ABIOP+

Consideration of biofouling by means of quantification protocols useful for engineering

DURATION: 45 months (2019-2022) | **BUDGET:** €2,014K

CONTEXT

Biocolonisation of submerged elements, also known as biofouling, could have a significant impact on mooring lines and dynamic cables. It also leads to a modification of the marine environment in which the structures are deployed, notably via the reef effect. However, biocolonisation is not fully understood, especially if we consider the very dynamic, shallow (< 200 m) and offshore sites, which are characteristic of the areas where offshore renewable energy recovery systems are installed. **Biofouling is therefore a crucial parameter to be quantified and qualified in order to be properly taken into account.**

OBJECTIVE

To characterise biofouling qualitatively and quantitatively by site and component through innovative, low-cost, globally applicable protocols based on robust data analysis

MAIN ACHIEVEMENTS

- Detailed characterisation over 30 months of biofouling at 5 offshore renewable energy sites in the Atlantic and Mediterranean
- Development of a new biofouling characterisation protocol including an adaptation to synthetic mooring lines, and allowing standards to evolve
- Development of an image analysis method for species group recognition based on deep learning, classification and segmentation
- Development of a protocol, experimental set-up and numerical model to quantify the thermal resistance of biofouling
- Selection of an in situ proven biofouling management solution
- Identification of material biodegradation modes

CONCLUSION

ABIOP+ has highlighted the high spatial and temporal variability of the communities of organisms making up the biofouling on offshore sites. It also led to the development of high-performance protocols and numerical tools to better take into account the impact of the biocolonisation of submerged components in the design studies of systems and farms. Finally, the project has enabled the identification of an innovative antifouling solution validated for use in static and dynamic conditions.

TECHNOLOGIES

STAGES OF THE VALUE CHAIN

Preliminary studies | Design | O&M

ASSOCIATED RESOURCES

- **Databases:** underwater image bank, DNA metabarcoding, morphology-based taxonomy, parameters influencing biocolonisation, biofouling characteristics, multi-species heat exchange coefficient
- **Numerical model** for predicting the heat exchange coefficient of biofouling
- **Standards and recommendations:** reliable range of biofouling densities for use in sensitivity studies, determination of component sensitivity, numerical modelling of thermal resistance, automatic quantification of percentage recovery from images
- **Reports:** comparison of biofouling management solutions, identification of microbial communities involved in material degradation
- **1 international publication**: Portas *et al.* (2022)

PARTNERS

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