OFFSHORE WIND
R&D Conference 2018

UNIVERSITÉ DE NANTES
UN-SEA-SMS

On-site test of components and sensors exposed to marine degradations processes: fatigue, corrosion and biofouling

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OUTLINE

1. SURFFEOL Project
2. Stakes for a full scale test site for SHM: UN-e-SEA
3. The UN-SEA- Smart Material Structure: the site
4. The monitoring and marine growth
5. The first results and analysis: monitoring and marine growth

1. SURFFEOL Project

Added value of SHM:
predictive and
combined maintenance

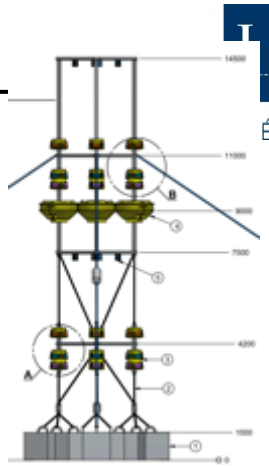
PROJET DE RECHERCHE ET DEVELOPPEMENT

SURFFEOL

Surveillance et Fiabilité des Fondations d'Eoliennes

Projet collaboratif entre :

IFSTTAR GeM BUREAU VERITAS stx France SOLUTIONS ACCOAST MMS mer molécules santé UNIVERSITÉ DE NANTES



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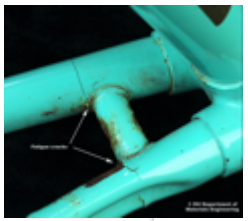
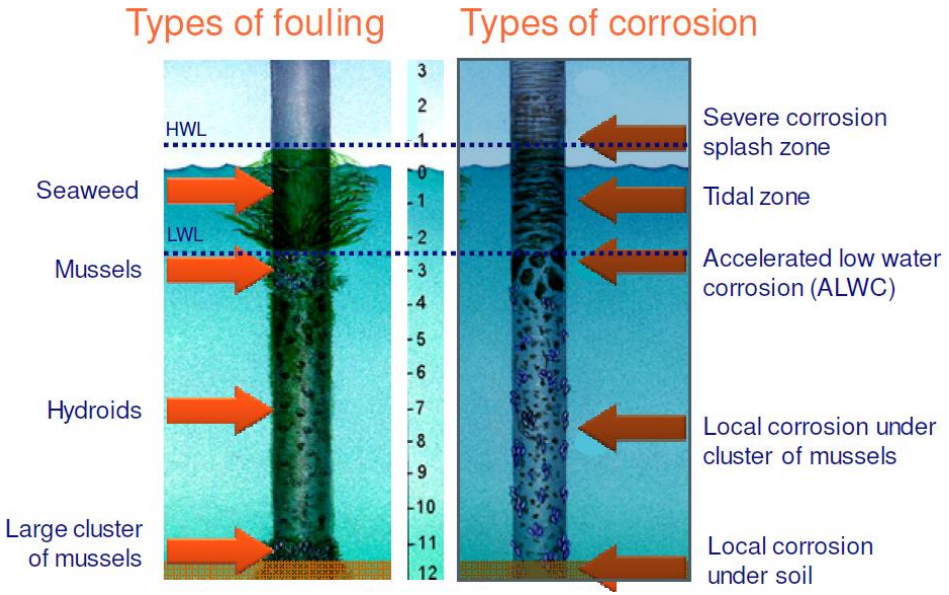
WP 2 Corrosion

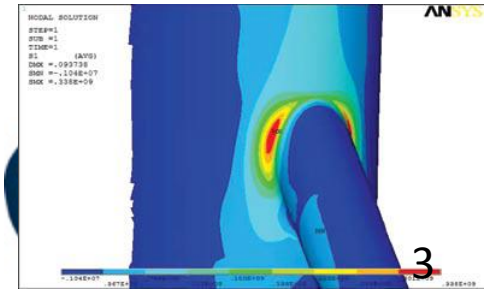
WP 3 Marine Growth



WP 4 Fatigue

[31, SOA N. Muller]





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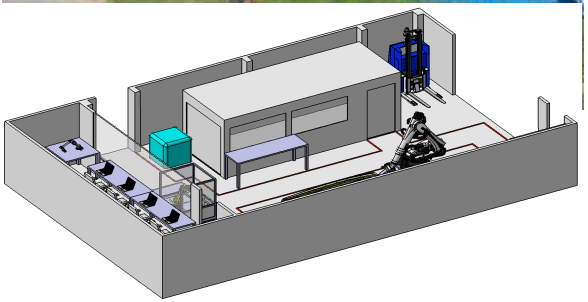
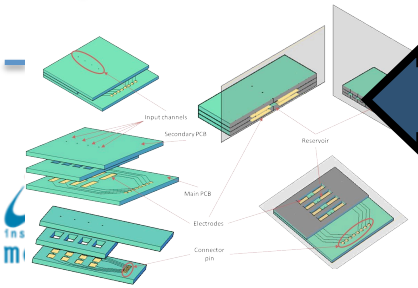
2. Stakes for a full scale test site for SHM: UN-SEA-SMS

- TRL (4-5) Cross the gap between laboratory non representative (accelerated) tests or simplified (env. conditions) tests AND test sites will all the complexity

