Simulating offshore blue mussel aquaculture through remote sensing and a metabolic model: a Belgian case study

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With the implementation of the Belgian Marine Spatial plan 2020-2026, new nearshore areas are now open for licensing commercial and industrial activities. These areas can host extractive aquaculture activities and commercial enterprises have already shown interest in large-scale shellfish aquaculture close to the harbor of Nieuwpoort. In addition, new multi-use areas have been allocated offshore where a combination of renewable energy generation and extractive aquaculture is encouraged. In the last few years, several iconic projects (Edulis, Value@Sea, Coastbusters) have actually shown that it is feasible to culture Belgian mussels in both nearshore and offshore Belgian waters.

By collecting data of these projects, a Dynamic Energy Budget model (DEB) for blue mussel was calibrated. The DEB model for blue mussel was forced with optimized remote sensing observations (CMEMS, Sentinel-3/OLCI) made available through the EUNOSAT tool. In addition, the DEB model has been coupled to a larval dispersal model for blue mussel larvae which provided the day of spat arrival in order to account for variability in growth based on arrival time.
Forcing historical, high-resolution, or real-time satellite data on the DEB model allows for the prediction of industry-relevant information such as best-suitable areas, inter-annual and individual growth variability, harvesting time, mortality events, size distribution, or real-time monitoring of growth.

Keywords: Blue mussel; Offshore aquaculture; Dynamic Energy Budget; Remote sensing; Belgian part of the North Sea