Identification of marine litter through remote sensing, hydrodynamic models and samplings: evaluation of impacts on the marine ecosystem

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Marine litter - Remote sensing

Concept. The marine litter is a growing and cross-border problem. The composition of the marine litter is variegated but it is known that the plastic materials represent the main component. Plastic marine debris can be classified into five size classes: nanoplastics, microplastics, mesoplastics, macroplastics and megaplastics. The behaviour of each class is different because the polymers could temporarily accumulate in the ocean surface and later along the water column and, finally, reach the seabed. It is difficult to monitor the marine litter trough *in situ* surveys, so the goal of this project is to evaluate the chance to use the remote sensing. The ability to detect plastics (also microplastics) at sea surface could help to mitigate the effects on protected/vulnerable habitat and species.

Scientific approach. The project will evaluate the spectral signatures of the most common polymers found at sea (water column and beaches). Spectral signatures of virgin polymers have been already analysed previously (indoor) and one of the project purposes is to analyse the plastics sampled in the environment and outdoor. For this reason, the polymers will be collected from the beach and from the sea to check how the degradation of the polymers from these two different settings will be unlike and, consequently, the spectral response. Experiments will be conducted both indoor and outdoor. Once known the spectral signature of the polymers, we will evaluate the possibility to use the satellite images to monitor the plastic pollution. Based on satellite and sampled data, a Lagrangian model will be carried out to predict the aggregation of plastic litter on the sea.

Research objectives. The goal of this PhD project is to evaluate the potential to detect the marine litter trough the remote sensing, by also integrating hydrodynamic models and samplings. The focus is on plastic pollution a growing and a cross-border problem. Also, the impacts of the marine litter, and in particular of the microplastics, are dangerous for different species and, in general, for the whole ecosystem. The early detection of these polymers could help the mitigation of their effects.