Laboratory (GeM-U-Tec)

multi-physics, multi-sensors, multi-scale

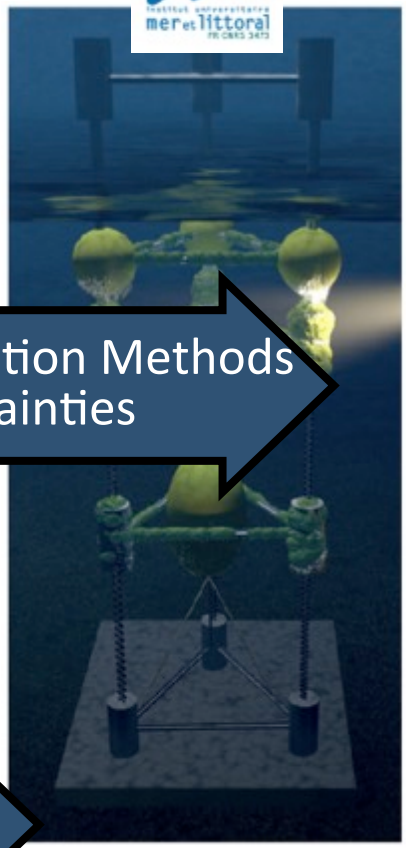




Coupling Uncertainties

Computation Methods Uncertainties

Watering, Couplings



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2. Stakes for a full scale test site for SHM: UN-SEA-SMS

- TRL (4-5) Cross the gap between laboratory non representative (accelerated) tests or simplified (env. conditions) tests AND test sites will all the complexity
- TRL (6-7) Test some technologies (waterproof, access to the buoy, energy demand, image processsing)

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FOR

- Sensors real reliability and lifetime
- Statistics about degradations processes (corrosion, damage, biofouling)
- Establishment of protocols

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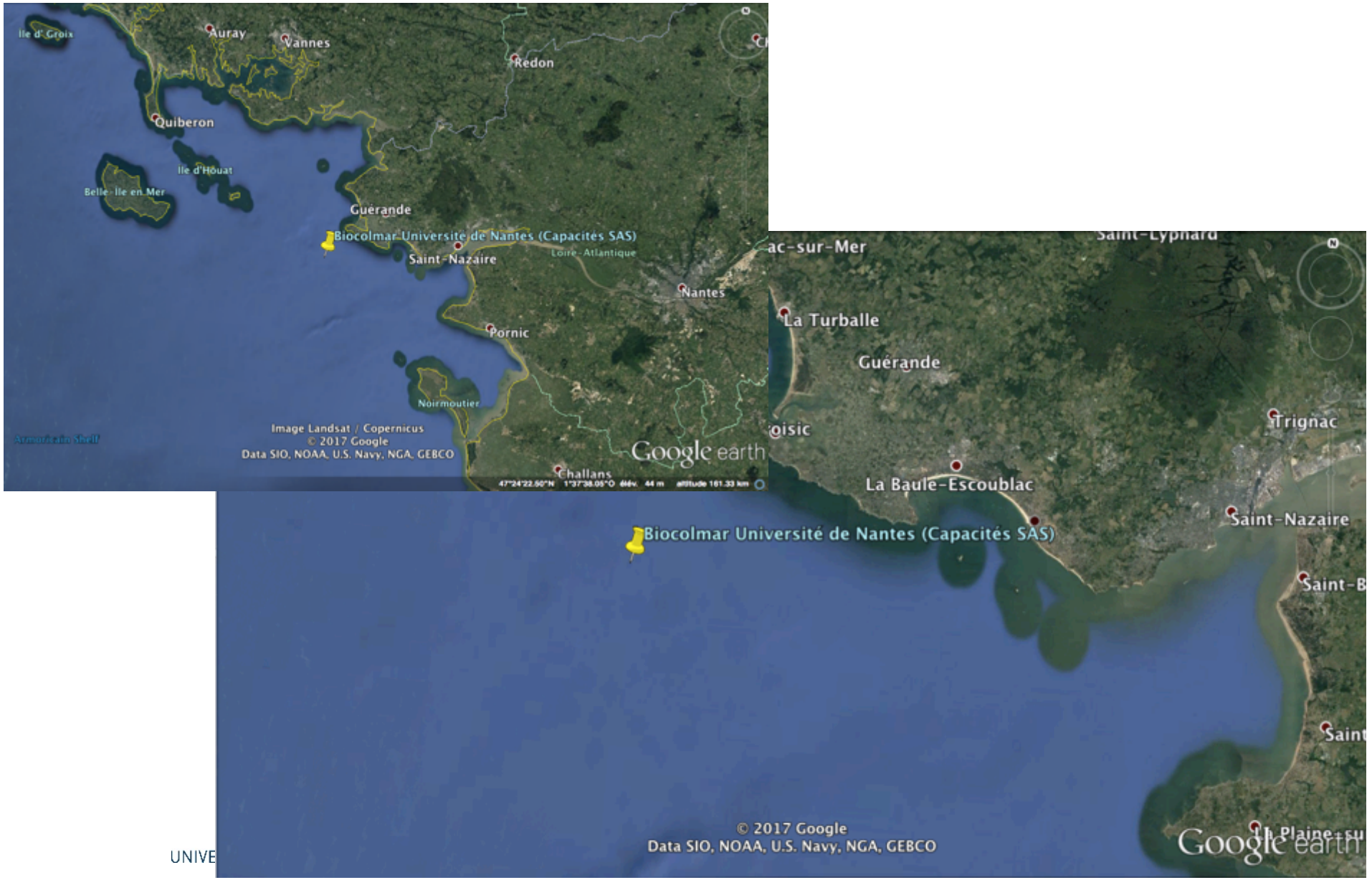
3. UN-SEA- Smart Material Structure: The site



