

SEMMACAPE

Monitoring and study of marine megafauna by automatic characterisation in wind farms

ADEME



Agence de l'Environnement et de la Maîtrise de l'Energie

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DURATION: 3 years | LAUNCH: Sept 2019
Total budget: k€ 600

RELEVANT TECHNOLOGIES



Fixed offshore wind



Floating offshore wind

OBJECTIVE

Demonstrate the relevance of software solutions for processing and analyzing aerial photographs to ensure the automated census of marine megafauna.

SCIENTIFIC CONTENTS

- Carrying out an aerial observation campaign of the megafauna (standardized visual method and very high-resolution digital image acquisition system) integrating the seasonal variability of species and environmental condition.
- Development and qualification of 2 types of algorithms for the automated processing of aerial images, for the identification and classification of animals:
 - ▷ Detection by deep neural network known as end-to-end, from the global image to the enclosing boxes in a direct way;
 - ▷ Anomaly detection by unsupervised deep learning.
- Evaluation of the performance of each of the detection methods tested on the basis of indicators broken down by species or groups of species, as well as environmental conditions.

CONTEXT

The development of offshore renewable energy (ORE) is booming in France. Between 2011 and 2017, the French government has launched 5 calls for tenders and expressions of interest for a total of 7 wind farms installed, 4 wind pilot farms and 2 tidal pilot farms. Over the next 5 years, 5 additional calls for tenders are scheduled, which could double the installed capacity at sea. According to the Environmental Code, project developers must produce environmental impact studies, particularly on marine megafauna (birds, mammals, turtles, big fish...).

The analysis of the impacts of an ORE project generally requires aerial observations of marine megafauna in order to better characterise the frequentation of species in the proposed areas. This includes monitoring during the construction, operation and decommissioning phases, a total of about 30 years.

These observations are classically based on aerial overflights by specialised naturalist observers. However, in the age of big data, recent scientific and technological developments offer new prospects for radically improving the cost-effectiveness of such monitoring.

RÉSULTATS ATTENDUS

- Demonstration of the feasibility of a fully automated image analysis solution for aerial tracking of marine megafauna at the scale of an ORE project area.
- Proposal of a software solution adapted to the monitoring of the marine megafauna present in metropolitan France, and more particularly in the areas of future French and European offshore wind farms.
- Guaranteeing the technical feasibility of aerial monitoring after the installation of offshore wind turbines, thanks to a combination of technologies allowing observations at an altitude imposed by safety constraints (300 m and more) and freeing the massive recourse to naturalist experts for their interpretation.

PARTNERS



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