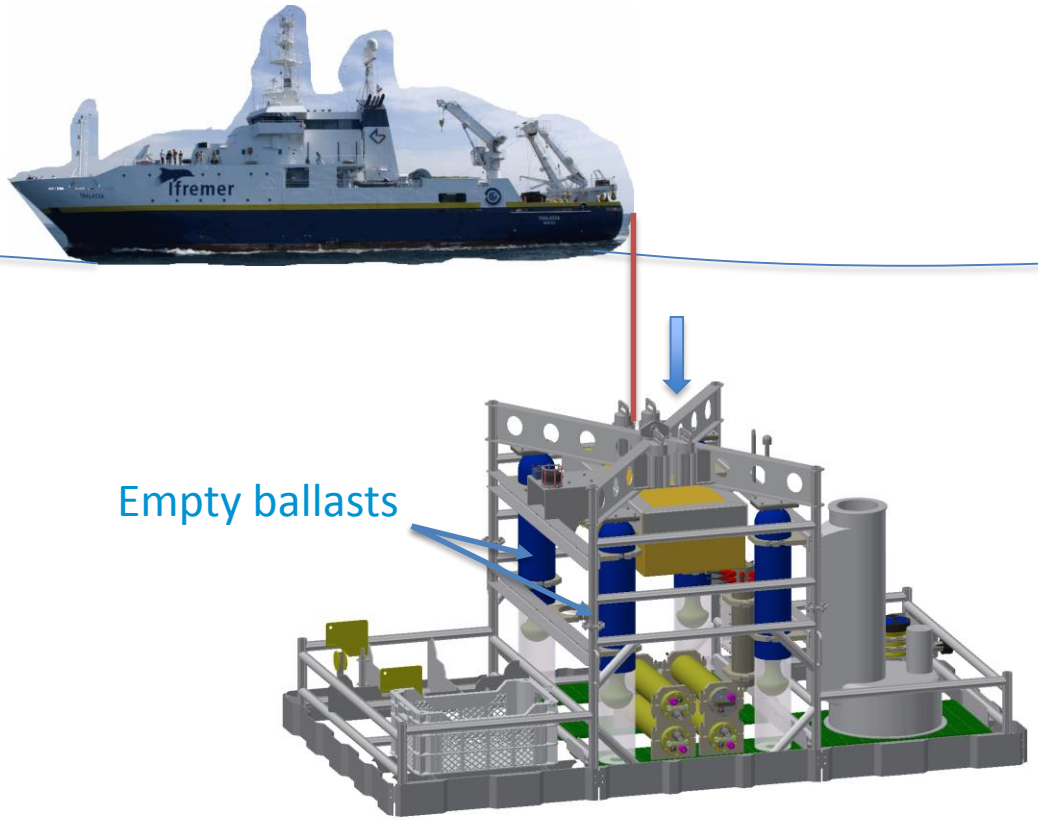
- ≈0,2 L/min from 1 to 2000 meters deep
- 1,5 hour from maximal weight to targeted buoyancy (300 N)
- 60 W.h for a complete oil transfert for each ballast at 1000 meters deep

Proof of concept

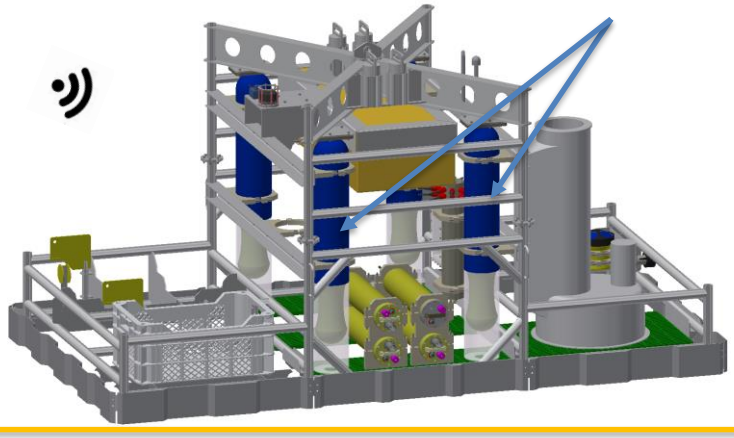
Possible development of a dedicated moto-pump