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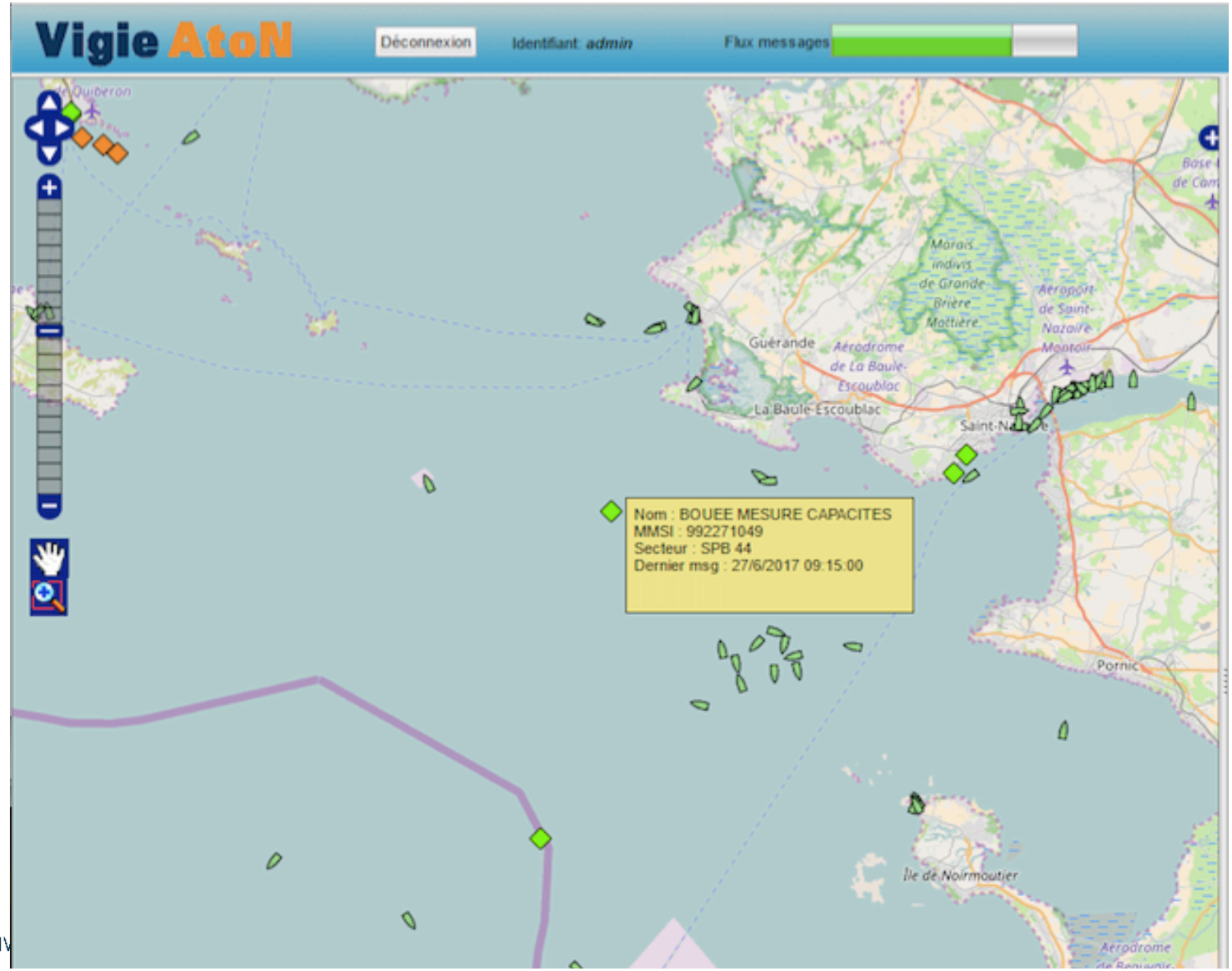
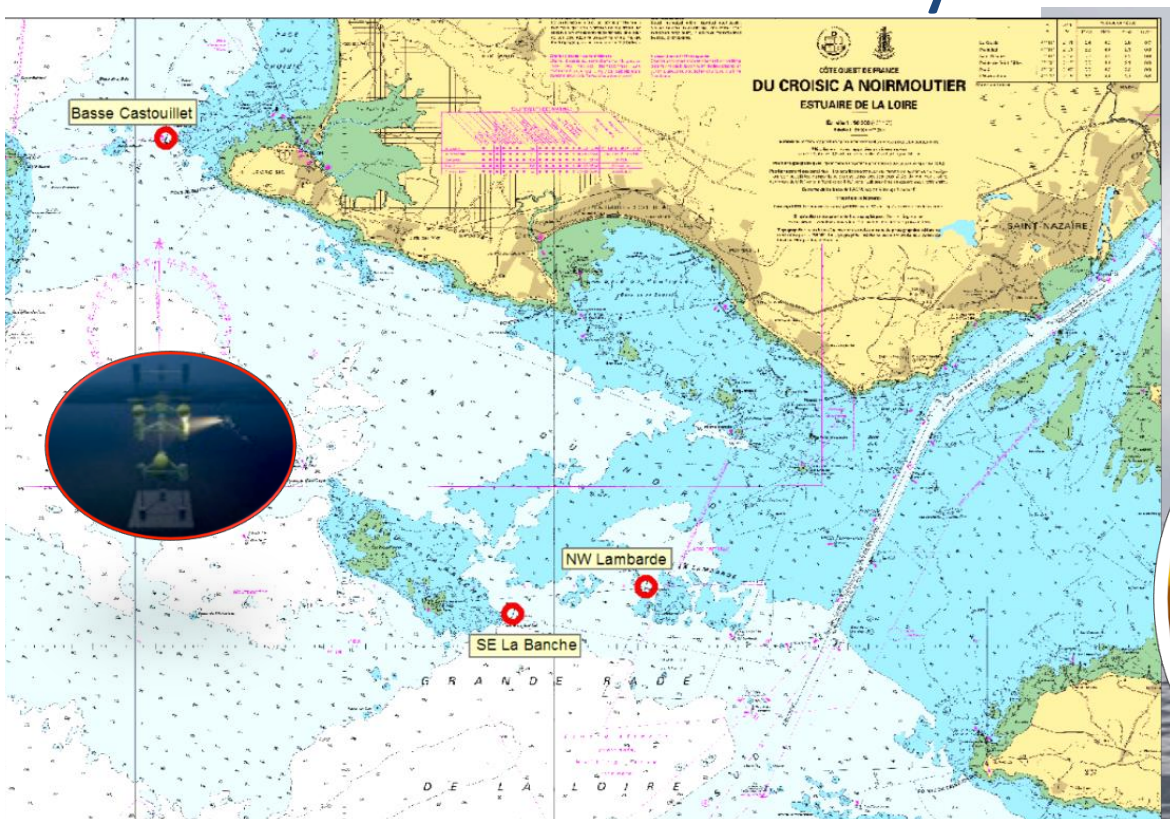


