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Earth Observation as a support to marine aquaculture (sites optimization and monitoring) – the DUE-SMART project

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Marine aquaculture is progressively becoming a key component of a sustainable food supply, and its role has been recognized by the European Blue Growth strategy, which aims at increasing the exploitation of marine resources in compliance with EU Directives designed for achieving or maintaining a Good Environmental Status, such as the Water Framework Directive and the Marine Strategy Framework Directive. To this regard, aquaculture activities need to be optimized, in order to maximize the profitability of the industry taking into account both the constraints set by the environmental legislation and by the competition for maritime space with other sectors. This harmonization could be achieved within the framework of the Maritime Spatial Planning Directive, which requires novel tools for its cost-effective implementation. The integration of Earth Observation and simulation models represent, in our point of view, a very promising approach to the development of such tools. In fact, aquafarming requires good environmental conditions (e.g. temperature, transparency, food availability for bivalves) for efficient production and shall be set out of risky areas (storms, waves, eutrophication, harmful algal blooms..).. EO provides a synoptic view of a large panel of required environmental data, which could then be used as input for a suite of simulation models and enable one, on one side, to predict the biomass yield and, on the other, to assess the environmental impact of aquaculture activities. The SMART project (Sustainable Management of Aquaculture through Remote sensing Technology), supported by ESA DUE-Innovator program, make use of EO for three aspects of aquaculture i) the monitoring of natural marine conditions for operational aquaculture and the optimization of locations for farming, ii) the mapping of potential in terms of carrying capacity for shellfish and iii) the impact induced by the extensive farming (e.g. shrimps) in terms of release of organic material. We will present the status of the project as well as the results concerning the first two aspects, namely the (future) use of Sentinel-3 (today of GHRSST and GlobColour) derived information (SST, Chl-a, SPM) as inputs for growth model of shellfish (mussels). The results of the validation with in situ-truth collected along the western Adriatic coastline were very encouraging and, on this basis, the SMART approach could be transferred to other areas, in order to map optimal sites for farming. Lastly, an innovative coastal POC (Particulate Organic Carbon) derived from Sentinel-3 OLCI-like measurements built with MERIS data has been developed, and validated and it will be used for further improving the modeling of carrying capacity of shellfish culture. In addition, Sentinel-2 products are also used for land mapping and shallow water classification to help the optimal farm zoning. The project will expand results and analysis on Algerian sites (mussels) and Vietnamese sites (shrimps). Results will be presented at the Symposium.