

Biofouling communities, parameters & impacts on mooring lines of a French floating offshore wind turbine

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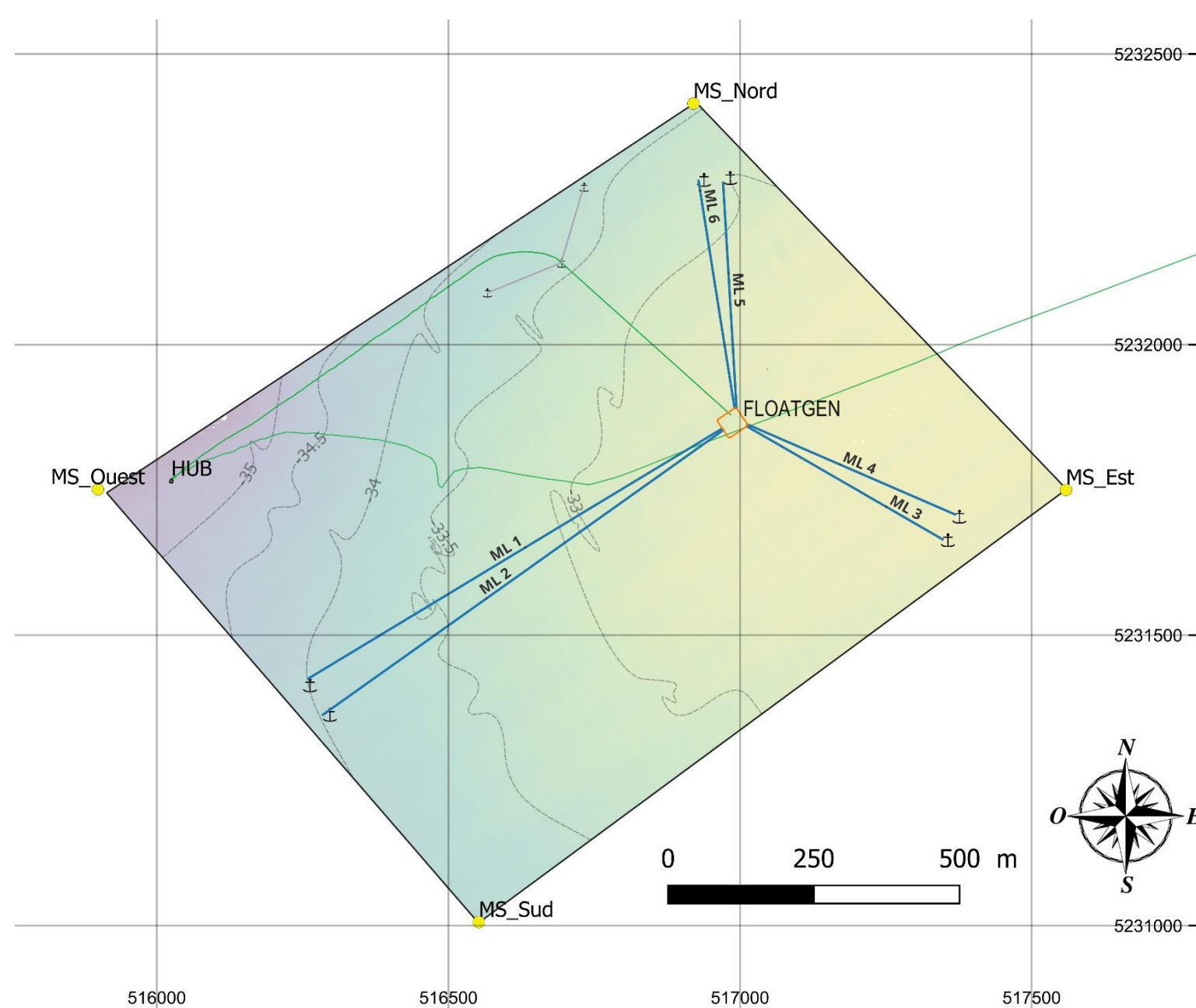
Context

- Emerging and booming technology, especially in France
- Only few feedbacks on biofouling communities on FOWT¹ and their impacts or their parameters
- Biofouling brings problems in terms of hydrodynamics constraints and loads for floaters and mooring lines²
⇒ Need for more (and *in situ*) data & feedbacks for next floating wind farms



Site

- Test site off Le Croisic managed by OPEN-C Foundation
- 12 nm offshore, average depth 33 m and velocity 0.3 nm/s
- Vestas V80 (2 MW) installed in 2018



Methods

- Underwater ROVs for 4 consecutive years (2019 – 2022)
- 2 out of 6 mooring lines, and similarly exposed to currents
- On a same frame (video analysis):
 - 3 points thickness calculation
 - semi-quantitative abundance of identifiable species
 - estimation of biofouling coverage
 - classification to mobile, hard or soft fouling