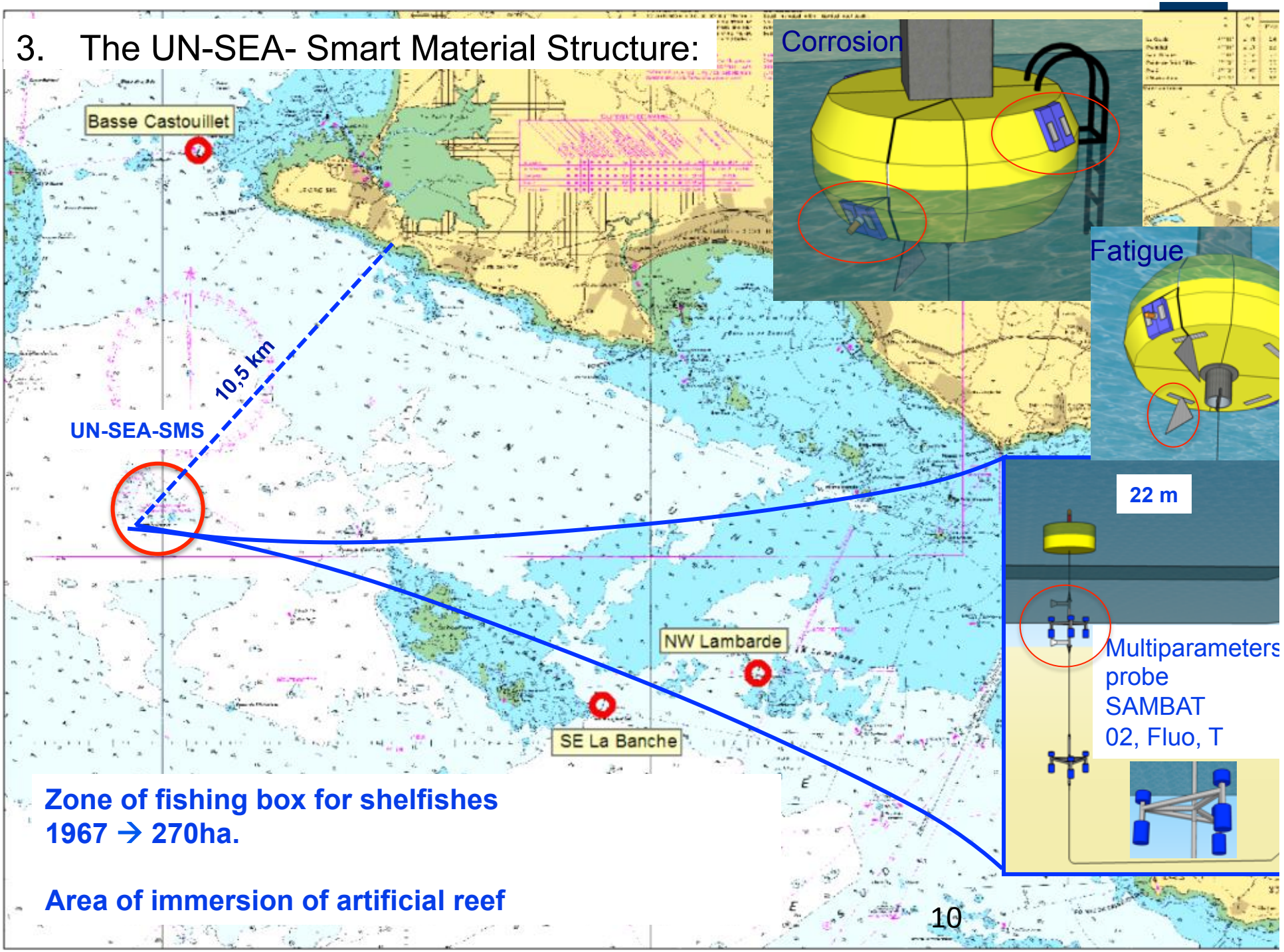
3. UN-SEA- Smart Material Structure: The site

TESTS on SITE for SHM systems

Biocolmar: an idea, a patent, a reality since may 2017 in Pays de la Loire



3. The UN-SEA- Smart Material Structure:



Zone of fishing box for shelfishes
1967 → 270ha.

