



Research School for Operations
Management and Logistics

Intelligent management of marine mining robotics systems

Ronald Ponguillo Intriago – Ghent University

This PhD research is conducted within the Horizon 2020 project MarTERA. This research project investigates how to efficiently extract ore on more than 4.5 km below sea level. The objectives are to improve the amount of mineral collected and to decrease the operational cost, while adhering to operational constraints, avoiding mining process risks, and preserving environmental conditions. The first stage consists of individually modelling and evaluating the costs for the tethered robots in the process, the vessel working on the surface, and the crawler mining in the seafloor. Parameters such as efficiency in the trajectory, energy consumption and environmental safety are important. In the next stage, the costs are integrated, and additional constraints are added to maintain the integrity of the cable that joins the two robots. The third stage implements the whole model at scale, covering the complete mining area from some kilometers. At this stage it is necessary to develop a strategy that divides the mining problem into smaller-scale mining problems. Finally, the results will be deployed in a real deep-sea mining by DEME company. Also, some other applications that imply urban mobility are being explored, to extrapolate these results.