Communities

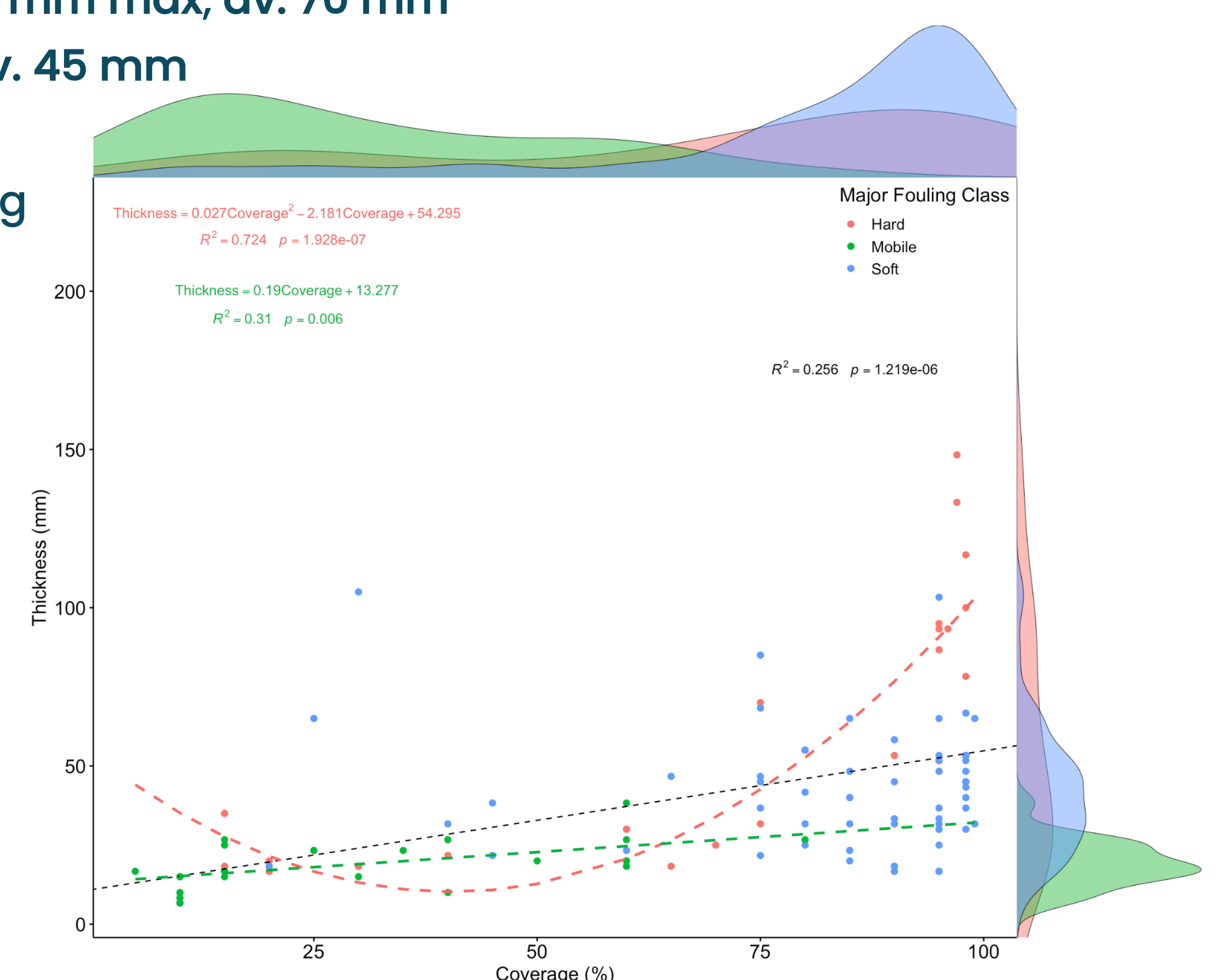
- 0 to 10 m : Hard fouling (Common mussel)
- 10–15 m : Soft and Mobile fouling (Common sea star, Urchin)
- 15 + m : only Soft fouling (Sea anemones, Soft corals)

Thickness & Coverage

- High variability of biofouling coverage above 15 meters
- Thickness reached its maximum above 10 meters (mussels patches): 95 mm max, av. 70 mm
- Stabilisation of thickness below 15 meters from the 3rd year monitored: av. 45 mm
- Update on relationship between biofouling coverage and thickness
- Significant overall linear model, high sig. quadratic model for Hard fouling

Conclusions & Recommendations

- General deeper depth preferendum for soft fouling
- Typical communities from North Sea artificial substrate³
- Soft corals can reach up to 200 mm ⇒ way above standards⁴
- No soft fouling predator recorded ⇒ no growth obstacles
- Outcompetition from anemones as actively stinging species
- Importance of fouling classification ⇒ different models
- Rigorous and continuous monitoring highly needed



¹Karlsson *et al.*, 2022 « Artificial hard-substrate colonisation in the offshore Hywind Scotland Pilot Park »

²Schoefs *et al.*, 2022 « Evaluating of hydrodynamic force coefficients in presence of biofouling on marine/offshore structures, a review and new approach »

³Kerckhof *et al.*, 2019 « About “mytilisation” and “slimeification”: a decade of succession of the fouling assemblages on wind turbines off the Belgian coast. »

⁴Standards Norway, 2007 « NORSOK: N-003 Actions and action effects »