Area of immersion of artificial reef

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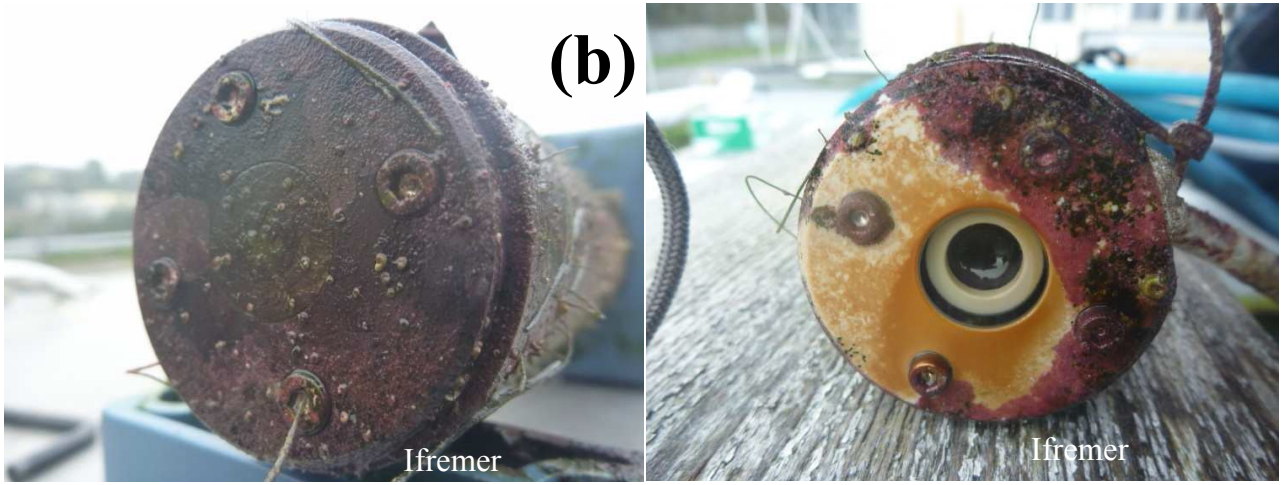
Stakes for sensors maintenance / protection

(a) **(b)**



- Without protection

with protection

4. The Fiber Pptical Sensor Monitoring

4. The Monitoring and marine growth assessment

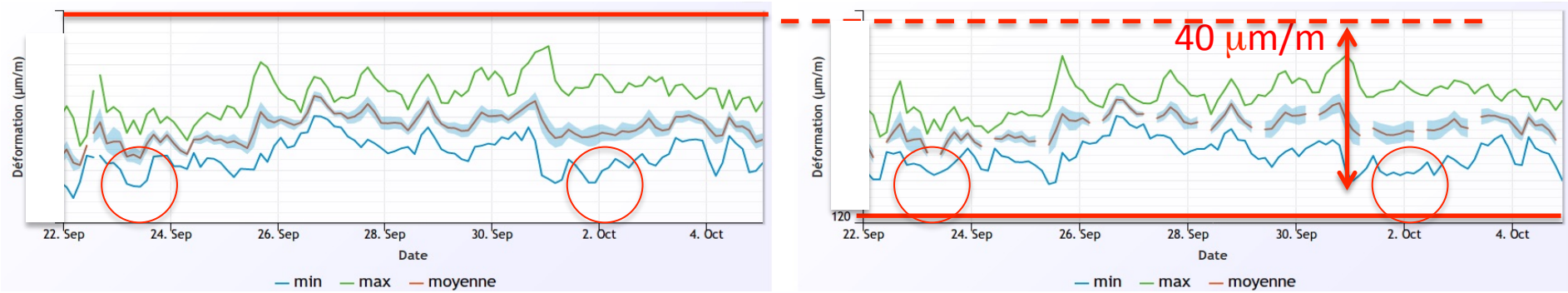
- Storage is expensive

- Reduce size of sampling (replace 3 hours measurements by mean, max min)

- Non destructive assessment of Marine Growth

5. First results and first learning from mooring system

Strain from FOS gauges



Not the same strain: 0 and calibration was made before transportation and installation
Gap of 40 µm/m can be explained by:

- a small chock but that is the range of evolution
- a bending behaviour

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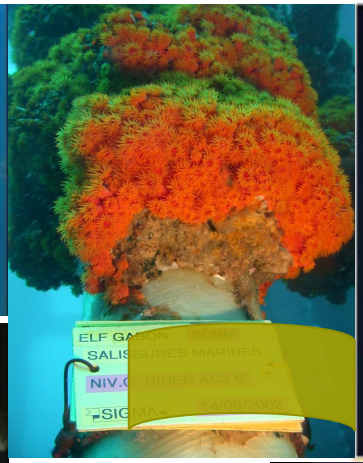
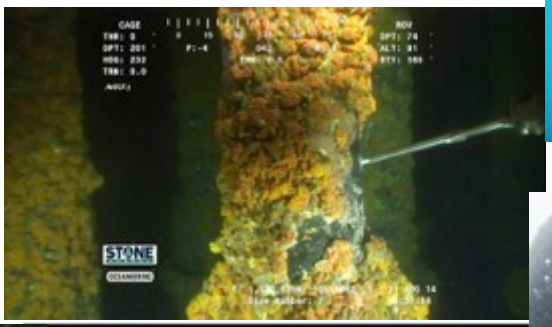
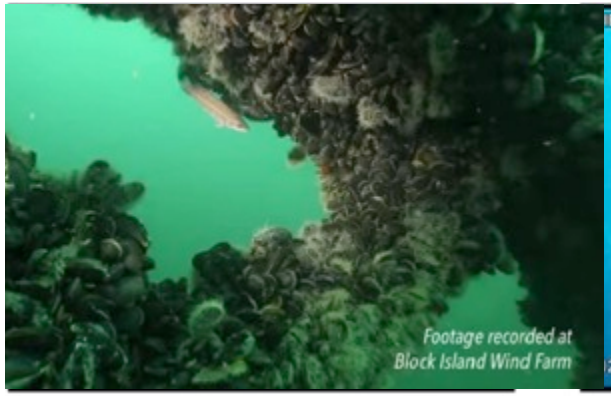
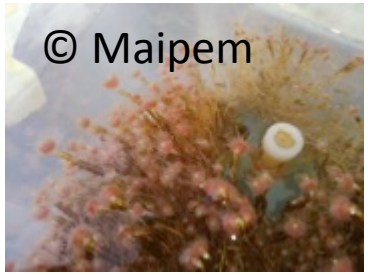
5. First results and first learning from mooring system

Test of protocols for marine growth









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5. First results and first learning from mooring system

Test of protocols for marine growth

ABIOP

A project Founded by French Research Agency (2017-2018) within the FEM Cluster and scientifically leaded by Université de Nantes*

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DCNS

eDF

CENTRALE NANTES

Ifremer

corrodys

UNIVERSITÉ DE TOULON

FRANCE ENERGIES MARINES

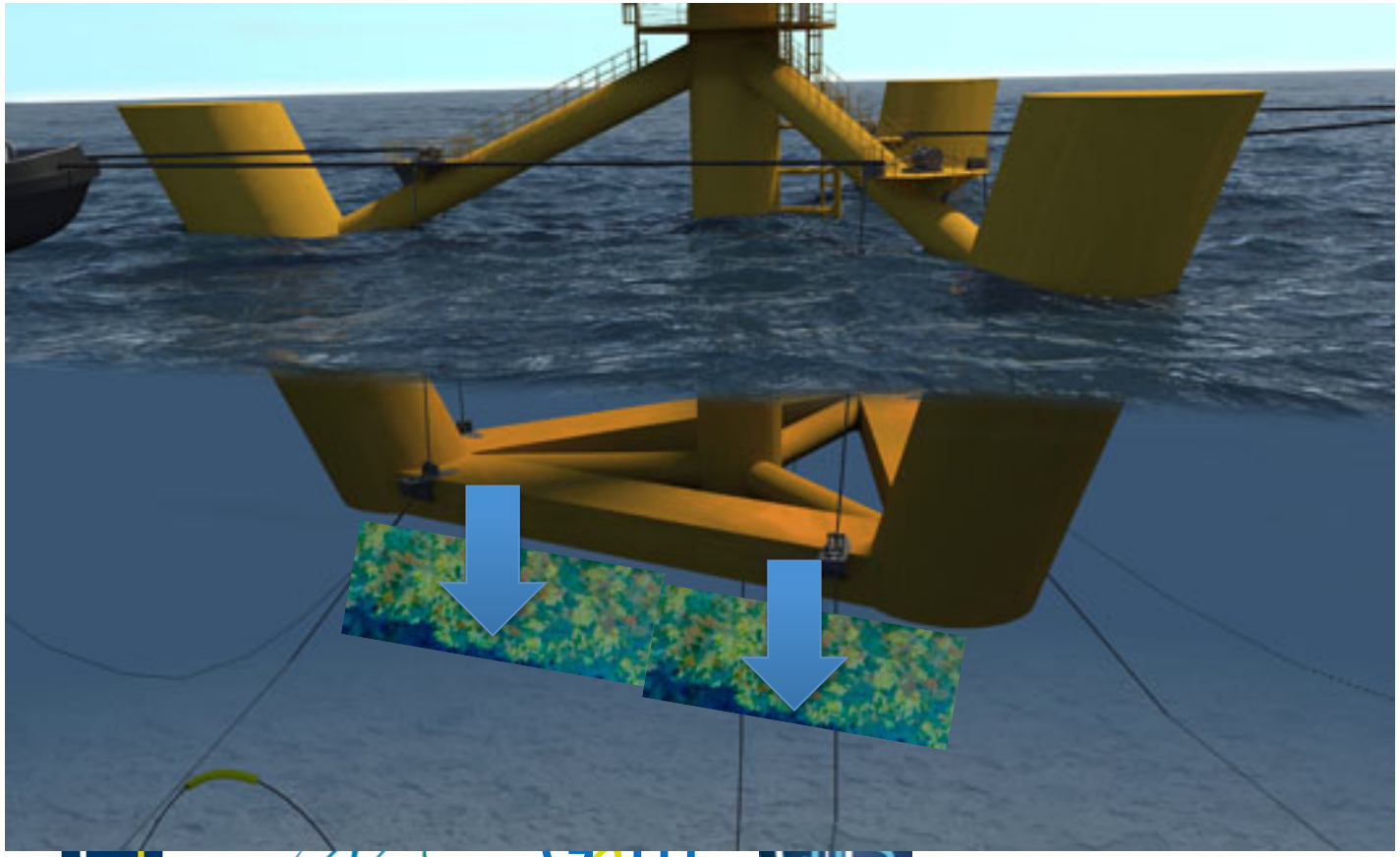
eDF energies nouvelles

* franck.schoefs@univ-nantes.fr

5. First results and first learning from mooring system

Test of protocols for marine growth

For floating structures: over weight and hydrodinamics: **floating part**, anchorage, ….