In this configuration, ROV used as safety

Deploying the observatory

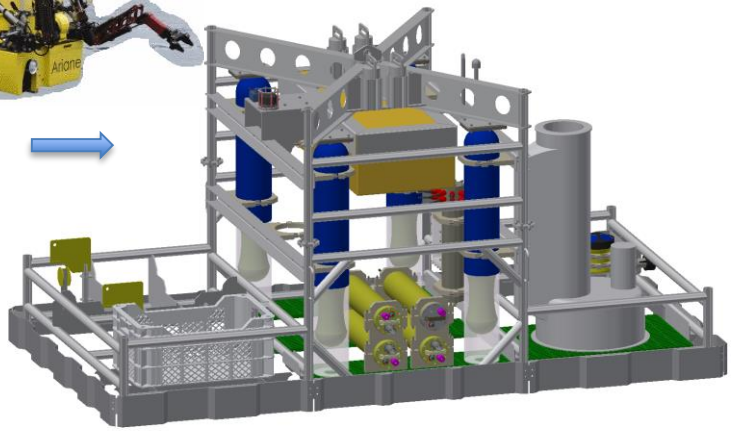


Deploying the ROV



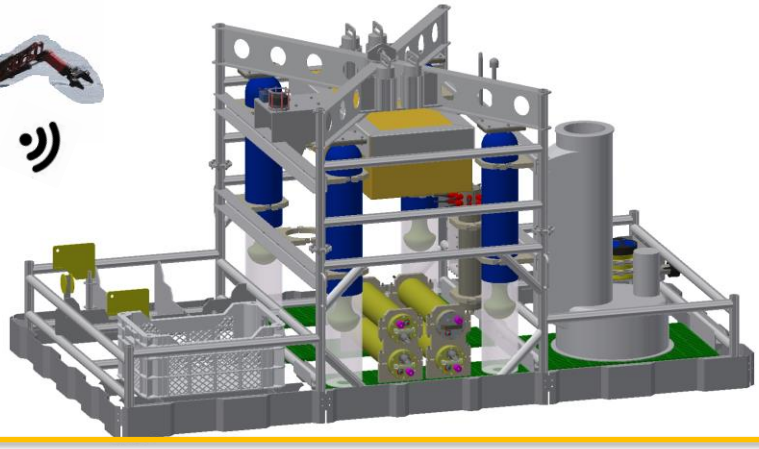
Half inflated ballasts allowing the ROV to move the observatory

Positioning the observatory



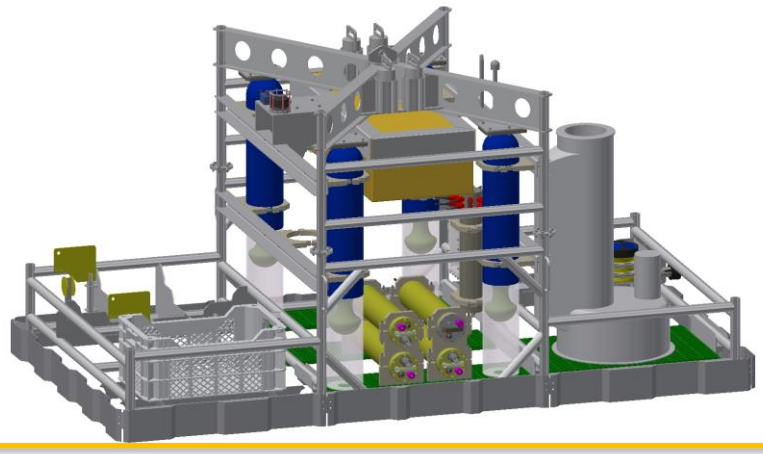
Modification of observatory weight and initializing of data acquisition

Empty ballasts



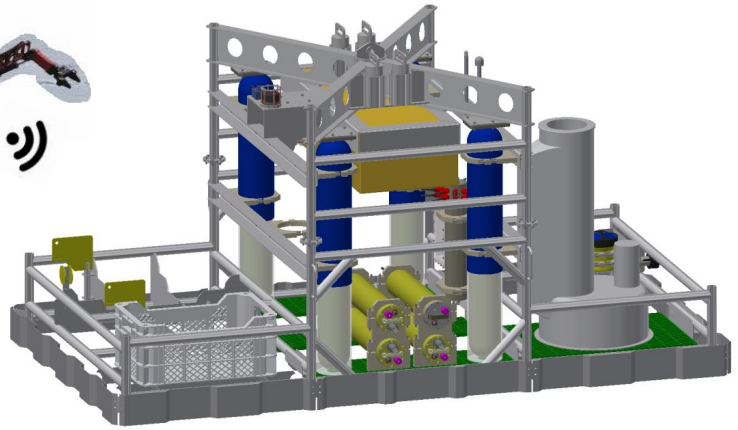
One year data acquisition period

Deploying the ROV

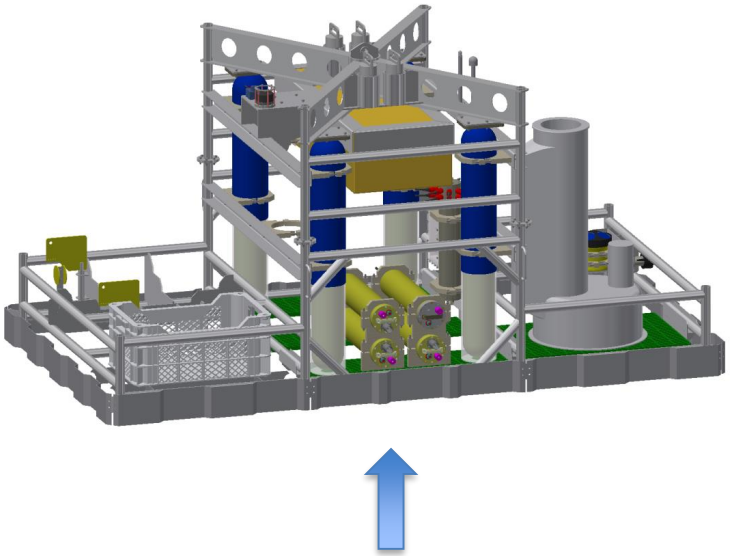


Modification of observatory weight and securizing its take off

Filled ballasts



Observatory recovery



The next phases

- Ballast assembly in progress
- Ballast tests in the early 2020
- Observatory test deployment mid 2020
- First real deployment 2021

Ballast other applications

- For equipment weight management (small cable trawler, or plough):

  To compensate the loss of weight of the plough when deploying cable

- For small instruments deployed numerously (OBS, ADCP) :

  Inflating the ballast at programmed time to recover the instrument without diving

Many thanks!