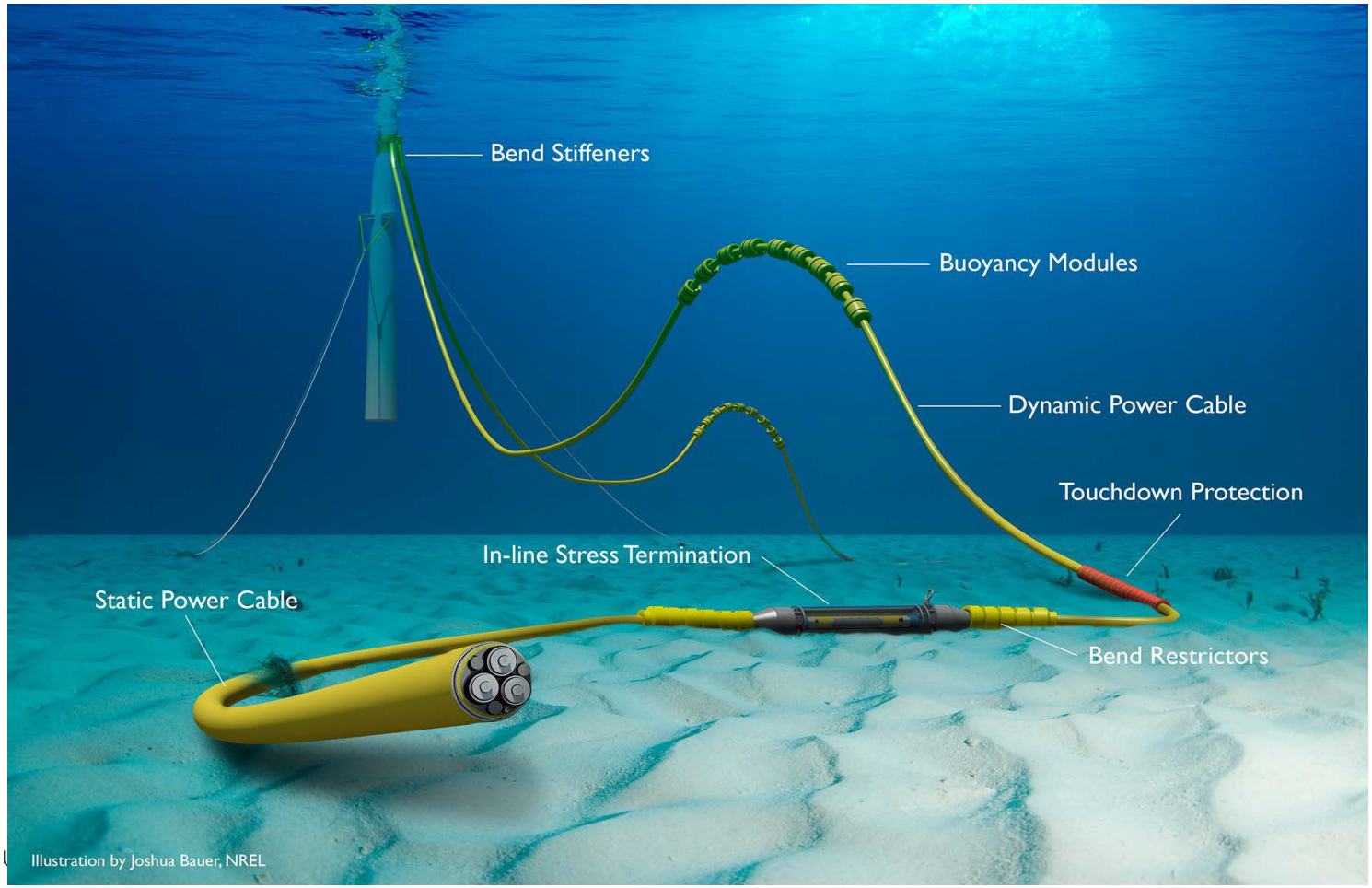


Over weight / dissymmetry

5. First results and first learning from mooring system

Test of protocols for marine growth

For floatting structures: over weight and hydrodinamics: floating part, **umbilical cable**, anchorage, ….



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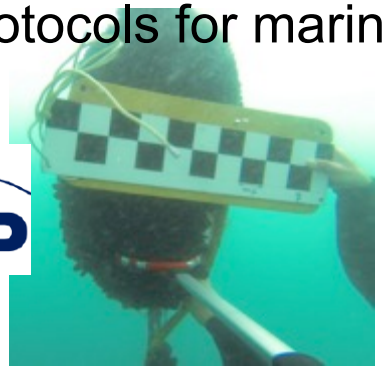
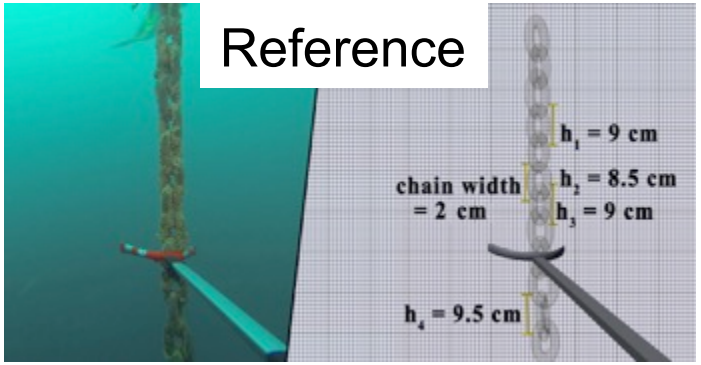
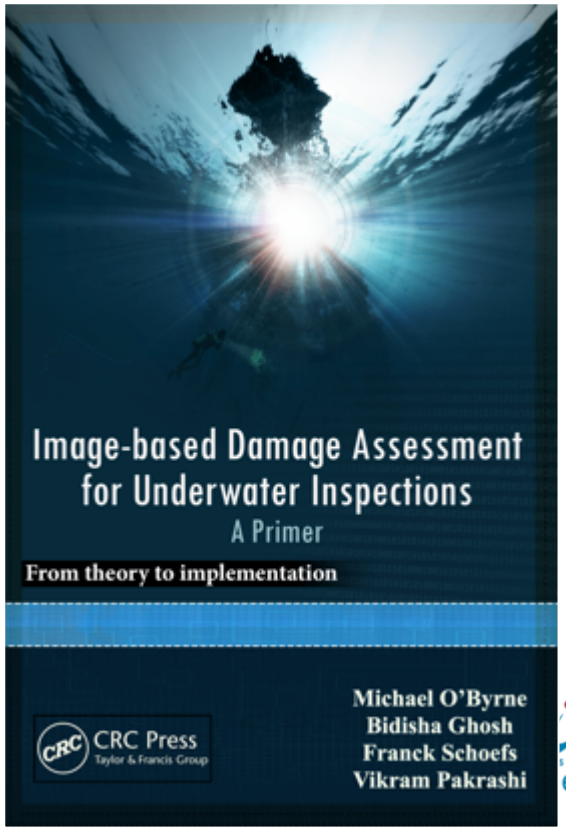
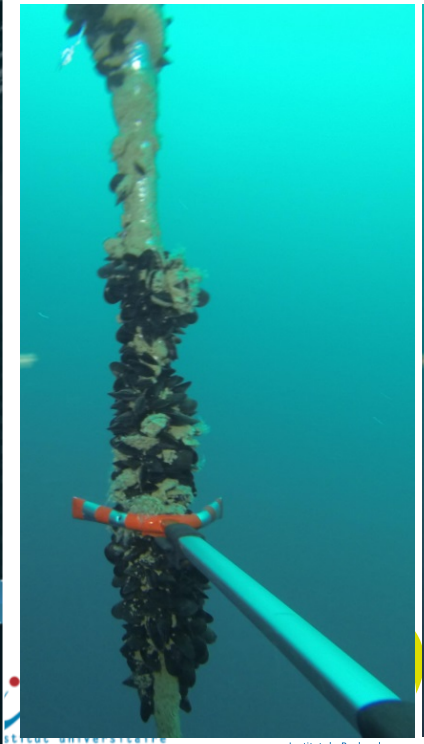
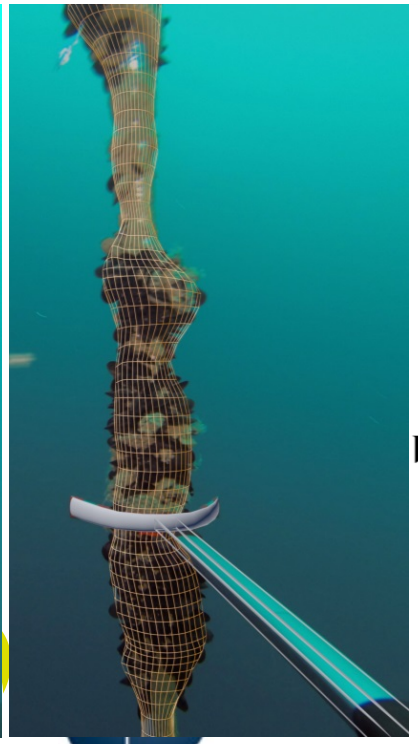




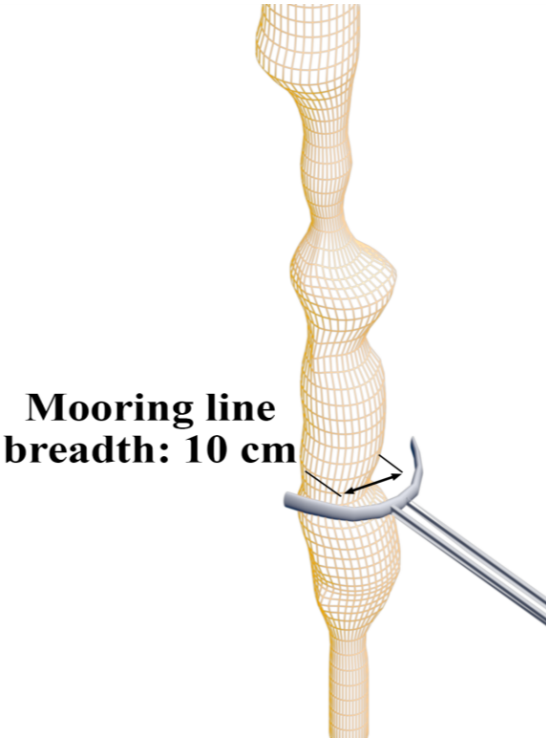




(a)



(b)



(c)

6. Conclusion

- First investigation and a lot of learning (acceptability, durability of sensors and welding of sensors)

- Mains goals and other: better understand the hydrodynamics of small floating bodies

- Analyze effect of marine growth